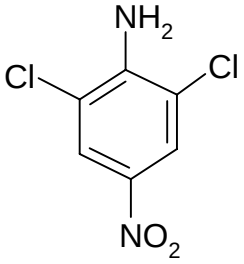
Environmental Fate and Ecological Risk Assessment for the Re-registration of DCNA



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EXECUTIVE SUMMARY

Nature of Chemical Stressor

DCNA (2,6-dichloro-4-nitroaniline; dicloran; PC Code 031301; CASRN 99-30-9), an organochlorine pesticide, is a contact fungicide that is the active ingredient in the end-use products (in multiple formulations) Allisan® and Botran®. The pesticide is registered for control of a wide range of pathogenic fungi (including *Botrytis cinerea*, or grey mold; and *Sclerotinia sclerotiorum*, or white mold or pink rot) that affect numerous agricultural and ornamental crops. DCNA is most effectively used as a barrier treatment, for which it is applied to plant stems and surface soil under the plants; it is also used after plant infection has begun. The pesticide prevents or inhibits normal spore germination and can suppress the growth of fungus mycelium once the fungus is present. The mode of action is through inhibition of protein synthesis, without inhibition of cellular respiration, which is similar or identical to the mode of action of the antibiotics chloramphenicol and cycloheximide.

Major pre-harvest uses of DCNA are on celery, lettuce, grapes, potatoes, snapbeans, and onions; the major post-harvest use is on sweet potatoes. The registrant has also applied for registration of four new uses, including pre-harvest use on peanuts and carrots, post-harvest use on tomatoes, and use on radicchio. DCNA is used mainly in California (81% of total annual domestic use in 2002) and the Pacific Northwest (18%), with a relatively high level of usage in Monterey County, CA (23% of the total domestic use as of 2002). The proposed uses on carrots and peanuts would presumably expand the extent of the DCNA use area.

DCNA is applied in the environment by ground, hand-held and aerial spray; chemigation; sprinkler irrigation; and soil incorporation equipment. DCNA is also used in dip tanks. DCNA is present as the active ingredient in end-use products formulated as dusts, wettable powders, water-soluble bags, or flowables.

Potential Risks to Non-target Organisms

This document comprises the Level 1 screening assessment of the environmental fate and ecological effects for the pesticide DCNA. It represents a national assessment, although the majority (99%) of DCNA usage is in California and the Pacific Northwest. The major risk concerns are summarized in the following table. Potential risks have been identified based on the calculated RQ's and the various Levels of Concern (LOC) established by EPA. There were no incidents or field study data to confirm the estimated risks.

Table A. Summary of LOC Exceedences for Various Non-Target Organisms[1]

Risk Presumptions	Fresh-water Fish and Amphi-beans	Freshwater Inverte-brates	Estuarine/ Marine Fish	Estuarine/ Marine Inverte-brates	Birds and Reptiles	Mammals	Aquatic Vascular & Nonvascular Plants	Terrestrial and Semi-aquatic Plants
Acute Risk	No	No	NS[2]	No	**Yes**	No[3]	No	NS
Acute Endangered Species	**Yes**	No	NS	No	**Yes**	**Yes**	No	NS
Chronic Risk	No[4]	No	NS	NS	**Yes**	**Yes**	NS	NS

[1]A finding of "Yes" indicates that the LOC is exceeded for at least one of the selected uses modeled for DCNA. [2]NS = data not submitted (therefore, **risks are assumed**) [3]Submitted data were only available for a 48.8% formulation of DCNA. Based on literature data for TGAI DCNA, the acute oral LD_{50} would be much lower and much higher RQ's would be expected. [4] Uncertain due to non-guideline study; guideline study still required.

Potential risks associated with DCNA usage are indicated for freshwater fish and amphibians (acute endangered species); birds and reptiles (acute, acute endangered species, chronic); and mammals (acute endangered species, chronic). There were no LOC exceedences indicating potential acute or acute endangered species risks to either freshwater or estuarine/marine invertebrates, nor acute risks to mammals. Chronic risk LOCs were not exceeded for freshwater fish and invertebrates. However, there is uncertainty associated with the freshwater fish chronic toxicity study which did not follow guidelines; a guideline freshwater fish chronic toxicity study is required. The potential for chronic risks to estuarine/marine fish and invertebrates is unknown because useable ecotoxicity data were not submitted. Similarly, ecotoxicity data were not submitted for aquatic vascular or for terrestrial or semi-aquatic plants, so potential risks to these taxa could not be assessed. In the absence of suitable toxicity data, risks are assumed. Hence for DCNA, chronic risks are assumed for estuarine/marine fish and invertebrates and risks are also assumed from aquatic vascular and terrestrial/semi-aquatic plants.

Conclusions – Exposure Characterization

DCNA is a low volatility compound that is, in general, expected to be persistent and to have low mobility in most soils. DCNA is expected to undergo faster degradation under anaerobic conditions than under aerobic ones, with much of the apparent loss of the compound attributed to the formation of non-extractable residues. The main transformation product of DCNA is nonextractable residues, the majority of which are associated with the humin and humic acid fractions of the soil organic matter, indicating that they were not simply adsorbed on the mineral portion of the soil. Bound residues were greater in flooded soils, and were observed to increase upon flooding (of aerobic soil) in the anaerobic soil metabolism study. Carbon dioxide was a major degradate only in the soil photodegradation study, and there were no other major degradates. The minor degradates of DCNA are: 2,6-dichloro-p-phenylenediamine (DCPD); 4-amino-3,5-dichloroacetanilide (DCAA); and 2,6-dichloro-4-hydroxyaniline (DCHA); and 3,5-dichloro-4-hydroxyacetanilide (3,5HA). Neither environmental fate nor ecotoxicity data were submitted for these minor degradates, with the exception of mobility data from an unacceptable column leaching study. None of the degradates were identified as degradates of toxic concern, and they are not included in the risk assessment. For the parent compound, the major data gap was a lack of information on the aerobic aquatic metabolism of the pesticide. This data gap contributed to uncertainty in the aquatic exposure modeling since the aerobic soil metabolism degradation rate had to be used as a default rate.

Because DCNA is persistent in the environment, it has the potential to contaminate surface water bodies via runoff. Although it is less significant than the potential for surface water contamination, there is also a potential that DCNA will reach groundwater. Because application methods include ground spray and aerial spray, it may reach surface water bodies through spray drift, although modeling indicates that the major mechanism by which it reaches surface water bodies is through runoff. To estimate surface water concentrations, Tier II modeling with PRZM/EXAMS was conducted using six different use scenarios. The major crop uses modeled to estimate aquatic exposure concentrations were five labeled uses including lettuce, grapes, potatoes, onions and snapbeans, and a proposed use on peanuts. Although celery is a major use, and radicchio a proposed use, they were not modeled because a standard scenario was not available. However, because head lettuce is in the same crop group as celery and radicchio, and is grown in the same geographical regions, modeling results for head lettuce in California are sufficient as surrogate modeling results for celery and radicchio. Of the six uses modeled, five were modeled in California or the Pacific Northwest; the sixth was modeled in North Carolina. Usage data indicate that, as of 2002, approximately 81% of total annual domestic use was in California (with 23% of the total domestic use occurring in Monterey County, CA) and 18% occurred in the Pacific Northwest; all other areas of the country accounted for the final 1%.

Conclusions – Effects Characterization

Guideline toxicity studies indicate that chronic exposure of DCNA to both birds and mammals resulted in decreased reproductive capacity. Birds exhibited decreased egg production, embryo viability and survival, hatchability, chick survival, and chick body weights when exposed to DCNA at concentrations higher than 35 mg/kg-bw. In chronic toxicity testing with mammals, DCNA rates higher than 250 mg/kg-diet produced decreased pup weights. Additional toxicity tests indicate that DCNA is slightly toxic to birds and mammals under acute exposure. Acute toxicity tests for rainbow trout and bluegill sunfish indicate that DCNA is highly toxic to freshwater fish, and that it was moderately toxic to freshwater invertebrates in acute toxicity tests. An acute toxicity test on green algae indicated that DCNA caused a significant decrease in growth.

Uncertainties and Data Gaps

The risk assessment for DCNA is incomplete, because the body of submitted toxicity data is incomplete. No data were submitted to assess the toxicity of DCNA to either terrestrial or aquatic vascular plants, chronic toxicity to estuarine/marine invertebrates, or the acute and chronic toxicity to estuarine/marine fish. Moreover, although a study was submitted on the chronic toxicity of DCNA to freshwater fish, it was not a guideline study and therefore the data are incomplete.

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PROBLEM FORMULATION

Stressor Source and Distribution

Source and Intensity

DCNA (2,6-dichloro-4-nitroaniline; dicloran), an organochlorine pesticide, is a contact fungicide that is undergoing re-registration (as the active ingredient in a manufacturing use product and multiple end-use products) by Gowan Company. DCNA is the active ingredient in the end-use products (in multiple formulations) Allisan® and Botran®. DCNA is registered for use on numerous agricultural and ornamental crops. Based on a Screening Level Usage Analysis (SLUA; dated 06/05/2003) completed by the Biologic and Economic Analysis Division (BEAD) of OPP/EPA for DCNA for the years 1997–2001, the crops with the largest amount of DCNA (active ingredient) applied domestically were celery (70,000 lb), lettuce (40,000 lb), and grapes & potatoes (30,000 lb each). The registrant reported that the use on potatoes is increasing. Gowan Co. indicated that usage occurs mainly in California (81% of total annual domestic use in 2002) and the Pacific Northwest (18%). Usage in Monterey County, CA, alone accounts for 23% of the total domestic use (as of 2002). DCNA is applied by ground, hand-held and aerial spray methods; chemigation; sprinkler irrigation; and soil incorporation equipment. DCNA is also used in dip tanks.

Physical/Chemical/Fate and Transport Properties

Based on the submitted environmental fate data, its physical-chemical properties, the proposed use patterns, and information found in the published literature, DCNA is a low volatility compound that is, in general, expected to be persistent and to have low mobility in most soils, but may have slightly higher mobility in coarser (sandy) soils, particularly those that are low in organic matter. The compound is expected to undergo faster degradation under anaerobic conditions than under aerobic ones, with much of the apparent loss of the compound attributed to the formation of non-extractable residues. The physical/chemical properties of DCNA (dicloran; PC 031301; CASRN 99-30-9) are presented in **Table 1**.

Table 1. General fate and physical-chemical properties of DCNA.

PARAMETER	VALUE	SOURCE OF INFO./COMMENTS
Chemical Name	2,6-dichloro-4-nitroaniline (IUPAC) 2,6-dichloro-4-nitrobenzenamine (CAS)	–
Molecular Weight	207.06 g/mole	--
Solubility (20 °C)	7 mg/L (ppm)	Registrant
Dissociation Constant (pKa)	3.31	Registrant
Vapor Pressure (25 °C) **(20 °C)**	1.96 x 10^{-6} mmHg 1.2 x 10^{-6} mmHg	Registrant
Hydrolysis Half-life (pH 5, 7, 9; 25 °C)	stable	Accession No. 253963
Aqueous Photolysis Half-life (pH 7)	47.2 hours	MRID's 43891901
Soil Photolysis Half-life	263.2 hours	MRID 43893601
Aerobic Soil Metabolism Half-life	18 months (approx. 540 days) in sandy loam soil, 6 months (approx. 180 days) in sand soil	MRID 40894801
Anaerobic Soil Metabolism Half-life	38 days in sandy loam soil, 24 days in sand soil	MRID 40894801
Anaerobic Aquatic Metabolism Half-life	0.45 days[1]	MRID 43866501
Organic Carbon Partition Coefficient (K_{oc})	760, 735, 660, 1062	MRID 40538202
Soil Partition Coefficient (K_d)	3.7, 9.7, 13.6, 15.4 mL/g	MRID 40538202
Log K_{ow}	2.76	MRID 41176202
Henry's Law Constant	7.78 x 10^{-8} atm*m^3/mol	
Bioconcentration Factors (BCF) in Fish	136X whole fish tissue 49X edible tissue 264X nonedible tissue	MRID 43782001

[1]The half-life was determined in a high organic matter (13.4%) sediment which may not be representative of the soils on which DCNA will be used. In sandy loam (3.1% o.m.) and sand (1.6% o.m.) soils treated and flooded simultaneously, and then anaerobically incubated as part of another study (MRID 40894801), respective anaerobic aquatic metabolism half-lives of 10.1 and 5.6 days were determined. In an aged soil column leaching study (MRID 43809001) where the soil was treated and aged anaerobically prior to placement on the columns, the half-lives of DCNA in sandy loam (2.8% o.m.), sand (0.59% o.m.), silt loam (0.54% o.m.) and clay (1.41% o.m.) soils, respectively, were 0.8, 8.5, 9.2 and 5.9 days.

Pesticide Type, Class and Mode of Action

DCNA (dicloran; PC Code 031301; CASRN 99-30-9) is a contact fungicide belonging to the organochlorine class of compounds. It is registered for control of a wide range of pathogenic fungi (including *Botrytis cinerea*, or grey mold; and *Sclerotinia sclerotiorum*, or white mold) that affect numerous agricultural and ornamental crops. DCNA is most effectively used as a barrier treatment, for which it is applied to plant stems and surface soil under the plants. It is also used after plant infection has begun. The active ingredient DCNA is present in numerous products marketed as Botran®, formulated as a dust, wettable powder, water-soluble bag, or flowable; and as Diclor Fungicide. It is also marketed as Allisan® for post-harvest use. Based on information provided by the registrant, there are currently 15 registered products containing dicloran, of which only about half are actively used.

Based on information provided by the registrant, DCNA prevents or inhibits normal spore germination and can suppress the growth of fungus mycelium once the fungus is present. The mode of

action is through inhibition of protein synthesis, without inhibition of cellular respiration. The inhibition effect on fungi can be reversed by the addition of amino acids. The mode of action is, therefore, similar or identical to that of chloramphenicol and cycloheximide (antibiotics).

Overview of Pesticide Usage

DCNA is a contact fungicide that provides preventative and curative protection in the field against fungal diseases in numerous agricultural and ornamental crops. It also has post-harvest uses against fungal infections in carrots, sweet potatoes, stone fruits and cut gladiolus. Greenhouse (and nursery) uses include several food crops as well as ornamentals (flowers and conifers). The major uses for which DCNA is currently registered are beans (snap), celery, grapes, lettuce, onions, potatoes and sweet potatoes. The proposed new uses are peanuts (pre-harvest), tomatoes (post-harvest), carrots (pre-harvest) and radicchio.

Ecosystems Potentially at Risk

Ecosystems potentially at risk are identified as those in close proximity to DCNA use sites and are expressed in terms of the selected assessment endpoints. The typical assessment endpoints for screening-level pesticide ecological risks are discussed in more detail in the next section.

Aquatic animal species of potential concern include freshwater fish and invertebrates, estuarine/marine fish and invertebrates, and amphibians. Ecosystems for these species could include freshwater (stream and/or lake) and saltwater (estuary and/or near-shore) habitats. Terrestrial animal species of potential concern include birds, mammals, and beneficial insects living in or visiting treated fields and their vicinity.

Assessment Endpoints

Assessment endpoints are explicit expressions of the actual environmental values that are to be protected, and, for the purposes of this ecological risk assessment, are operationally defined by an ecological entity and its attributes that are considered to be at risk. The assessment of risk from exposure of terrestrial and aquatic animals to DCNA focuses on effects on **survival** and **reproduction**. The effects of DCNA on **growth** are also considered mostly in terms of potential impacts on survival and reproduction, but also may be considered in their own right when considering the quality of affected animals as a food source for other animals. The assessment endpoints for aquatic and terrestrial animals, and the measurement endpoints used to consider them, are listed in **Tables 2 & 3**.

For both aquatic and terrestrial animal species, direct acute and direct chronic exposures are considered. Although all endpoints are evaluated at the individual level, they provide insight about risks at higher levels of biological organization (e.g. populations and communities). For example, pesticide effects on individual survival can be used to evaluate potential effects at higher levels of biological organization.

For terrestrial and aquatic plants, only acute effects on **survival** and **growth** are evaluated. Reproductive effects are not directly evaluated, but screening assessments for pesticides consider the potential impacts survival and growth have on individual competitive ability and reproductive success. Effects on survival and growth are also considered when evaluating the suitability or availability of affected plants as a food source for animals.

The assessment endpoints of survival and reproduction of reptiles and amphibians are also evaluated in this assessment, although toxicity data for these taxa are not required by Agency guidelines. These assessment endpoints are evaluated through consideration of risk to surrogate taxa. For the purposes of risk assessments in OPP, if risks to birds are below the level of concern, the risks to reptiles are also assumed to be low. Freshwater fish are considered to be a suitable surrogate amphibians in the aquatic phase, and birds for amphibians in their terrestrial phase.

Table 2. Terrestrial animal assessment and measurement endpoints.

Assessment Endpoint	Measure of Effect	Measure of Exposure
Avian Survival	Acute Avian Oral LD_{50}, Dietary LC_{50} from most sensitive bird tested, adjusted for size for 20 g bird	concentration on food items (foliar) or dose on planted seeds consumed by 20 g bird
Avian Growth/Reproduction/ Survival	NOEC/LOEC from avian chronic study from most sensitive bird tested	residues on food items (foliar) or planted seeds
Mammalian Survival	acute oral LD_{50}, dietary LC_{50} for most sensitive mammal tested, adjusted for 15 g mammal	concentration on food items (foliar) or dose on planted seeds consumed by 15 g mammal
Mammalian Growth/Reproduction/Survival	NOEC/LOEC from chronic mammalian study from most sensitive mammal tested	maximum concentration on food items
Non-target Beneficial Insect Survival	Honey-bee acute contact LD_{50}	none

Table 3. Aquatic animal assessment endpoints

Assessment Endpoint	Measure of Effect	Measure of Exposure
Freshwater Fish Survival	96-hr LC_{50} for most sensitive species tested	1-in-10 year peak concentration from exposure model
Freshwater Fish Growth/ Reproduction/ Survival	Fish Early Life Stage NOEC/LOEC for Growth	1-in-10 year 21-day mean concentration from exposure model
Freshwater Invertebrate Survival	48-hr EC_{50} based on mortality (immobility) for most sensitive species tested	1-in-10 year peak concentration from exposure model
Freshwater Invertebrate Growth/Reproduction /Survival	Invertebrate Life Cycle NOEC for growth or reproductive effect	1-in-10 year 21-day mean concentration from exposure model
Marine/Estuarine Fish Survival	96-hr LC_{50} for most sensitive species tested	1-in-10 year peak concentration from exposure model
Marine/Estuarine Fish Growth/Reproduction /Survival	Estuarine/Marine Fish NOEC for growth	1-in-10 year 60-day mean concentration from exposure model
Marine/Estuarine Invertebrate Survival	48-hr EC_{50} based on mortality (immobility) for most sensitive species tested	1-in-10 year peak concentration from exposure model

Marine/Estuarine Invertebrate Growth/ Reproduction/Survival	Estuarine/Marine Invertebrate NOEC for reproduction for most sensitive species	1-in-10 year 21-day mean concentration from exposure model

Conceptual Model

Risk Hypotheses

The Office of Pesticide Programs uses a screening risk hypothesis for its initial risk assessments. This hypothesis assumes that the use of DCNA in accordance with the label produces adverse effects on survival, reproduction and/or growth for the following non-target taxonomical groups: birds, reptiles, amphibians, mammals, terrestrial invertebrates, freshwater fish, freshwater invertebrates, marine/estuarine fish, and marine/estuarine invertebrates. The hypothesis also assumes that the use of DCNA in accordance with the label produces adverse effects on growth for non-target aquatic vascular, aquatic nonvascular, terrestrial and semi-aquatic plants.

The conceptual model used to depict the potential ecological risk associated with DCNA is fairly generic and assumes that as a fungicide DCNA is capable of affecting terrestrial and aquatic organisms provided that environmental concentrations are sufficiently elevated as a result of proposed label uses. A diagram of the conceptual model is presented in **Figure 1**. Almost all of the use scenarios for DCNA involve foliar application of the pesticide, although incorporation is also used.

As there may be multiple applications of the pesticide to foliage in many of the labeled use patterns, degradation on the foliage between applications is considered in the terrestrial assessments. For aquatic assessments the degradation on foliage was considered not to occur, but wash-off of the foliage was considered. Spray drift was directly considered in the aquatic assessments as a route of loading to a pond, with higher levels of spray drift for aerial applications *vs*. ground spray applications.

For terrestrial assessments, spray drift was not directly considered. However, since the evaluation of risk was done for on-field foliage, non-target foliage receiving spray drift should have reduced pesticide loading and the assessment based on the on-field residues would be protective of both. A variety of food types (*i.e.* short grass, long grass, broadleaf plants *etc.)* were assessed regardless of the type represented by the target crop, as a variety of food types will exist within and alongside the treated field.

For aquatic assessments, DCNA degradation prior to runoff is explicitly considered. Runoff includes transport of DCNA in a dissolved state as well as DCNA attached to eroded sediment. Once DCNA reaches the pond, the pesticide is partitioned between the water column, suspended sediment, and bed sediment based on its physical/chemical properties. Degradation by photolysis, abiotic hydrolysis, and microbial metabolism is taken into account. The route of exposure is through uptake of DCNA dissolved in the water column through the gills and integument.

Bioaccumulation and biomagnification may be a concern for DCNA given its moderate to high

potential to bioaccumulate in fish. Thus, exposure through consumption of contaminated fish or other animals may also occur. Although degradation is rapid in anaerobic aquatic environments, much of the loss of parent compound is attributed to the formation of non-extractable residues in the sediment. Dietary exposure for benthic organisms is not considered because data were not available.

For birds and mammals, only the dietary route of exposure is being considered. While there is a potential for dermal exposure from the foliar use, the data needed to assess this route (dermal absorption factors, dislodgeable foliar residue data) are not available for DCNA. Furthermore, this route is not usually assessed at the screening level. Although the inhalation route of exposure was also not assessed, DCNA has low volatility, suggesting that this exposure route would be insignificant relative to other routes of exposure.

Diagram

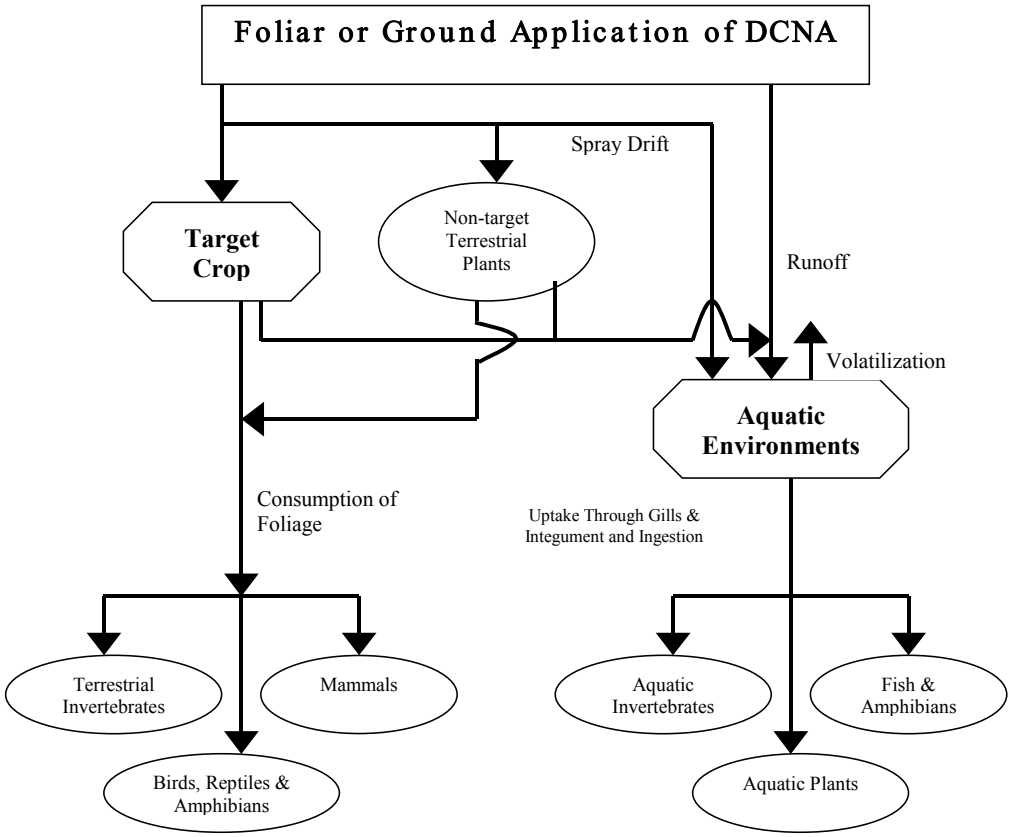

Figure 1. Conceptual Model for Foliar or Ground Applications of DCNA.

Analysis Plan

For DCNA use, as with any pesticide use, there is concern regarding the potential effects on non-target animals and plants. This document characterizes the environmental fate of DCNA to assess whether label uses and proposed new uses of DCNA provide a means of exposure to non-target organisms. Additionally, the toxicity of DCNA is characterized, and then both potential exposure and effects are integrated to provide an estimate of whether there is a likelihood of adverse effects (risk) to non-target endangered/threatened and non-endangered animals and plants.

This screening assessment uses a risk quotient (ratio of exposure concentration to effects concentration) approach to evaluate the potential for adverse effects on non-target terrestrial and aquatic animals. Calculated risk quotients are compared to predetermined levels-of-concern (LOCs) to provide a preliminary indication of the potential for risk. Although risk, in the context intended here, is often defined as the likelihood and magnitude of adverse ecological effects, the risk quotient-based approach does not provide a quantitative estimate of likelihood and/or magnitude of an adverse effect. Such estimates may be possible through a more refined, probabilistic assessment.

Risk presumptions, along with the corresponding RQs, equations, and LOC's are summarized in **Tables 4- 7**. The exposure estimates in this screening assessment are derived using maximum label rates and minimum application intervals for each use.

Table 4. Risk presumptions for terrestrial animals (birds and wild mammals).

Risk Presumption	RQ	LOC
Acute	EEC[1]/LC_{50} or LD_{50}/ft^2 or LD_{50}/day3	0.5
Acute Restricted Use	EEC[1]/LC_{50} or LD_{50}/ft^2 or LD_{50}/day (or LD50 < 50 mg/kg)	0.2
Acute Endangered Species	EEC[1]/LC_{50} or LD_{50}/ft^2 or LD_{50}/day	0.1
Chronic Risk	EEC/NOEC	1

[1] abbreviation for Estimated Environmental Concentration (ppm) on avian/mammalian food items

Table 5. Risk presumptions for aquatic animals.

Risk Presumption	RQ	LOC
Acute	EEC[1]/LC_{50} or EC_{50}	0.5
Acute Restricted Use	EEC/LC_{50} or EC_{50}	0.1
Acute Endangered Species	EEC/LC_{50} or EC_{50}	0.05
Chronic Risk	EEC/NOEC	1

[1]EEC = (ppm or ppb) in water

Table 6. Risk presumptions for terrestrial and semi-aquatic plants.

Risk Presumption	RQ	LOC
Acute Risk	EEC[1]/EC_{25}	1
Acute Endangered Species	EEC/EC_{05} or NOEC	1

[1] EEC = lbs ai/A

Table 7. Risk presumptions for aquatic plants.

Risk Presumption	RQ	LOC
Acute High Risk	EEC[1]/EC_{50}	1
Acute Endangered Species	EEC/EC_{05} or NOEC/EC_{05} or NOEC	1

[1] EEC = (ppb/ppm) in water

This screening-level assessment is not intended to provide a site-specific understanding of particular DCNA uses and their effects on specific species. However, some refinements, *e.g.* Tier II aquatic exposure assessments, have been incorporated into this assessment. Additionally, where uncertainties exist, they have been identified along with possible avenues to address the uncertainties in terms of additional data. As part of its analysis plan, OPP worked with Office of Research and Development (ORD) National Health and Environmental Research Laboratory Mid-Continent Ecology Division to reduce uncertainty regarding the potential effects of DCNA by using toxicity data captured in the on-line ECOTOX database.

Preliminary Identification of Data Gaps and Methods

For the aquatic exposure characterization, the main data gap is the lack of information on the aerobic aquatic metabolism of DCNA, as the submitted study was classified as not acceptable. In the absence of these data a default estimate of twice the aerobic soil metabolism half-life was used in modeling to determine the aquatic exposure concentrations. While aerobic aquatic metabolism is not expected to occur as rapidly as anaerobic aquatic metabolism (half-lives ranging from approximately 0.5 to 10 days) for an organochlorine such as DCNA, it is unlikely that the compound will be as persistent in the environment under aquatic conditions as suggested by the default 1828-day aerobic half-life.

There are ecotoxicity data gaps for DCNA which limit the Agency's ability to fully characterize potential risks from the use of DCNA. Submitted studies indicate that DCNA is highly toxic to freshwater fish, but the registrant did not provide acute and chronic studies for estuarine/marine fish. Submitted studies indicate that DCNA is moderately toxic to freshwater invertebrates, but the registrant did not provide acute or chronic toxicity data for estuarine/marine invertebrates. Although a shell-deposition study was provided using the Eastern oyster and another study was identified in the outside literature, additional acute toxicity tests for estuarine/marine invertebrates should be submitted.

A paper from the outside literature identified damage to blue spruce seedlings caused by exposure to DCNA (Fischer and Landis, 1990). However, no data were submitted to assess the toxicity of DCNA to either terrestrial or vascular aquatic plants.

The approach to conducting the aquatic exposure characterization was based on the use of mathematical models to estimate environmental concentrations of DCNA in water resources. OPP used the combined model PRZM (version 3.12 beta)/EXAMS (version 2.98.04) to conduct surface water exposure assessments, and SCI-GROW (version 2.3) for groundwater. Input values were based only on the parent compound, as the laboratory studies indicated that there were no major degradates for DCNA. Modeling input values for DCNA were derived from guideline study data and were determined according to the current EFED standard guidance document (*Input Parameters in Modeling the Environmental Fate and Transport of Pesticides, Version II*, February 28, 2002). As the majority of label uses were foliar and many allowed aerial applications, OPP conducted the modeling to account for this. Use scenarios (crop, application rate & type) for modeling were selected based on the identities of the major crops treated with DCNA and the main geographical regions of use (based on information provided by the registrant and by BEAD), and on current label information. Each label use modeled is referenced by the appropriate EPA Registration Number.

Use rates chosen for modeling were the maximum single use rates except for one crop (potatoes) for which the maximum annual rate was used. When allowed by label, aerial uses were selected over ground spray or other uses to maximize potential spray drift to surface water bodies (resulting in higher EEC's). The five label uses selected for the assessment are lettuce, grapes, potatoes, onions, snapbeans; and the selected proposed use is peanuts. While grapes, celery and lettuce together account for the majority of the national agricultural use of DCNA, use on celery was not selected for modeling because a standard modeling scenario was not available. However, because head lettuce (which was modeled) is in the same crop group as celery, and is grown in the same geographical regions, modeling results for head lettuce in California are sufficient as surrogate modeling results for celery. As of 2002, approximately 81% of total annual domestic use was in California (with 23% of the total domestic use occurring in Monterey County, CA), and 18% of the total domestic use occurred in the Pacific Northwest; all other areas of the country accounted for the final 1%. Although screening level assessments are not regionally specific, the approach to modeling captures the higher geographic uses in the state of California and the Pacific Northwest, as five of the six standard scenarios used for modeling represent those areas.

Measures to Evaluate Risk Hypotheses and Conceptual Model

Measures of Exposure

There are two measures of exposure of non-target organisms to DCNA. Exposure to terrestrial animals through consumption of treated feed items is calculated from the maximum proposed label rate using a nomogram derived from the work of Kenaga (1972) and Fletcher et al. (1994) using the spreadsheet model T-rex (Version 1.1).

Measures of exposure to aquatic animals and plants are concentrations in surface water simulated by the PRZM and EXAMS computer models (PRZM version 3.12 beta, EXAMS version 2.98.04). PRZM/EXAMS use registrant-submitted environmental fate data and proposed label rates for DCNA to simulate runoff and spray drift to a standard pond that is intended to represent a site which is more vulnerable than most sites in the United States, and makes a deterministic estimate of the concentration that would be equaled or exceeded in the pond once every ten years.

Maximum application rates on vulnerable soils for representative crops are selected for modeling environmental concentrations for this screening-level deterministic (risk quotient-based) assessment. Measures of exposure are derived using screening level models. Because a preliminary assessment of DCNA suggested that Tier II aquatic exposure estimates may be necessary, the assessment will rely on PRZM/EXAMS modeling using input parameters derived from registrant-submitted environmental fate laboratory studies. This assessment, however, is not intended to represent a site or time-specific analysis. Screening level assessments are intended to represent a national-level exposure based on vulnerable soils as opposed to being a regionally specific exposure assessment.

Measures of Effect

As mentioned previously, measures of effects are obtained from a suite of registrant-submitted guideline studies conducted with a limited number of surrogate species. The test species are not intended to be representative of the most sensitive species, but rather were selected based on their ability to thrive under laboratory conditions. Consistent with EPA test guidelines, Gowan Company has provided ecological effect data. However, the database of required guideline studies is incomplete.

Acute measures of effect are the concentrations that produce 50% mortality or growth reduction in the test organisms (LC_{50}s and EC_{50}s, respectively). The measure of effect for terrestrial plants is the EC_{25}. Chronic effects endpoints are the lowest test concentration where there is no observed adverse effect (NOAECs) on survival, growth or reproduction.

Measures of Ecosystem and Receptor Characteristics

Although assessment endpoints are evaluated at the individual level, they provide insight into potential risks at higher levels of biological organization (e.g. populations and communities). Thus, ecological effects that are measured at the individual level are utilized to provide insight on effects that may occur at higher levels of biological organization. Similarly, surrogate species used in laboratory tests are assumed to be representative of each taxon considered in the risk assessment. While species tested were chosen primarily for their ability to thrive in the laboratory, the variety of surrogates is meant to represent non-target organisms from a variety of ecosystems (e.g. cold-water vs. warm-water freshwater fish, freshwater vs. estuarine/marine invertebrates, upland vs. water birds).

Multiple ecosystem characteristics influence the behavior and location of the entities selected as the assessment endpoints, the distribution of a stressor, and life-history characteristics of the assessment endpoint or its surrogate. These ecosystem characteristics may affect exposure as well as response to the stressor. The terrestrial exposure model TREX is not sensitive to differences in the characteristics of fields planted with different agricultural crops, calculating estimated environmental concentrations (EECs) on the basis of the amount of pesticide applied. The agronomic differences between the various vegetables to which DCNA is applied may not be sufficiently large to effect the exposure to potential receptors. However, application to containerized plants in nurseries can occur indoors, or to plants on manmade surfaces. Wild animals might be less likely to approach such areas, or to find food there.

The aquatic models (e.g., PRZM/EXAMS) used by OPP to predict exposure concentrations are intended to be more representative of the ecosystems potentially at risk. A “standard agricultural field-farm pond” scenario is used for all surface water aquatic exposure assessments. The standard pond scenario is designed to predict pesticide concentrations in the standard farm pond, but has been shown to be a good predictor of upper level pesticide concentrations in small but ecologically important upland streams and is used to represent a variety of small water bodies that can be found at the top of a

watershed. This standard pond scenario is used to simulate pesticide applications to most US agricultural crops, simulating local soil, weather and farm management in the areas in which each are grown. For a given crop and area in which it is grown, standard modeling scenarios are intended to represent relatively more vulnerable sites. A vulnerable site is defined as one at which high concentration levels are expected due to the occurrence of those conditions of pesticide application, weather, and soils known to favor transport to and persistence in surface water.

The current and proposed uses of DCNA will potentially expose a variety of ecosystems and receptors to the fungicide. For instance, while the majority of DCNA has been applied to vegetables in California, these vegetables are grown in coastal regions (with the potential for estuarine/marine exposure) and the Central Valley (with predominantly freshwater exposure). Aquatic exposure might be less likely for application to vegetables in irrigated, arid regions, but the variety of terrestrial animals that might be exposed could be different. Aquatic exposure from container nurseries might occur anywhere in the nation, and can result in transport to manmade retention ponds (Keese, et al., 1994). The measures of effects and measures of exposure used in this screening-level risk assessment cannot represent all of the different characteristics of ecosystems potentially at risk from the use of DCNA. Those ecosystem characteristics which would likely effect the potential for DCNA exposure are considered qualitatively in the Risk Description section of this document.

ANALYSIS

Use Characterization

General Use Information

DCNA is a contact fungicide that provides preventative and curative protection in the field against fungal diseases in numerous agricultural and ornamental crops; it also has post-harvest uses against fungal infections in carrots, sweet potatoes, stone fruits and cut gladiolus. Greenhouse uses include several food crops as well as ornamentals (flowers and conifers).

The pesticide is currently registered for use (major uses shown in bold) on apricots, **beans** (succulent; snap), carrots, **celery**, cherries, Christmas trees, cucumbers, endive (escarole), fennel, forest trees (softwoods – conifers), garlic, **grapes**, **lettuce** (head and leaf), nectarines, **onions**, ornamental herbaceous plants, ornamental woody shrubs and vines, peaches, plums, **potatoes** (white/Irish), prunes, rhubarb, shallots, **sweet potatoes**, and tomatoes. The registrant has also proposed three new uses: peanuts, tomatoes (post-harvest), and carrots (pre-harvest).

Based on a screening level usage analysis (SLUA; dated 6/5/2003) of pesticide usage data for the years 1997–2001, compiled by BEAD, the pesticide is or has been used on alfalfa, almonds, apples, beans/peas (green, dry, vegetable), broccoli, cabbage, cauliflower, celery, cotton, cucumbers, endive (escarole), fennel, garlic, grapes, lettuce, nectarines, onions, green onions, oranges, peaches, pears, potatoes, prunes & plums, spinach, sweet potatoes, tomatoes, and pasture & rangeland. However, not all crops listed in the SLUA are crops for which the compound is registered. Only registered crops and the three proposed new uses are considered in this risk assessment.

Based on current labels and on information provided by the registrant (8/14/2003 SMART Meeting document), the pesticide will be applied in the environment by ground spray, duster, aerial spray,

chemigation, sprinkler irrigation, or seed piece (sweet potatoes only). DCNA may be applied as a dip, a seed piece treatment, a pre-emergent or emergent, a pre-plant, at planting or transplant, or as a post-emergent (at various stages dependent on the crop). Based on information from the registrant, applications of DCNA are typically made only once a year, although the labels allow for repeat applications for many of the crops. As stated by the registrant in the SMART Meeting document (dated 8/14/03), the maximum use rate is intended to be 4 lb/A/year, regardless of the number of applications. It was further stated in that document and in subsequent communications (personal communication from Bob Hawk, Gowan Co., to Demson Fuller, EPA, on 8/17/04) that the intended maximum rate among all crop uses is 4 lb a.i./A/year. An exception to this is a Section 24(c) use (Special Local Need uses in CA, ID, OR, WA) on potatoes at a maximum single application rate of 4.5 lb ai/A and a maximum annual rate of 7.5 lb ai/A/yr. More complete application information is presented in **Table A1 (in Appendix A)**, compiled by BEAD, for all labels accepted as of 2/28/05.

Based on information provided by the registrant (8/14/2003 SMART Meeting document) and obtained from the California DPR use reports, the average use rates for celery and lettuce (head) are 2.7 and "just under" 2 lb a.i./A, respectively; average use on leaf lettuce is <2 lb a.i./A. For grapes, the average use rate is within the range of 1.3 – 1.7 lb a.i./A. The highest average use rate of 3.4 lb a.i./A is for fennel, which is not considered a major crop for DCNA use.

Major Crops Treated

Crops associated with the predominant uses of DCNA, based on information from the registrant, are lettuce and celery.

Based on information compiled by the National Center for Food and Agricultural Policy (NCFAP) and reported on the U.S. Geological Survey website as part of their National Pesticide Synthesis Project (at www.usgs.gov/pnsp), among agricultural crops, DCNA is most frequently used on celery, grapes, and lettuce. In the benchmark year 1997 (based on crop acreage in 1997 and pesticide use patterns for the years 1995–1998), the estimated annual agricultural use for these three crops, respectively, was 97,869 lbs., 55,369 lbs., and 29,200 lbs., accounting for almost all of the agricultural food use of DCNA. Over half (approximately 54%) of the estimated national agricultural use of DCNA in benchmark year 1997 was attributed to use on celery. In the benchmark year 1992 (based on crop acreage in 1992 and pesticide use patterns for the years 1990–1993), grapes, celery and lettuce (in that order) again accounted for the majority (approximately 72%) of the national agricultural use of DCNA; in that benchmark year, cherries accounted for 10.2% of the national use, and all other crops on which DCNA was used each accounted for less than 2.3% of the national use.

As reported in the Screening Level Usage Analysis (SLUA; dated 06/05/2003) completed by the Biologic and Economic Analysis Division (BEAD) of OPP/EPA for DCNA for the years 1997–2001, the crops with the largest number of pounds of DCNA (active ingredient) applied domestically during those years were celery (70,000 lb), lettuce (40,000 lb), grapes and potatoes (30,000 each), and beans (green) and cotton (10,000 lb each). Based on the SLUA, the crops with the highest percentage of their total U.S. planted acres treated with DCNA were celery (45%) and lettuce (10%); no other crop had more than 2.5% of acreage treated with DCNA (BEAD, 2003). Similar data were presented by the registrant in the SMART Meeting document (8/14/03). The registrant also indicated that an estimated 52–58% of the total U.S. celery crop, 9% of the total U.S. lettuce crop, and 3% of the total U.S. potato crop are treated with DCNA. Based on residues-in-crops information from USDA's Pesticide Data Program for the years 1997 and 1998, the registrant estimated that more than half of the total U.S. sweet potato crop is treated with

DCNA (8/14/03 SMART Meeting document); however, the presence of residues in the sweet potatoes could be attributed to post-harvest use as well. Based on 1996 data, approximately 25% of the total U.S. harvested sweet potatoes were treated with DCNA (Kevric, 2000).

Geographic Regions of Major Use Sites

DCNA is used mainly in California and the northwest, with over half of the total annual domestic use occurring on celery and lettuce in the coastal areas of central California. In the Pacific Northwest, the major use is on potatoes (using chemigation), with a lesser use on onions. According to information provided by the registrant in the SMART Meeting document (8/14/03), as of 2002, approximately 81% of total annual domestic use was in California (with 23% of the total domestic use occurring in Monterey County, CA). As of 2002, 18% of the total domestic use occurred in the Pacific Northwest; all other areas of the country accounted for the final 1%. In the past (1996–2000), approximately 5% of the total domestic use occurred in the southeast, but the registrant indicated that use there has "dropped considerably" since that time. Pesticide use data compiled by NCFAP indicate that in the benchmark year 1992 (based on crop acreage in 1992 and pesticide use patterns for the years 1990–1993), DCNA was also used (in lower total annual amounts) in the northeast as well as in Michigan and Missouri.

Exposure Characterization

Environmental Fate and Transport Characterization

Based on the submitted environmental fate data, its physical-chemical properties, the proposed use patterns, and information found in the published literature, DCNA is a low volatility compound that is, in general, expected to be persistent and to have low mobility in most soils, but may have slightly higher mobility in coarser (sandy) soils, particularly those that are low in organic matter. The compound is expected to undergo faster degradation under anaerobic conditions than under aerobic ones, with much of the apparent loss of the compound attributed to the formation of non-extractable residues. More complete information on the submitted environmental fate guideline studies can be located in **APPENDIX B.**

Based on the submitted environmental fate studies, the main transformation product of DCNA is bound or nonextractable residues, the majority of which are associated with the humin and humic acid fractions of the soil organic matter, indicating that they were not simply adsorbed on the mineral portion of the soil. Bound residues were greater in flooded soils, and were observed to increase upon flooding in the anaerobic soil metabolism study. Carbon dioxide was a major degradate only in the soil photodegradation study. The minor degradates of DCNA are: 2,6-dichloro-p-phenylenediamine (DCPD); 4-amino-3,5-dichloroacetanilide (DCAA); and 2,6-dichloro-4-hydroxyaniline (DCHA); and 3,5-dichloro-4-hydroxyacetanilide (3,5HA). Maximum levels of each degradate detected in the submitted studies are presented in **Table 8**. Structures of the parent compound and its degradates are presented at the end of **APPENDIX B**.

Table 8. Maximum levels of DCNA degradates (as percentages of applied, in parent equivalents) and day of occurrence by study type.

Study Type	DCPD	DCAA	DCHA	3,5-HA	Non-extractable Residues	CO_2
Hydrolysis	Not Detected	ND	ND	ND	Not Applicable	ND
Aqueous Photodeg.[1]	ND	ND	ND	ND	ND	ND
Soil Photodeg.[2]	ND	ND	ND	ND	19.5% (236 hours)	23.3% (360 hours)
Aerobic Soil Metab.	&0.4% (both soils)	&0.4% (both soils)	&0.4% (both soils)	ND (both soils)	19.4% (1 year) 50.7% (1 year)	2.8% (1 year) 7.6% (1 year)
Anaerobic Soil Metab.	&1.6% 7.6% (one month)	&1.6% (both soils)	&1.6% (both soils)	ND	63.8-65.4% (4-6 mos.) 70.8-78.5% (4-6 mos.)	2.5% (6 mos.) 6.3% (6 mos.)
Aerobic Aquatic Metab.[3]	–	–	–	–	–	–
Anaerobic Aquatic Metab.	7.4% (12 hours)	6.2% (14 days)	5.1% (3 days)	0.4% (14 days)	86.2%[4]	–
Terr. Field Dissipation	–	ND	0.54 ppm (time 0)[5]	–	–	–
Bioaccumulation in Fish	1.8 ppm in viscera; 0.051 ppm in edible tissue	0.46 ppm the viscera; 0.057 ppm the edible tissue				

[1]Despite extensive attempts to characterize the degradates , there were no major or minor degradates identified. See study summary in Appendix B for additional information on photoproducts. [2] Despite extensive attempts to characterize the degradates , there were no major or minor degradates identified other than CO_2. See study summary in Appendix B for additional information on photoproducts. [3]The degradate 2,6-dichlorobenzoic acid, which was detected only in this study, was detected in the total water/sediment systems at maximums of 12.8% and 9.4%, both at 7 days, in the two systems studied. However, these data are not entered in the table because the aerobic aquatic metabolism study was classified as unacceptable. [4]At 59 days, [^{14}C]residues removed by acid hydrolysis were 11.2% of the applied and those associated with the humic acid, fulvic acid, and humin fractions were 25.7%, 11.2%, and 32.1% of the applied, respectively. [5]The degradate was detected at this level in only one of three replicates, and was not detected at any other time in the study.

A primary degradation pathway for DCNA is aqueous photodegradation if the compound reaches surface water and when the compound is present in an unsorbed state in clear and shallow surface water under favorable light conditions. Aqueous photodegradation of DCNA in the laboratory yielded a half-life of approximately 2 days (MRID 43891901). However, direct photolytic degradation of DCNA in turbid and/or deeper waters in the environment may be limited by the attenuation of sunlight due to unfavorable conditions, and the half-life may be greatly extended (e.g., it is 124X longer in PRZM/EXAMS simulations) under such conditions. Thus, caution must be used in extrapolating laboratory photolysis data (obtained under optimal conditions) to the environment. Also, adsorption of the compound to suspended particles in the water column will decrease the amount of compound available for photolytic degradation. DCNA is stable to hydrolysis (Acc. No. 253963).

On surface soil, DCNA photodegraded with a half-life of approximately 11 days under favorable light conditions in the laboratory (MRID 43893601). Despite a slower rate of degradation, in the environment, photodegradation of DCNA residing on surface soil may be relatively more important than aqueous photolysis. However, soil photodegradation will be of decreasing importance as the compound moves into the soil or is removed from the soil surface in runoff. In aerobic soil, DCNA biodegrades slowly, with first-order half-lives of approximately 6 months and 18 months reported in a submitted guideline study (MRID 40894801). However, based on information reported in the published literature, DCNA is biodegraded more rapidly in soils in which the microbial population has adapted to the presence of the compound (HSDB, 2004).

In anaerobic soil, DCNA biodegrades moderately rapidly, with respective half-lives of approximately 38 days and 24 days in anaerobic sandy loam and sand soils reported in a submitted guideline study (MRID 40894801). DCNA also degrades more rapidly in anaerobic aquatic environments compared with aerobic soil, with a half-life of 0.45 days reported in a submitted guideline study (MRID 43866501). However, in that study, the flooded sediment contained a relatively high organic matter content of 13.4%. Because the majority of the compound is eventually present as nonextractable residues which are assumed to be associated with the soil organic matter, it is possible that in anaerobic soils or sediments with lower organic matter contents, the rate of disappearance of the parent compound may not be quite as rapid. In other studies in which DCNA was aged under anaerobic aquatic conditions, however, the compound was still observed to degrade relatively rapidly, with half-lives of 0.8, 8.5, 9.2 and 5.9 days in sandy loam (2.8% o.m.), sand (0.59% o.m.), silt loam (0.54% o.m.) and clay (1.41% o.m.) soils, respectively, which were used in an aged column leaching study (MRID 43809001). Also, in a supplemental study conducted as part of the anaerobic soil metabolism study, in which some of the soils were treated and flooded simultaneously (as done for an anaerobic aquatic metabolism study), DCNA degraded with half-lives of 10.1 and 5.6 days, respectively, in sandy loam (3.1% o.m.) and sand (1.6% o.m.) soils (MRID 40894801). Information on the aerobic aquatic metabolism is not available, as the submitted study (MRID 46216001) was classified as "not acceptable."

In the field, DCNA is expected to be moderately persistent in soil based on a first-order dissipation half-life of 95 days reported for a terrestrial field dissipation study in which DCNA (Botran® 75W) was broadcast sprayed once at 4.0 lb a.i./A to a bare ground plot of sandy loam soil in California (MRID 44414201). The observed DT_{50} was less than the first-order half-life and occurred between 29 and 60 days.

DCNA is expected to have low mobility in most soils, but, because adsorption of the compound is correlated with organic carbon content, DCNA is likely to be somewhat more mobile in soils with lower organic matter content, such as coarse sand soils. In a batch equilibrium study, K_{oc} values were 660-1062 in four German (non-naturally occurring) laboratory-mixed standard soils (MRID 40538202). Based on those results and using the McCall classification scheme (Swann et al., 1983), DCNA will have low mobility in soils. However, the soils used in that study were made in the laboratory and may not be directly representative of those found in nature. Based on the results of several submitted column leaching studies, (MRID's 40538201,43809001, 40863001), the parent compound has low or no mobility in most soil types, but is slightly mobile in sand soils. Determinations of the mobility of the DCNA degradates using aged column leaching studies were inconclusive due to problems with the submitted studies.

There is a potential for DCNA to reach surface water through spray drift when applied using ground spray or aerial spray, as would be utilized for many of the labeled uses. However, for the two modeled uses (lettuce and snapbeans) that resulted in the highest acute and chronic EEC's, modeling

results indicated that the majority of the contamination was attributed to runoff rather than spray drift. Because DCNA is generally expected to be moderately persistent in field soils, over time the compounds may be present in field runoff and could thus reach surface water bodies. The slow biodegradation of DCNA in most soils will increase the potential for both groundwater and surface water contamination. However, the potential for groundwater contamination should be decreased by the tendency of the compound to adsorb to most types of surface soils. While DCNA is likely to adsorb to aquatic sediments, the potential for the compound to accumulate in such environments may be decreased by the more rapid degradation of the compound under anaerobic conditions.

DCNA has a moderate to high potential to bioaccumulate in fish based on the results (BCF's in whole fish tissue) of submitted guideline studies and a commonly used classification scheme (Franke, C. et al., 1994). In one study, maximum bioconcentration factors (BCF) based on total radioactivity were 49X for edible, 264X for nonedible and **136X** for whole fish tissue samples (MRID 43782001). In a second study, average bioconcentration factors based on total radioactivity were 268X for viscera, 12X for edible, 29X for nonedible and **46X** for whole fish tissue samples; however, the visceral tissue did not reach a plateau concentration during the 14-day exposure period (MRID 40508808). Depuration of the compound is fairly rapid (the majority is depurated by 1 day) and extensive, with 86-98% of the accumulated pesticide gone by 7-14 days of depuration. The classification scheme used indicates that compounds with BCF values of 30-100 have a moderate potential to bioaccumulate and those with values of >100-1000 have a high potential to bioaccumulate.

Data from batch equilibrium studies, when considered along with results from Tier I (see **APPENDIX C**) screening models and guideline terrestrial field dissipation studies, indicate a low potential for leaching to groundwater. Because adsorption of the compound is related to soil organic carbon content, a slightly higher, though still low, potential for leaching to groundwater might exist for DCNA in soils which are relatively low in organic matter, as is often the case with coarse-textured soils.

Based on a 26-month small-scale prospective ground-water monitoring study (initiated in Sept. 1996) in which DCNA was applied as Botran 75W to head lettuce in Monterey County, California, at 4.0 lb ai/acre, DCNA and its degradates are not likely to be transported to groundwater. The results of environmental fate studies suggest that this might be due largely to the propensity for DCNA to bind to soil as nonextractable residues. In the study, most soil samples taken from the monitoring well and soil characterization cores were classified as sand, loamy sand, sandy loam, or loam, with few samples classified with a finer texture. The depth to groundwater at the study site was between 9 and 16 feet during site instrumentation, which occurred soon after the rainy winter season in that area of California. Neither DCNA nor its degradates DCPD, DCAA and DCHA were detected in groundwater taken from the monitoring wells. DCNA was detected in soil water, with a maximum concentration of 31.6 ppb detected at a depth of 3 feet, 30 days after application. DCPD, DCHA and DCAA were detected in the same suction lysimeter at concentrations of 6.8 ppb, 6.2 ppb and 0.16 ppb at 63 days after application.

Measures of Aquatic Exposure

Aquatic Exposure Modeling

This section identifies the data used as the source of the input parameter values, as well as the actual input parameter values, used in modeling to determine the Estimated Environmental Concentrations (EEC) for the ecological exposure assessment. The EEC's utilized by OPP for use in the ecological risk assessment for DCNA are presented in **Table 9**. Reported values represent the maximum estimated contamination levels resulting from selected label uses of DCNA (excluding ornamental and other non-food/non-feed uses) as presented in BEAD's Table (see **Appendix A**): "Maximum DCNA use rates and management practices by crop based on current labels. (Generalized Screening Level Portrayal of Current Label Uses) – Current As Of 02/28/2005." Additional application information used in modeling was obtained from the most recent labels, as captured in the LUIS database, revised labels submitted to OPP, and from multiple electronic communications from the registrants, including the 3/15/05 email from Bob Hawk, Gowan Company, to Nathan Mottl, Chemical Review Manager, EPA/OPP/SRRD. In that email, it was confirmed that Gowan intended to continue to support the registrations of DCNA for Section 24(c) SLN on potatoes. **Table 9** also includes EECs generated by PRZM/EXAMS using the lettuce and snap bean standard scenarios with either spray drift or runoff effectively set to zero in order to determine the contribution of spray drift to the surface water contamination (see further discussion below). Those EECs were not used in calculation RQs, but served as an evaluation tool to determine the relative importance of spray drift in the overall contamination of surface water as estimated by the model.

DCNA Sediment concentrations Table 10.

The EEC's for surface water bodies were determined using the Tier II screening-level simulation models PRZM (v. 3.12 beta; input generated by PE4VO1.pl, dated 8/8/03) and EXAMS (2.98.04). Specific label application information (e.g., dates, target disease, application type, Registration numbers) and input parameter values utilized for PRZM/EXAMS modeling are presented in **Table 11**. The general fate and physical-chemical property data used as the source of the input parameter values for modeling were obtained from the guideline studies and other submissions from the registrant and were presented previously in **Table 1**. Additional information on the models PRZM and EXAMS can be located at: http://www.epa.gov/oppefed1/models/water/.

Table 9. Surface water EEC's for ecological exposure assessment based on DCNA use on multiple crops.

Crop	Acute (ppb)	1-in-10 Year 21-day Concentration (ppb)	1-in-10 Year 60-day Concentration (ppb)
CA lettuce	42.3	22.9	11.0
CA grapes	9.8	3.4	1.6
ID potatoes	11.2	5.4	3.1
CA onions	0.24	0.11	0.05
OR snapbeans	28.9	19.7	12.9
NC peanuts	34.1	10.9	5.3
CA lettuce (**spray drift only**)	2.2	1.1	0.44
CA lettuce (**runoff only**)	42.3	22.9	11.0
OR snapbeans (**spray drift only**)	10.5	3.7	1.4
OR snapbeans (**runoff only**)	28.9	19.7	12.9

Crop	Acute (ppb)	1-in-10 Year 21-day Concentration (ppb)	1-in-10 Year 60-day Concentration (ppb)
CA lettuce	57.5	50.4	40.0
CA grapes	10.7	9.2	7.3
ID potatoes	41.7	27.6	24.2
CA onions	0.28	0.24	0.21
OR snapbeans	56.3	52.4	42.1
NC peanuts	49.2	44.2	38.8
CA lettuce (**spray drift only**)	2.3	2.0	1.6
CA lettuce (**runoff only**)	57.4	50.2	40.0
OR snapbeans (**spray drift only**)	10.8	9.3	7.5
OR snapbeans (**runoff only**)	54.1	50.2	39.3

Table 10. Estimated benthic exposure concentrations for ecological exposure assessment based on DCNA use on multiple crops.

Crop	Acute (ppb)	1-in-10 Year 21-day Concentration (ppb)
CA lettuce	**4.6**	**4.0**
CA grapes	**0.62**	**0.54**
ID potatoes	**1.1**	**1.1**
CA onions	**0.019**	**0.018**
OR snapbeans	**5.4**	**5.1**
NC peanuts	**4.1**	**2.9**

Table 11. PRZM/EXAMS input parameter values for surface water EEC's for DCNA.

Parameter	Value	Source and/or Comments
Application Rate (lb a.i./A/application)	CA lettuce: 4.0 CA grapes: 3.5 ID potatoes: 1.5 single (7.5 total) CA onions: 4.0 OR snapbeans: 3.75 NC peanuts: 4.0	Reg.: 10163-221 (Botran Flowable) Reg.: 10163-221 (Botran Flowable) Reg.: ID940006, 10163-189 (Botran 75W) Reg.: 10163-207 (75WSB) Reg.: 10163-191 (Botran 15% dust) Reg.: 10163-189 (Botran 75W)
Number of Annual Applications Used in Modeling	lettuce: 1 grapes: 1 potatoes: 5 onions: 1 snapbeans: 1 peanuts: 1	Reg.: 10163-221 (Botran Flowable) Reg.: 10163-221 (Botran Flowable) Reg.: ID940006, 10163-189 (Botran 75W) Reg.: 10163-207 (75WSB) Reg.: 10163-191 (Botran 15% dust) Reg.: 10163-189 (Botran 75W)
Interval Between Applications (days)	lettuce: Not Applicable grapes: NA potatoes: 7 onions: NA snapbeans: NA peanuts: NA	Reg.: 10163-221 (Botran Flowable) Reg.: 10163-221 (Botran Flowable) Reg.: ID940006, 10163-189 (Botran 75W) Reg.: 10163-207 (75WSB) Reg.: 10163-191 (Botran 15% dust) Reg.: 10163-189 (Botran 75W)
Date of First Application/specific use	lettuce: March 21/applied post-thinning for *Sclerotinia minor* grapes: May 1 /applied at onset of bloom for Botrytis (rot/stem rot) potatoes: July 1/applied at layby for Botrytis (blight; both applic.) onions: Oct. 1/at planting, for white rot snapbeans: Aug. 1/ between flowering and harvest, for *Sclerotinia* peanuts: June 15th/for *Sclerotinia*)	Based on USDA Crop Profiles information located at http://pestdata.ncsu.edu/cropprofiles/, information in EFED's PRZM standard scenarios metadata files, and label information
Application Type and Depth of Incorporation (cm); CAM #, IPSCND # (if applicable)	lettuce: foliar/ground spray; 0 cm; CAM = 2, IPSCND = 3 grapes: foliar/aerial spray; 0 cm; CAM = 2, IPSCND = 3 potatoes: foliar/ground spray; 0 cm; CAM = 2, IPSCND = 3 onions: ground spray; 5 cm; CAM = 7 (T-band), NA snapbeans: foliar/aerial spray; 0 cm; CAM = 2, IPSCND = 3 peanuts: foliar/aerial spray; 0 cm; CAM = 2, IPSCND = 3	Reg.: 10163-221 (Botran Flowable) Reg.: 10163-221 (Botran Flowable) Reg.: ID940006, 10163-189 (Botran 75W) Reg.: 10163-207 (75WSB); depth from PRZM manual Reg.: 10163-191 (Botran 15% dust) Reg.: 10163-189 (Botran 75W)
Organic Carbon Normalized Partition Coefficient (K_{oc}; mL/g)	660	MRID 40538202; lowest non-sand value of four values, per input parameter guidance
Aerobic Soil Metabolism Half-life (days)	$t_{1/2}$ = 914	MRID 40894801; represents the 90th percentile of the upper confidence bound on the mean of two half-life values
Spray Drift Fraction	0.05 (aerial) 0.01 (ground spray)	Input parameter guidance

Application Efficiency	0.95 (aerial) 0.99 (ground spray)	Input parameter guidance
Molecular Weight (g/mole)	207.0	Product chemistry data
Vapor Pressure (25 °C)	1.96 x 10^{-6} mmHg	Product chemistry data
Henry's Law Constant	7.78 x 10^{-8}	Product chemistry data
Solubility in Water at 20°C (ppm)	70	set at 10X solubility limit of 7 ppm based on input parameter guidance
Aerobic Aquatic Metabolism Half-life (days)	$t_{1/2}$ = 3.7	input value is 2X the aerobic soil metabolism half-life input value as in input parameter guidance
Anaerobic Aquatic Metabolism Half-life (days)	$t_{1/2}$ =7.9	MRID's 43866501, 45333301, 45575001, 43809001, 40894801
Hydrolysis Half-life @ pH 7 (days)	stable	Acc. No. 259363
Aquatic Photolysis Half-life @ pH 7 (days)	1.97	MRID's 43891901, 45575001

The five labeled agricultural uses and one proposed agricultural use of DCNA chosen to represent the use of the compound in the environment are lettuce, grapes, potatoes, onions, snapbeans, and peanuts (proposed use). While celery is a major crop for DCNA use, a standard PRZM/EXAMS scenario was not available. However, because head lettuce (which was modeled) is in the same crop group as celery, and is grown in the same geographical regions, modeling results for head lettuce in California are sufficient as surrogate modeling results for celery. For the five label uses selected for modeling, use scenarios were selected based on the identities of the major crops treated with DCNA and the main geographical regions of use based on information provided by the registrant and by BEAD. For each crop receiving a single application (i.e., all crops except potatoes), the use scenario reflects the maximum single application rate allowed on the labels. For potatoes, the use scenario reflects the maximum annual application rate allowed on the labels; this use rate is associated with Special Local Need (SLN; Section 24C) uses allowed only in ID, CA, OR and WA. While the *single* maximum rate for potatoes (4.5 lb ai/A) is higher than for any other crop, preliminary modeling indicated that the use of the maximum *annual* rate (7.5 lb ai/A, applied in five applications of 1.5 lb ai/A) yielded higher acute and chronic EEC's than the single maximum rate. When allowed by label, aerial uses were selected over ground spray or other uses to maximize potential spray drift to surface water bodies.

To simulate the selected uses, OPP used a California (iceberg) lettuce standard scenario, a California grapes (Northern and Southern) standard scenario, an Idaho potatoes standard scenario, a California onions standard scenario, an Oregon vegetables (snapbeans) standard scenario, and a North Carolina peanuts standard scenario. Application dates (see **Table 11**) were chosen based on label information, as well as on crop-specific information presented in EFED's PRZM/EXAMS standard scenario metadata files and the USDA agricultural crop profiles at www.pestdata.ncsu.edu/cropprofiles.

In determining EEC's for ecological exposure assessment, EFED utilizes a standard EXAMS scenario referred to as the "standard pond" in Tier II modeling with PRZM/EXAMS. Scenarios simulate a ten-hectare field draining into a one-hectare static pond that is two-meters deep and does not have an outlet. The pond serves as a surrogate for a variety of small water bodies that can be found at the top of a watershed. It is assumed that runoff is equally likely to flow into the pond from all areas of the treated field, and that the entire field is cropped and treated. Chemical property input values were chosen according to the current EFED standard guidance document (*Input Parameters in Modeling the*

Environmental Fate and Transport of Pesticides, Version II, February 28, 2002). Complete PRZM and EXAMS output files (including input values) from modeling conducted to determine EECs are presented in **APPENDIX C.**

To determine the contribution of spray drift to the EECs, additional modeling runs were conducted using PRZM/EXAMS. The lettuce and snap beans modeling scenarios were used, first with the contribution from spray drift effectively set to zero to estimate EECs resulting only from runoff, and then with the contribution from runoff effectively set to zero to estimate EECs resulting only from spray drift. Results of both runs were analyzed to determine whether spray drift was an important contributor to the contamination of the surface water body modeled. Results were reported in **Table 9**. While spray drift alone results in higher EECs for snap beans relative to lettuce, for both crops the EECs from runoff alone are very similar to those which account for both spray drift and runoff, indicating that contamination of the surface water by spray drift is relatively unimportant.

Aquatic Exposure Monitoring and Field Data

Monitoring data for DCNA were not available from the U.S. Geological Survey's National Water-Quality Assessment (NAWQA) Program, as the pesticide was not monitored under that program. Additionally, a review of data from the Surface Water Database of California Department of Pesticide Regulation indicated that there were no detections of DCNA. However, the latter program was designed to document the existence of pesticides in various aquatic environments for as many pesticides as possible. Therefore, selected monitoring sites were likely not specifically targeted for heavy DCNA use. Also, the sampling design for these monitoring studies was not intended to capture the peak concentrations, so sampling was infrequent.

In a 26-month small-scale prospective ground-water monitoring study (initiated in Sept. 1996) in which DCNA was applied as Botran 75W to head lettuce in Monterey County, California, at 4.0 lb ai/acre, neither DCNA nor its degradates DCPD, DCAA and DCHA were detected in groundwater taken from the monitoring wells. DCNA was detected in soil water, with a maximum concentration of 31.6 ppb detected at a depth of 3 feet, 30 days after application. DCPD, DCHA and DCAA were detected in the same suction lysimeter at concentrations of 6.8 ppb, 6.2 ppb and 0.16 ppb at 63 days after application. In the study, most soil samples taken from the monitoring well and soil characterization cores were classified as sand, loamy sand, sandy loam, or loam, with few samples classified with a finer texture. The depth to groundwater at the study site was between 9 and 16 feet during site instrumentation, which occurred soon after the rainy winter season in that area of California.

Groundwater Exposure Modeling and Monitoring

Estimated concentrations of DCNA in groundwater, while not used directly in this assessment, were determined using the model SCI-GROW2, a regression-based, Tier 1 screening model that provides a groundwater exposure value to be used in determining the potential risk to human health from drinking water contaminated with the pesticide. However, elevated groundwater exposure values may also be important in cases where surface water bodies are fed by groundwater sources. SCI-GROW2 estimates potential groundwater concentrations if the pesticide is used at the maximum allowable rate in areas where groundwater is vulnerable to contamination. Characteristics of such vulnerable areas include high rainfall, rapidly permeable soil, and a shallow water table . In most cases, a large majority of the use area will have groundwater that is less vulnerable to contamination than the areas used to derive the SCI-GROW2 estimate. Unlike pesticide concentration estimates for surface waters, groundwater estimates by

EFED using SCIGROW are not dependent on specific geographic locations or application methods, but instead, only depend on the pesticide use rate. Therefore only the highest application rate was used as input for SCIGROW. The estimated drinking water concentration (EDWC) for groundwater drinking water sources, based on an aerial application of 4.0 lb ai/A in a single application, is 1.3 ppb. SCI-GROW modeling outputs for an aerial use of DCNA are presented in **Appendix C**.

A small-scale prospective ground-water monitoring study was performed for DCNA in 1996. Although the soils were predominantly sandy, and the water table was as shallow as 9 to 16 feet below ground surface, DCNA was not detected in monitoring wells installed at the site. The final report for this study is still in review, but results suggest that the concentrations predicted by SCI-GROW might be a conservative estimate.

Measures of Terrestrial Exposure

Terrestrial Exposure Modeling

DCNA is proposed for use on many non-food and food crops, including: forest trees (Christmas trees and nursery stock), ornamentals (herbaceous, shrubs, and vines), and various fruit and vegetable crops (including fruit orchards and post-harvest applications). Applications for all uses of DCNA include: ground spray (high and low volume), dip, chemigation, aerial, broadcast, dust, banded, in-furrow (flowable concentrate and wettable powder), and bulb and seed treatments. This combination of many uses and assorted application methods can potentially result in various routes of non-target exposure to terrestrial and aquatic organisms.

In this terrestrial exposure assessment, pesticide residues per unit area and foliar applications are considered. The sweet potato seed treatment use is acknowledged, but given that this application will occur in a prepared seed bed and that this application rate is less when compared to other crops, EFED believes the potential risk from such a proposed use will be accounted for by the other representative crops examined in this screening level risk assessment.

Terrestrial exposure was evaluated using estimated environmental concentrations generated from T-REX (v1.2), a spreadsheet-based model that calculates pesticide loading per unit area (*i.e.*, seed treatment uses and non-foliar applications) and the decay of a chemical applied to foliar surfaces for single or multiple applications based on the methods of Hoerger and Kenaga (1972) as modified by Fletcher *et al.* (1994). Further explanation of the model is presented in **Appendix D**.

LD_{50} ft^{-2} Residues

Estimating potential terrestrial pesticide exposure to birds and mammals for non-foliar, non-seed treatment applications is assessed by calculating the pesticide loading per unit area. This exposure is directly related to the application method (*e.g.*, broadcast, banded, in-furrow) and results in an exposure value for available mg A.I. ft^{-2}. The LD_{50} values for various weight classes of birds and mammals are then used as the toxicity parameter. The LD_{50} ft^{-2} is then calculated by dividing the exposure by the toxicity adjusted for body weight. See **Appendix D** for the discussion of this method.

In this assessment, the proposed use of DCNA on onions was examined using this method. Onion sets are to be placed in rows to which an in-furrow spray of DCNA is to be applied. For modeling purposes, a 14 inch row spacing, 4.5 inch spray bandwidth, and a 92% incorporation efficiency (T-band

applications as per USEPA guidance, 1992) with the WP or dust formulations was used. The estimated environmental concentration from such a scenario was **130 mg AI ft^{-2}** with **10.4 mg AI ft^{-2}** available for direct exposure to terrestrial organisms.

The estimation of exposure from a spray application by this method is an estimate of total possible exposure to non-target animals, and should be considered to be conservative. Since application is directly to soil, dietary exposure would be through incidental soil ingestion or consumption of soil invertebrates. Other potential routes of exposure, for which relevant toxicity data are not available, are through dermal contact or inhalation.

Foliar Applications and Residues

Terrestrial estimated environmental concentrations (EECs) for foliar applications (**Table 12**) were derived for 5 major crops (carrots, lettuce, peanuts, potatoes and snap beans) using current application rates and intervals between applications. These crops also represent many other crop uses with similar application rates of DCNA. There is some uncertainty in the terrestrial EECs for crops with multiple applications, due to a lack of foliar dissipation data. When such data are absent, EFED assumes a 35-day foliar dissipation half life, which is an upper-bound value based on the work of Willis and McDowell (1987). Foliar dissipation data for DCNA are not included in the OPP Chemistry Documents database.

For pesticides applied to foliage as a nongranular product (e.g., liquid, dust), the estimated environmental concentrations (EECs) on food items following product application are compared to acute and chronic toxicity values to assess risk. The predicted maximum and mean residues of DCNA that may be expected to occur on selected avian or mammalian food items according to the proposed use labeled application rate for lettuce, peanuts, potatoes and snap beans are presented in **Table 12**.

Table 12. Estimated environmental concentrations on avian and mammalian food items (ppm) following label specified applications of DCNA to carrots, lettuce, peanuts, potatoes, and snap beans.

Crop	Application Rate lbs. a.i./A (# app / interval, days)	Food Items	Upper bound Kenaga Residue EEC (ppm)[1]	Predicted Mean Residue EEC (ppm)[2]
Carrots	2 (2 / 7)	Short grass	898	318
		Tall grass	412	135
		Broadleaf plants/small insects	505	168
		Fruits, pods, seeds, and large insects	56	26
Celery, Carrots, Lettuce, Peanuts	4 (1 / NA)	Short grass	960	340
		Tall grass	440	144
		Broadleaf plants/small insects	540	180
		Fruits, pods, seeds, and large insects	60	28
Potatoes	1.5 (5/ 7)	Short grass	1390	492
		Tall grass	637	209
		Broadleaf plants/small insects	782	261
		Fruits, pods, seeds, and large insects	87	41
Snap beans	3.75 (1 / NA)	Short grass	900	319
		Tall grass	413	135
		Broadleaf plants/small insects	506	169
		Fruits, pods, seeds, and large insects	56	26

[1] Predicted maximum and mean residues are based on Hoerger and Kenaga (1972) as modified by Fletcher *et al.* (1994).
[2] Predicted mean residues from Fletcher et al.: Short grass = 85; Tall grass = 36; Broadleaf plants / insects = 45; and Seeds / fruits = 7

ECOLOGICAL EFFECTS CHARACTERIZATION

A number of required guideline toxicity studies have been submitted for DCNA as part of the registration and reregistration processes. These studies indicate that chronic exposure of DCNA to both birds and mammals resulted in decreased reproductive capacity. Birds exhibited decreased egg production, embryo viability and survival, hatchability, chick survival, and chick body weights when exposed to DCNA at concentrations higher than 35 mg/kg-bw. In chronic toxicity tests with mammals, DCNA at concentrations greater than 250 mg/kg-diet produced decreased pup weights. Acute toxicity tests for rainbow trout and bluegill sunfish indicate that DCNA is highly toxic to freshwater fish.

Additional toxicity tests described below help provide a further understanding of the toxicity of DCNA, but the body of submitted toxicity data is incomplete. No data were submitted to assess the toxicity of DCNA to terrestrial plants, chronic toxicity to estuarine/marine invertebrates, or the acute and chronic toxicity to estuarine/marine fish. A summary of the guideline studies that were submitted is provided below. A more detailed discussion of the ecological toxicity studies that went into this assessment can be found in **APPENDIX E**.

Toxicity testing reported in this section does not represent all species of bird, mammal, or aquatic organisms. Only a few surrogate species for both freshwater fish and birds are used to represent all freshwater fish (2000+) and bird (680+) species in the United States. For mammals, acute studies are usually limited to Norway rat or the house mouse. Estuarine/marine testing is usually limited to a crustacean, a mollusk, and a fish. Also, neither reptiles nor amphibians are tested. The assessment of risk or hazard assumes that estimated avian risks are protective of potential risk to reptiles and terrestrial-phase amphibians. Also, the assessment of risks to aquatic-phase amphibians incorporates freshwater fish as surrogates for this taxa.

Terrestrial Effects Characterization

Terrestrial Animals

Toxicity to Birds

DCNA was determined in an acceptable acute avian toxicity tests to be slightly toxic to bobwhite quail (LD_{50} = 900 mg/kg bodyweight), and practically non-toxic to mallard ducks (see Table 12). There were mortalities at concentrations below the LD_{50} for bobwhite quail, but these started to occur at the dose (500 mg/kg bw) at which food consumption also began to drop. Similarly, mortalities occurred in the subacute studies for both bobwhite and mallard ducks at concentrations below the LC_{50}. Mortality occurred at concentrations as low as 250 ppm in the acceptable bobwhite quail study (LC_{50} = 1219 ppm), but there were no signs of gross pathology observed. In the subacute mallard study, mortality and food avoidance both started to occur at 2600 ppm; the birds that died were observed to be emaciated. Mortalities in these tests appear to have been caused by food avoidance and starvation.

Reproductive effects to birds and mammals from DCNA were observed in chronic laboratory toxicity studies. In a single, core avian reproduction study with bobwhite quail (MRID 46218900), a NOEC of 387 ppm was observed based upon a significant reduction in egg production, embryo viability, embryo survival, hatchability, offspring survival and 14-day survivor body weight resulting from a LOEC of 967 ppm. There were six adult mortalities observed during the course of this experiment (one in the control, two in the 160 ppm group, one in the 400 ppm group, two in the 1000 ppm group). These

mortalities appear to have been the result of male trauma (e.g., head lacerations, bone fractures) and some of the observations in the necropsies (e.g., egg yolk peritonitis) can be attributed to stress or physical restraint of the egg laying hen.

Toxicity to Mammals

DCNA was determined to be practically non-toxic to mammals in a laboratory test (LD_{50} = 3400 kg/mg-bw, see Table 12). However, the mammalian study is classified as supplemental since it did not use the technical grade of DCNA, but a 48% formulation.

A parental and reproductive NOEL of 250 ppm was observed in a two-generation reproduction study in rats. A number of effects were observed at 1250 ppm. These included decreased body weight gains in both generations of both sexes during pre-mating (F_1 and F_2 pup weights) and in females during gestation. There were decreased epididymal and ovarian weights and increased testicular weights in both generations at 1250 ppm. There was increased vaginal proestrus morphology and decreased metestrus morphology at the same dose.

Toxicity to Insects

DCNA was found to be practically non-toxic to honeybees in a core acute contact test. Mortality in this study did not exceed 5.2%, which was observed at the highest dose tested, 181.29 µg/bee. Thus, the LD_{50} was considered to be greater then 181.29 µg/bee.

Terrestrial Plants

Neither acute nor chronic toxicity data for terrestrial plants have been submitted, so the toxicity to and potential for risk to such cannot be assessed.

Aquatic Effects Characterization

Aquatic Animals

Toxicity to Freshwater Fish

DCNA was observed to be highly toxic to freshwater fish in acceptable acute toxicity tests with rainbow trout and bluegill sunfish. LC_{50} values of 0.90 and 1.08 mg a.i./L (ppm) were observed for the two species, respectively. In the acute toxicity test with rainbow trout, mortality was observed at concentrations as low as 0.24 ppm. At the 0.75 ppm level and above, 100 % mortality was observed.

Acceptable toxicity tests with one of the formulated end-use products, Botran 50W, resulted in 96-hr LC_{50} values of 4.1 and 7.0 mg/L (ppm) for bluegill and rainbow trout, respectively. This DCNA formulation can be classified as moderately toxic to freshwater fish.

Acceptable guideline Tests of the chronic toxicity of DCNA to freshwater fish have not been submitted. However, one supplemental study was submitted in which growth of juvenile fish exposed to DCNA was evaluated. Although this study was not classified as acceptable, the NOAEC was 0.049 mg a.i./L and is used in this assessment. A guideline study on the chronic toxicity of DCNA to freshwater fish is required.

Toxicity to Freshwater Invertebrates

DCNA was classified as moderately toxic to freshwater aquatic invertebrates in an acceptable acute toxicity test with *Daphnia magna.* An EC_{50} of 2.07 mg/l was calculated, based on observed immobilization. The NOEC in this study was 1.0 mg/l.

The data requirements for a chronic toxicity study on freshwater invertebrates was met with a 21-day study on the toxicity of DCNA to *Daphnia magna*. Although the study was classified as supplemental, the data are used in this assessment and the study does not need to be repeated. The NOAEC was 0.032 mg a.i./L based on reproductive effects. In addition, a non-guideline, 28-day study on the toxicity of DCNA to sediment-dwelling *Chironomus riparius* was submitted and classified as supplemental. There were no significant effects of DCNA on *C. riparius* emergence so the NOAEC was the highest concentration tested, which was 2.4 mg/L a.i. in overlying water (nominal) and 1.2 mg/kg in sediment (mean of days 0, 7, 28 values). Importantly, the submitted Chironomid study does not meet requirements because dodine was added to the water and not the sediment.

Toxicity to Estuarine and Marine Fish

Neither acute nor chronic toxicity data for estuarine/marine fish have been submitted, so the toxicity to and the potential for risk to these animals can not be assessed.

Toxicity to Estuarine and Marine Invertebrates

DCNA was categorized as practically non-toxic to estuarine/ marine shellfish, based on a supplemental acute toxicity study with eastern oyster. An EC_{50} for technical DCNA of 2300 µg/L (ppb) was observed, based on reduction in the shell deposition rate.

Tests of the chronic toxicity of DCNA to estuarine/marine invertebrates have not been submitted. Therefore, the chronic toxicity to and the potential for risk to these animals cannot be assessed.

Table 13 provides a summary of the most sensitive ecological toxicity endpoints used in the hazard assessment of terrestrial animals and **Table 14** summarizes the most sensitive endpoints used in the hazard assessment of aquatic animals.

Table 13. Summary of acute and chronic toxicity data for terrestrial organisms exposed to DCNA.

Species	Acute Toxicity				Chronic Toxicity	
	LD_{50} (mg/kg-bw)	**Acute Oral Toxicity (MRID)**	**8-day LC_{50} (ppm)**	**Subacute Dietary Toxicity (MRID)**	**NOEC/LOEC (mg/kg) (MRID)**	**Affected Endpoints**
Northern bobwhite quail *Colinus virginianus*	900	slightly toxic (437551-01)	1219	slightly toxic (431155-01)	387 / 967 (462189-00)	growth and reproduction
Honey bee *Apis meliferus*	>181.29 (µg/bee contact)	practically non-toxic (00036935)	--	--	--	--
Laboratory rat *Rattus norvegicus*	3400 (48.8% formulation)	practically non-toxic (00024234)	--	--	250 (44233803, 44474101)	decreased pup weights

Table 14. Summary of acute and chronic aquatic toxicity estimates using DCNA.

Species	Acute Toxicity			Chronic Toxicity	
	96-hr LC_{50} (mg/L)	48-hr EC_{50} (mg/L)	Acute Toxicity (MRID)	NOEC / LOEC (mg/L)	Affected Endpoints (MRID)
Rainbow trout *Oncorhynchus mykiss* (TGAI)	0.90	--	highly toxic (00096064)	0.049[1]	Juvenile growth
Bluegill Sunfish *Lepomis macrochirus* (Botran 50W)	4.1	--	moderately toxic (00096062)	--	--
Water flea *Daphnia magna*	--	2.07 (NOEC = 1.0)	moderately toxic (405831-02)	0.032	Reproduction (offspring per parent)
Eastern Oyster *Crassostrea virginica*	2.3	--	moderately toxic (00087031)	--	–
Midge *Chironomus riparius*	–	–	–	2.4 mg/L (water) 1.2 mg/kg (sediment)	No significant effects
Green Algae *Scenedesmus subspicatus*	EC_{50} = 1.3 EC_{05} = 0.12 (72-hour)	–	(466571-05)	–	--

[1] Based on supplemental study; guideline study still required.

Aquatic Plants

A 72-hour study on the acute toxicity of DCNA to the green algae, *Scenedesmus subspicatus*, was categorized as acceptable (**Table 14**; MRID# 466571-05). There were significant effects of DCNA on algal cell density, growth rate, and biomass at all tested concentrations. As a result, the NOAEC and LOAEC were <0.135 mg/L and 0.135 mg/L (lowest tested concentration), respectively. The lowest EC_{50} was for effects of DCNA on biomass and was 0.12 mg/L (95% C.I. = 0.075-0.18 mg/L).

ECOTOX Database

OPP utilized the ECOTOX (Ecotoxicology Database System) database in an attempt to augment the registrant submitted data. ECOTOX is a comprehensive computer-based system that provides single chemical toxic effect data for aquatic life, terrestrial plants and terrestrial wildlife derived predominately

from peer-reviewed literature. The literature relevant to the exposure and toxic effects of DCNA and the metabolites was collected, reviewed and evaluated for inclusion into this chapter; citations and literature search information are presented in **Appendix I**. Citations and abstracts were obtained by searching the following commercial or publicly available databases: TOXLINE, MEDLINE, BIOSIS previews, AGRICOLA, and AQUIRE, as well as, Dissertation Abstracts. For a more in-depth discussion of the ECOTOX on-line database, see http://www.epa.gov/ecotox/.

OPP has developed a data quality screening process for use and evaluation of open literature from ECOTOX (OPP, 2004). A total of six open literature papers passed both the ECOTOX and OPP screens. Three of these papers summarize efficacy data for DCNA use on peanuts and peaches. One study examines the mitochondrial effects of DCNA and its metabolites on rats. The fifth study describes fungal population and abundance effects of DCNA exposure. The last paper reports the acute toxicity of DCNA to Daggerblade grass shrimp (*Palaemonetes pugio*), a estuarine invertebrate species often found in tidal marsh habitats, and mummichogs (*Fundulus heteroclitus*), a close relative of the sheepshead minnow.

Burton and Fisher report a 48-h LC_{50} = 1.9 mg/l for the shrimp and that 20% of the mummichogs died at the highest concentration of DCNA tested (2.7 mg/l). Based on this study, DCNA is classified as moderately toxic to estuarine/marine invertebrates on an acute exposure basis. Due to the lack of registrant-submitted data for acute toxicity of DCNA to estuarine/marine organisms, EFED used the Daggerblade grass shrimp toxicity endpoint to supplement this ecological risk assessment (**Table 15**).

Table 15. Summary of open literature toxicity data used quantitatively in this assessment.

Species	Toxicity Endpoint	Citation	Toxicity Category
Daggerblade grass shrimp *Palaemonetes pugio*	48-h LC_{50} = 1.9 mg/l	Burton, D. T. and D. J. Fisher. 1990. Bull. Environ. Contam. Toxicol.	moderately toxic

Two other papers passed the ECOTOX screening process, but did not pass the OPP screen; however, both contain data that is qualitatively useful. The first paper reported the phenomenon of stem injury to blue spruce (*Picea pungens*) seedlings from post-sowing applications of DCNA (Fischer and Landis, 1990). Initial symptoms of the injury included stunting, stem swelling, and twisting. For those seedlings that did not exhibit the early symptoms, the DCNA application was implicated in causing brittle stems which caused the seedlings to fall over or break during packing and shipping. Further examination of the stems showed that these seedlings developed a stem swelling in the area of the hypocotyl above the cotyledon scar (meristematic tissue). The stems below this swelling was very constricted, thus creating a weak point that later would break. The authors report that 27% of the crop at the end of the growing season had been damaged this way. They also conclude that the fungicide apparently either killed or damaged the cells of the phloem and lateral meristem, producing a partial girdle of the young stem. In a greenhouse confirmatory experiment, seedlings treated with DCNA had a 33.8% damage rate and those treated with a combination of Captan and DCNA exhibited a 30% damage rate, while Captan alone produced no damage. Given these data, and the fact that two of the major proposed non-food uses of DCNA in this assessment are to Christmas trees and forest conifers, the value of guideline plant data for DCNA would be high.

The second paper examined the acute toxicity data for a wide range of pesticides (Jones *et al.*, 1968). The authors report a range of acute toxicities for DCNA to the rat of 1500 – 4040 mg/kg-bw. Lack of reported experimental methods in the paper prevents EFED from using these endpoints for risk determination;

however, the 1500 mg/kg-bw value is substantially lower than the 3400 mg/kg-bw value used in this assessment.

RISK CHARACTERIZATION

Risk characterization is the integration of exposure and effects characterizations to determine the ecological risk from the use of DCNA and the likelihood of effects on aquatic life, wildlife, and plants based on various pesticide-use scenarios. The risk characterization provides an estimation and a description of the risk; articulates risk assessment assumptions, limitations, and uncertainties; synthesizes an overall conclusion; and provides the risk managers with information to make regulatory decisions.

Risk Estimation – Integration of Exposure and Effects Data

Results of the exposure and toxicity effects data are used to evaluate the potential for adverse ecological effects on non-target species. For the assessment of DCNA risks, the risk quotient (RQ) method is used to compare exposure and measured toxicity values. Estimated environmental concentrations (EECs) or the estimated dose are divided by acute and chronic toxicity values. The RQs are compared to the Agency's levels of concern (LOCs). These LOCs are the Agency's interpretive policy and are used to analyze potential risk to non-target organisms. These criteria are used to indicate when a pesticide's use as directed on the label has the potential to cause adverse effects on non-target organisms. **Table 16** summarizes the risk presumptions, RQ methods and LOCs used in this risk assessment for terrestrial animals and plants, while **Table 17** summarizes this information for aquatic animals and plants.

Table 16. Risk presumptions for terrestrial animals and plants.

Taxonomic Group	Risk Presumption	Risk Quotient (RQ)	Level of Concern (LOC)
Birds			
	Acute Risk	Estimated Environmental Concentration (EEC)/LC_{50}	0.5
		Avian acute daily exposure/adjusted LD_{50}	
		LD_{50} ft^{-2}	
		LD_{50} day^{-1}	
	Acute Endangered Species	EEC/LC_{50}	0.1
		Avian acute daily exposure/adjusted LD_{50}	
		LD_{50} ft^{-2}	
		LD_{50} day^{-1}	
	Chronic Risk	EEC/NOAEC	1
Mammals			
	Acute Risk	EEC/LC_{50}	0.5
		Mammalian acute daily exposure/adjusted LD_{50}	
		LD_{50} ft^{-2}	
		LD_{50} day^{-1}	

	Acute Endangered Species	EEC/LC_{50}	0.1
		Mammalian acute daily exposure/adjusted LD_{50}	
		LD_{50} ft^{-2}	
		LD_{50} day^{-1}	
	Chronic Risk	EEC/NOAEC	1
Plants			
	Acute Risk	EEC/EC_{25}	1
	Acute Endangered Species	EEC/EC_{05} or NOAEL	

Table 17. Risk presumptions for aquatic animals.

Taxonomic Group	Risk Presumption	Risk Quotient (RQ)	Level of Concern (LOC)
Animals	Acute Risk	EEC^1/LC_{50} or EC_{50}	0.5
	Acute Endangered Species	EEC/LC_{50} or EC_{50}	0.05
	Chronic Risk	EEC/NOAEC	1
Plants			
	Acute Risk	EEC^1/EC_{50}	1
	Acute Endangered Species	EEC^1/EC_{05} or NOAEL	

[1] EEC = concentration in water (ppm or ppb)

Non-target Aquatic Animals and Plants

Surface water concentrations resulting from DCNA application to selected agricultural and non-agricultural crops were predicted with the Tier II models PRZM-EXAMS. Six scenarios that consider flowable, WP or dust applications of DCNA, including grapes (CA), lettuce (CA), onions (CA), peanuts (NC), potatoes (ID) and snap beans (OR), were modeled. While celery is a major crop for DCNA use, a standard PRZM/EXAMS scenario was not available. However, because head lettuce (which was modeled) is in the same crop group as celery, and is grown in the same geographical regions, modeling results for head lettuce in California are sufficient as surrogate modeling results for celery. For each crop receiving a single application (*i.e.*, all crops except potatoes), the use scenario reflects the maximum single application rate allowed on the labels. For potatoes, the use scenario reflects the maximum annual

application rate allowed on the labels; this use rate is associated with Special Local Need (SLN; Section 24C) uses allowed only in ID, CA, OR and WA. When allowed by label, aerial uses were selected over ground spray or other uses to maximize potential spray drift to surface water bodies.

Peak EECs were compared to acute toxicity endpoints to derive acute RQs. Acute RQs for freshwater organisms are summarized in **Table 18**. Definitive acute RQ values could not be derived for estuarine/marine fish due to lack of toxicity endpoint data. RQ values for estuarine/marine invertebrates were based on a non-guideline species (e.g., Daggerblade grass shrimp) from an open literature source (Burton and Fisher, 1990) due to the absence of registrant-submitted data and were below the LOC for all uses modeled (**Table 19**). To derive chronic RQs, 60- and 21-day average EECs were compared to freshwater fish and freshwater invertebrate toxicity endpoints, respectively. The EC_{50} and EC_{05} were used to derive acute RQs for non-vascular plants and listed non-vascular plants, respectively.

In addition RQs for pelagic organisms, RQs were also calculated for benthic invertebrates (**Table 20**) since DCNA may be expected to partition to sediment. Sediment EECs were compared to toxicity estimates based on a sediment toxicity study on the midge, *Chironomus riparius*.

Risk quotients did not exceed the specified LOCs for any combination of duration (acute or chronic) and taxa (fish, invertebrate, aquatic nonvascular plant). The only exception was for the use of DCNA on celery (modeled with lettuce scenario) in which the RQ exceeded the listed-species acute risk LOC for freshwater fish. Importantly, for both the chronic fish study and the chironomid sediment toxicity study additional, guideline studies are recommended since both submitted studies deviated from guideline-specified methods.

Table 18. Acute and chronic risk quotients for freshwater fish, invertebrates and non-vascular plants exposed to DCNA.

Crop Application Annual Rate (# of apps)	EECs	Acute Risk Quotients				Chronic Risk Quotients	
	Peak / 21-day Average 60-day Average (µg/L)	Freshwater Fish [a] LC_{50} = 904 (µg/L)	Freshwater Invertebrate[b] LC_{50} = 2070 (µg/L)	Non-vascular plant[c] EC_{50} = 1300 EC_{05} = 120 (µg/L)		Freshwater Fish [a] NOEC = 49 (µg/L)	Freshwater Invertebrate[b] NOEC = 32 (µg/L)
CA grapes	9.8	0.01	<0.01	<0.01	0.08	–	–
	3.4	–	–	–	–	–	0.11
	1.6	–	–	–	–	0.03	–
CA lettuce	42.3	**0.05**[d]	0.02	0.03	0.35	–	–
	22.9	–	–	–	–	–	0.72
	11.0	–	–	–	–	0.22	–

Crop Application Annual Rate (# of apps)	EECs Peak / 21-day Average 60-day Average (µg/L)	Acute Risk Quotients				Chronic Risk Quotients	
		Freshwater Fish [a] LC_{50} = 904 (µg/L)	Freshwater Invertebrate[b] LC_{50} = 2070 (µg/L)	Non-vascular plant[c] EC_{50} = 1300 EC_{05} = 120 (µg/L)		Freshwater Fish [a] NOEC = 49 (µg/L)	Freshwater Invertebrate[b] NOEC = 32 (µg/L)
CA onions	0.24	<0.01	<0.01	<0.01	<0.01	–	–
	0.11	–	–	–	–	–	<0.01
	0.05	–	–	–	–	<0.01	–
NC peanuts	34.1	0.04	0.02	0.03	0.28	–	–
	10.9	–	–	–	–	–	0.34
	5.3	–	–	–	–	0.11	–
ID potatoes	11.2	0.01	<0.01	<0.01	0.09	–	–
	5.4	–	–	–	–	–	0.17
	3.1	–	–	–	–	0.06	–
OR snap beans	28.9	0.03	0.01	0.02	0.24	–	–
	19.7	–	–	–	–	–	0.62
	12.9	–	–	–	–	0.26	–

[a] Rainbow trout (*Oncorhynchus mykiss*)
[b] Water flea (*Daphnia magna*)
[c] Green algae (*Scenedesmus subspicatus*)
[d] exceeds endangered species level of concern (RQ ′ 0.05)

Table 19. Acute and chronic risk quotients for estuarine/marine fish and invertebrates exposed to DCNA.

Crop Application Annual Rate (# of apps)	EECs Peak / 21-day Average 60-day Average (µg/L)	Acute Risk Quotients		Chronic Risk Quotients	
		Estuarine/marine Fish[a] LC_{50} = NS[c] µg/L	Estuarine/marine Invertebrate[b] LC_{50} = 1900 µg/L	Estuarine/marine Fish NOEC = NS µg/L	Estuarine/marine Invertebrate NOEC = NS µg/L
CA grapes	9.8	NS	<0.01	–	–
	3.4	–	–	–	NS
	1.6	–	–	NS	–
CA lettuce	42.3	NS	0.02	–	–
	22.9	–	–	–	NS
	11.0	–	–	NS	–
CA onions	0.24	NS	<0.01	–	–
	0.11	–	–	–	NS
	0.05	–	–	NS	–
NC peanuts	34.1	NS	0.02	–	–
	10.9	–	–	–	NS
	5.3	–	–	NS	–
ID potatoes	11.2	NS	<0.01	–	–
	5.4	–	–	–	NS
	3.1	–	–	NS	–
OR snap beans	28.9	NS	0.02	–	–
	19.7	–	–	–	NS
	12.9	–	–	NS	–

[a] Sheepshead minnow (*Cyprinodon variegatus*)

[b] Daggerblade grass shrimp (*Palaemonetes pugio)*

[c] NS = not submitted

Table 20. Chronic risk quotients for freshwater, sediment-dwelling invertebrates exposed to DCNA.

Crop Application Annual Rate (# of apps)	EECs	Chronic Risk Quotient
	21-day Average (µg/L)	Freshwater midge (sediment-dwelling) NOEC = 1200 µg/L
CA grapes	0.54	<0.01
CA lettuce	4.0	<0.01
CA onions	0.018	<0.01
NC peanuts	2.9	<0.01
ID potatoes	1.1	<0.01
OR snap beans	5.1	<0.01

Non-target Terrestrial Animals

The EEC values for terrestrial exposure for foliar applications were derived from the Kenaga nomograph, as modified by Fletcher *et al*. (1994), based on a large set of actual field residue data. For spray applications, EECs were calculated for five different crop scenarios (carrots, lettuce, peanuts, potatoes, and snap beans) with application rates ranging from 3.75 to 7.5 lb ai/A/year. For non-foliar applications , EECs were calculated for onions based on a mass of pesticide per unit area, in this case, mg ai ft^{-2}. Typically, risk quotients are based on the most sensitive LC_{50} or LD_{50} and NOAEC or NOAEL values for birds and mammals (mammalian risk is based on lab rat studies). For non-foliar applications, the mg ai ft^{-2} values are compared to adjusted LD_{50} values to estimate the potential for mortality (*i.e.*, $LD_{50}ft^{-2}$).

The predicted peak and mean residues of a pesticide that may be expected to occur on selected avian or mammalian food items immediately following a direct single application at 1 lb ai/A is presented in **Table 20**. Dose-based acute risk and dietary-based chronic RQs for non-granular applications of DCNA to birds are addressed in **Table 21**. Acute and endangered species LOCs are exceeded for birds on many of the proposed uses in this screening-level assessment (RQ range: 0.1 – 2.96). Chronic RQ exceed the LOCs in the short grass, tall grass, and broadleaf plants/small insects categories for all uses modeled (RQ range: 1.06 – 4.35). Acute and chronic RQs were the highest on potatoes and the lowest on carrots and snap beans.

Table 20. Estimated environmental concentrations on avian and mammalian food items (ppm) following a single applications at 1 lb ai/A.

Application Rate	Food Items	EEC (ppm) Predicted Upper Bound Residue[1]	EEC (ppm) Mean[1]
1 lb a.i./A	Short grass	240	85

Application Rate	Food Items	EEC (ppm) Predicted Upper Bound Residue[1]	EEC (ppm) Mean[1]
	Tall grass	110	36
	Broadleaf/forage plants and small insects	135	45
	Fruits, pods, seeds, and large insects	15	7

[1] Predicted upper bound and mean residues are for a 1 lb ai/a application rate and are based on Hoerger and Kenaga (1972) as modified by Fletcher *et al.* (1994).

Table 21. Avian acute and chronic risk quotients for selected uses of nongranular products of DCNA based on a bobwhite quail LD_{50} = 900 mg/kg-bw[a] and NOAEC of 300 ppm[a].

Use/App. Method	Application Rate lbs. a.i./A (# app / interval, days)	Food Items	Acute RQ (Avian Acute Daily Exposure / adj. LD_{50})			Chronic RQ (EEC/ NOAEC)
			20 g	100 g	1000 g	
Carrots	2 (2 / 7)	Short grass	**1.61**[b]	**0.72**[b]	**0.23**[c]	**2.32**[d]
		Tall grass	**0.74**[b]	**0.33**[c]	**0.10**[c]	**1.06**[d]
		Broadleaf plants/small insects	**0.90**[b]	**0.40**[c]	**0.13**[c]	**1.31**[d]
		Fruits, pods, seeds, and large insects	**0.10**[c]	0.04	0.01	0.15
Celery Carrots, Lettuce, Peanuts	4 (1 / NA)	Short grass	**1.72**[b]	**0.77**[b]	**0.24**[c]	**2.48**[d]
		Tall grass	**0.79**[b]	**0.35**[c]	**0.11**[c]	**1.14**[d]
		Broadleaf plants/small insects	**0.97**[b]	**0.43**[c]	**0.14**[c]	**1.40**[d]
		Fruits, pods, seeds, and large insects	**0.11**[c]	0.05	0.02	0.16
Potatoes	1.5 (5 / 7)	Short grass	**2.49**[b]	**1.11**[b]	**0.35**[c]	**3.59**[d]
		Tall grass	**1.14**[b]	**0.51**[b]	**0.16**[c]	**1.65**[d]
		Broadleaf plants/small insects	**1.40**[b]	**0.63**[b]	**0.20**[c]	**2.02**[d]
		Fruits, pods, seeds, and large insects	**0.16**[c]	0.07	0.02	0.22
Snap beans	3.75 (1 / NA)	Short grass	**1.61**[b]	**0.72**[b]	**0.23**[c]	**2.33**[d]
		Tall grass	**0.74**[b]	**0.33**[c]	**0.10**[c]	**1.07**[d]
		Broadleaf plants/small insects	**0.91**[b]	**0.41**[c]	**0.13**[c]	**1.31**[d]
		Fruits, pods, seeds, and large insects	**0.10**[c]	0.05	0.01	**0.15**

[a] acute oral toxicity test (MRID 437551-01), avian reproduction study (MRID 462189-00).
[b] exceeds acute risk (RQ ′ 0.5) and endangered species level of concern (RQ ′ 0.1)
[c] exceeds endangered species level of concern (RQ ′ 0.1)
[d] exceeds chronic risk level of concern (RQ ′ 1.0)

Estimating potential acute risk with non-foliar applications of a pesticide is accomplished by calculating the $LD_{50}ft^{-2}$. The pesticide per unit area (*e.g.*, mg ai ft^{-2}) and the LD_{50} for 20, 100 and 1000 g birds was also calculated. In this screening assessment, in-furrow treatment of onions with DCNA was examined by this method. A 92% incorporation efficiency for T-band applications was used as per Agency guidance (USEPA, 1992). **Table 22** summarizes the acute risk to the various weight classes of birds from the onion scenario. Acute and endangered species LOCs are exceeded for 20 g birds and the acute endangered species LOC was exceeded for 100 g birds.

Table 22. $LD_{50}ft^{-2}$ values for birds from DCNA application to onions based on a Bobwhite quail LD_{50} = 900 mg/kg-bw and an exposed mg ai ft^{-2} = 10.37. Values in bold exceed the LOC (see table footnotes).

Avian weight class (g)	$LD_{50}ft^{-2}$
20	**0.799**[a]
100	**0.126**[b]
1000	0.009

[a] exceeds the acute risk LOC = 0.5 and the acute endangered species LOC = 0.1

[b] exceeds the acute endangered species LOC = 0.1

Acute risk and chronic RQs for mammals are summarized in **Tables 23 and 24**, respectively. Using the rat LD_{50} endpoint from a 48.8% formulation of DCNA, acute endangered species LOCs are exceeded in the short grass category for all crops modeled (15 and 35 g mammals, except for snap beans), tall grass for potatoes (15 g mammals only), and the broadleaf plant/small insects for potatoes (15 and 35 g mammals) (RQ range: <0.01 – 0.21). Chronic LOCs for mammals were exceeded for all major crops modeled on many food items, with the exception of seeds, at current application rates (RQ range: 0.2 – 58). Data from the literature suggest that the acute oral LD_{50} for rats exposed to TGAI DCNA can be as low as 1500 mg/kg-bw (Jones *et al.*, 1968). If this value were used to estimate the potential risk, the acute RQs would be much higher.

Table 23. Acute dose-based RQ values for small (15-g), intermediate (35-g) and large (1,000-g) mammals feeding on short or tall grass, broadleaf plants/small insects, fruits/pods/large insects and seeds exposed to DCNA following single and multiple applications based on a rat LD_{50} = 3400 mg/kg-bw[a].

Use/App. Method	Application Rate lbs. a.i./A (# app / interval, days)	Body Weight, (g)	Mammalian Acute Risk Quotients				
			Short Grass	Tall Grass	Broadleaf Plants/Small Insects	Fruits/pods/ large insects	Seeds
Carrots	2 (2 / 7)	15	**0.11**[b]	0.05	0.06	0.01	<0.01
		35	**0.10**[b]	0.04	0.06	0.01	<0.01
		1000	0.05	0.02	0.03	<0.01	<0.01
Celery, Carrots, Lettuce, Peanuts	4 (1 / NA)	15	**0.12**[b]	0.06	0.07	0.01	<0.01
		35	**0.10**[b]	0.05	0.06	0.01	<0.01
		1000	0.06	0.03	0.03	<0.01	<0.01
Potatoes	1.5 (5 / 7)	15	**0.18**[b]	0.08	0.10[b]	0.01	<0.01
		35	**0.15**[b]	0.07	0.09	0.01	<0.01
		1000	0.08	0.04	0.04	<0.01	<0.01
Snap beans	3.75 (1 / NA)	15	**0.11**[b]	0.05	0.06	0.01	<0.01
		35	**0.10**[b]	0.05	0.06	0.01	<0.01
		1000	0.05	0.02	0.03	<0.01	<0.01

[a] acute oral rat study (MIRD 000242341), used a 48.8% formulation, no acceptable TGAI study available

[b] exceeds endangered species level of concern (RQ ′ 0.1)

Table 24. Chronic dose-based RQ values for small (15-g), intermediate (35-g) and large (1,000-g) mammals feeding on short or tall grass, broadleaf plants/small insects, fruits/pods/large insects and seeds exposed to DCNA following single and multiple applications based on a rat NOAEL = 12.5 mg/kg-bw. Values in bold exceed the chronic risk LOC = 1.0.

Use	Application Rate lbs. a.i./A (# app / interval, days)	Body Weight, (g)	Mammalian Chronic Risk Quotients				
			Short Grass	Tall Grass	Broadleaf Plants/Small Insects	Fruits/pods/ large insects	Seeds
Carrots	2 (2 / 7)	15	**31**	**14**	**18**	**2**	0.43
		35	**27**	**12**	**15**	**1.7**	0.37
		1000	**14**	**6.5**	**8**	0.89	0.2
Carrots, Lettuce, Peanuts	4 (1 / NA)	15	**33**	**15**	**19**	**2**	0.46
		35	**28**	**13**	**16**	**1.8**	0.4
		1000	**15**	**7**	**8.6**	0.95	0.21
Potatoes	1.5 (5 / 7)	15	**48**	**22**	**27**	**3.0**	0.7
		35	**41**	**19**	**23**	**2.6**	0.6
		1000	**22**	**10**	**12**	**1.4**	0.3
Snap beans	3.75 (1 / NA)	15	**31**	**14**	**18**	**2**	0.4
		35	**27**	**12**	**15**	**1.7**	0.4
		1000	**14**	**6.6**	**8**	0.9	0.2

Table 25 summarizes the acute risk to the various weight classes of mammals from the onion scenario. There were no acute exceedances of the LOC for mammals; however, given that the LD_{50} values were based on 48.8% formulation of DCNA and not the TGAI, these $LD_{50}ft^{-2}$ values are possibly underestimated.

Table 25. $LD_{50}ft^{-2}$ values for mammals from DCNA application to onions based on an acute oral rat LD_{50} = 3400 mg/kg-bw (48.8% DCNA formulation) and an exposed mg ai ft^{-2} = 10.37.

Mammalian weight class (g)	$LD_{50}ft^{-2}$
15	0.092
35	0.049
1000	0.004

Non-target Terrestrial and Semi-Aquatic Plants

No data were available to estimate the risk to non-target terrestrial and semi-aquatic plants.

Risk Description

The results of this screening-level risk assessment suggest the potential for direct adverse acute effects to birds, and chronic effects to birds and mammals, based on all modeled non-granular application rates of DCNA (1.5 to 4.0 lb ai/A). Non-foliar application of DCNA at 4 lb ai/A may also result in direct adverse acute effects to non-target birds. Since acute endangered species LOCs were also exceeded for mammals and freshwater fish for some uses, these taxa are also included in the endangered species assessment, below. Results also indicated that acute risks to non-vascular plants, including endangered non-vascular plants, are unlikely.

A deficiency in the risk assessment is that chronic toxicity data for DCNA were not submitted for estuarine/marine fish nor for estuarine/marine invertebrates. Also, guideline chronic toxicity data for freshwater fish is still required, although a supplemental study was used in this assessment to estimate risks. In addition, the chironomid sediment toxicity study did not meet guideline requirements and therefore there is some uncertainty associated with risk estimates for sediment-dwelling invertebrates. Although the chronic risks to freshwater fish and invertebrates suggest that effects are not likely for most proposed uses, the potential for chronic risk for estuarine and marine animals cannot be precluded. Given the proximity of many of the use sites to estuarine and marine habitats, this Without chronic toxicity data for estuarine and marine animals, the ecological risk assessment for DCNA should be considered incomplete.

Risks to Aquatic Organisms

Risk to Fish

The RQ generated from the CA lettuce scenario exceeded the listed-species acute risk level of concern (LOC) for listed freshwater fish species indicating that acute effects to fish may occur under some use patterns, particularly for lettuce. The RQs do not indicate a potential risk to non-listed fish populations since RQs are below the acute level of concern for both rainbow trout and bluegill sunfish. Although there appears to be little potential for risk to fish, the toxicity data for freshwater fish suggest substantial variability between species. For instance, the LC_{50} for bluegill sunfish (1.08 ppm) is greater than the concentration which caused 100% of test subjects to die in the rainbow trout study (0.75 ppm). Freshwater fish that are more sensitive than the rainbow trout could be at greater risk of mortality from exposure to DCNA. However, it is important to acknowledge that the modeled EECs, which were simulated using maximum application rates, are significantly below the lowest concentration at which any mortality was observed in laboratory tests (0.24 ppm for rainbow trout).

Although an RQ was generated for chronic fish risk, the toxicity study used for this assessment was a non-guideline study. It is possible that results from a guideline study would produce a lower

toxicity endpoint since the submitted study did not include an evaluation of fish development or reproduction, which may be more sensitive than growth alone.

Importantly, neither acute nor chronic data were submitted for estuarine/marine fish. Without this data, ***the ecological risk assessment for DCNA should be considered incomplete.*** A majority of DCNA use is in California where applications of this pesticide can impact coastal ecosystems. For instance, use on celery has accounted for more of the total pounds of DCNA applied than any other crop in recent years. The USDA crop profile for California indicates that 75% of celery grown in the US is grown in California, and nearly 99% of that is grown in the Central Coastal and South Coastal growing regions (http://www.ipmcenters.org/cropprofiles/docs/cacelery.html).

Burton and Fisher (1990), reported a 20% mortality to mummichogs, a close relative of the Sheepshead minnow, from acute exposure to DCNA at the highest level tested (2.7 ppm). The toxicity data for this non-guideline species indicate that DCNA is toxic to estuarine/marine fish. However, since this concentration is much higher than the highest peak EEC estimated with PRZM-EXAMS, it would not result in an LOC exceedence were it to be used to calculate a risk quotient . Toxicity testing using guideline species sheepshead minnow would be valuable to better determine the potential risk to estuarine/marine fish.

Risk to Aquatic Invertebrates

Acute risk to freshwater invertebrates is unlikely, based on the results of the screening assessment. Although DCNA is classified as moderately toxic to freshwater invertebrates, the current proposed uses did not produce acute LOC exceedances. Similarly, acute risk to estuarine/marine invertebrates is considered unlikely, since the current proposed uses did not produce acute LOC exceedances, based on non-guideline toxicity data for the daggerblade grass shrimp (*Palaemonetes pugio).*

The results of the screening assessment indicated that chronic risk to freshwater invertebrates is similarly unlikely. No RQs exceeded the chronic risk LOC including RQs for sediment-dwelling invertebrates even though DCNA may be expected to partition to sediments under some conditions. However, the submitted sediment toxicity study did not meet guideline requirements so there is some uncertainty associated with the RQs. Importantly, there were no data available for to evaluate the potential risks to estuarine/marine inveterbrates associated with proposed uses of DCNA.

Plants

Risk quotients for aquatic non-vascular plants did not exceed the acute risk LOC for non-listed or listed species. Hence, risks to non-vascular plants are not expected from the proposed uses of DCNA. No toxicity data were available for aquatic vascular plants, and therefore, risks to these species cannot be completely precluded. However, given the low potential for adverse effects to non-vascular aquatic plants, it seems unlikely that there would be adverse effects to aquatic vascular plants associated with uses of DCNA.

Risks to Terrestrial Organisms

Acute risk to Birds

Although DCNA is classified as practically non-toxic to slightly toxic to birds, in both the acute oral and subacute dietary studies, mortality was observed. In the acute dietary tests, there was a dose-related reduction in food consumption in addition to the mortalities. Clinical signs of toxicity started at 250 mg/kg-bw and mortalities started at the 500 mg/kg-bw dose. While clinical signs of toxicity were minor in these tests, the mortalities seemed to be caused by food avoidance and starvation, rather than overt toxicity. In the acute oral tests, there was also a dose-related reduction in food consumption coupled with increasing body weight losses noted with increasing dosage concentration.

Because of the uncertainty involved with the food avoidance and indirect mortality observed in the subacute dietary test (*i.e.*, this test being of lesser quality as an indicator of toxicity in this case), the acute dose-based RQs generated were relied upon for determining risk. Dose-based RQs also allowed EFED to scale the risk to different weight classes of birds, and given the LOC exceedance pattern, decrease the uncertainty of characterizing the risk from applications of DCNA. While the dietary-based RQ values are lower than the dose-based RQ values, there were still acute and endangered species exceedances of a similar pattern.

Since the maximum annual application rate for all crops except potatoes is 4 lb ai/acre, the maximum residues on terrestrial food items would occur for these crops immediately after a single 4 lb ai/acre application. Such an application is allowed on the label for some of the most important DCNA crops, including celery and lettuce. The peak EEC for a 4 lb ai/acre application, assuming the 95th percentile concentrations from Fletcher and Kenaga, would be 960 ppm. Given the bobwhite quail LD_{50} of 900 mg/kg-bw, a single application rate of 1.15 lb ai/acre would be necessary to reduce all avian RQs below the acute LOC (Figure 2). The maximum application rate for all DCNA crops, including potatoes, is currently higher than that rate. Even if a single application at 1.15 lb ai/acre were to occur, however, the resulting 95th percentile EECs would still result in exceedence of the endangered species LOC for 20 g and 100 g birds for most feed items.

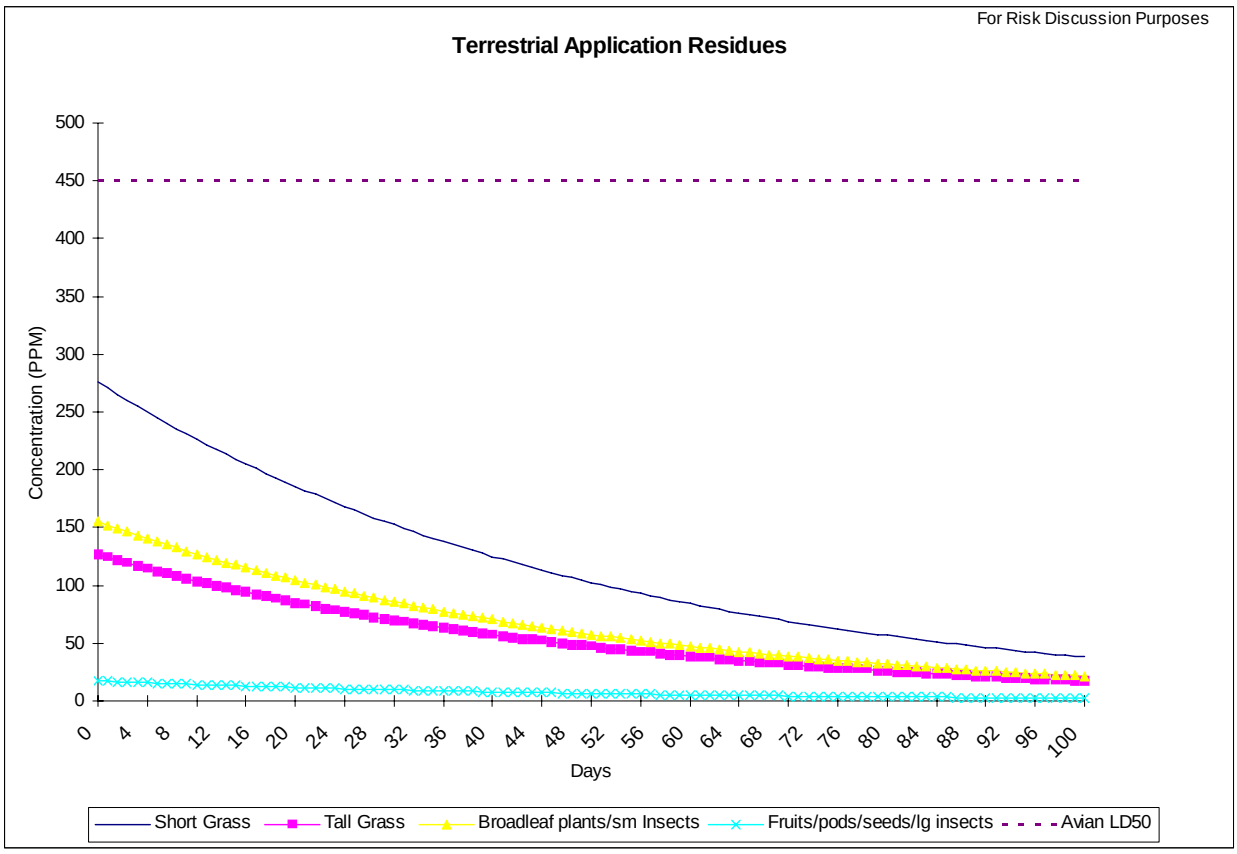

Figure 2. 95th percentile terrestrial residues from a 1.15 lb application of DCNA to celery

If EECs based on mean Fletcher and Kenaga residues are considered, the 4.0 lb ai/acre rate leads to an RQ above the acute LOC for 20 g birds feeding on short grass only, and exceedence of the endangered species LOC for 20 g and 100 g birds for most feed items. It would require a single application of no more than 0.6 lb ai/acre to bring all dose-based avian RQs below the endangered species LOC. Therefore, even when considering mean residues on avian feed items, it might be difficult to eliminate endangered species concerns with DCNA application rate reductions.

Chronic Risk to Birds

The potential for chronic risk to birds is indicated for all DCNA-treated crops. Chronic toxicity of DCNA to birds was evidenced in the avian reproduction study by a significant reduction in egg production, embryo viability, embryo survival, hatchability, offspring survival, and survivor body weights (NOAEC = 387 mg/kg-diet). Additionally, a dose-related reduction in food consumption occurred. Mortality occurred during this study and those dead birds were considered to be emaciated at the time of death.

This observation of emaciated birds in the chronic toxicity study is a source of some uncertainty in the finding of potential avian reproductive effects. The chronic risk quotients were calculated with the assumption that birds near or in the treated field would eat only food items treated with DCNA. These RQ values were all below 2.5, with the exception of the 3.59 chronic RQ for short grass near treated potatoes. If birds were to consume a smaller portion of treated feed because they were repulsed by DCNA contamination, they might receive a dose not expected to cause the chronic effects seen in the laboratory.

An additional uncertainty in the potential for chronic effects to birds stems from the time of application of DCNA. Revised labels proposed by the registrant for the reregistration of DCNA will proscribe the maximum application rate "per year" instead of "per season." This is significant for the potential for chronic risk since some of the major crops on which DCNA is used can be grown more than once in a year. For instance, the USDA crop profile for California celery indicates that 2.5 crops of celery can be grown in a single year. If DCNA is applied in the winter rainy season, then residues may not be present during birds' breeding season to cause the effects. However, since the Sclerotinia fungus can persist throughout the year, then application during the breeding season is also possible. The new label language ensures that multiple applications can occur during one of those time periods, but multiple applications will not occur during both.

The highest chronic risk quotients result from the maximum annual application rate on potatoes, which is five 1.5 lb ai/A applications of DCNA with a seven day interval. If one assumes 95th percentile residues as reported by Fletcher and Kenaga, and a 35 day foliar dissipation half-life, residues on short grass, tall grass, and broadleaf plants/small insects are above the avian chronic NOAEC for a length of time. Residues on short grass exceed the avian NOAEC for approximately 80 days after the second application and 30 to 40 days after the third application for broadleaf and tall grass feed items (**Figure 3)**. A single foliar DCNA application of 1.6 lb ai/A, two applications of 0.85 lb ai/A with a seven-day interval, or five applications of 0.41 with a seven-day interval would be required to achieve RQ values for birds that are less than chronic LOCs.

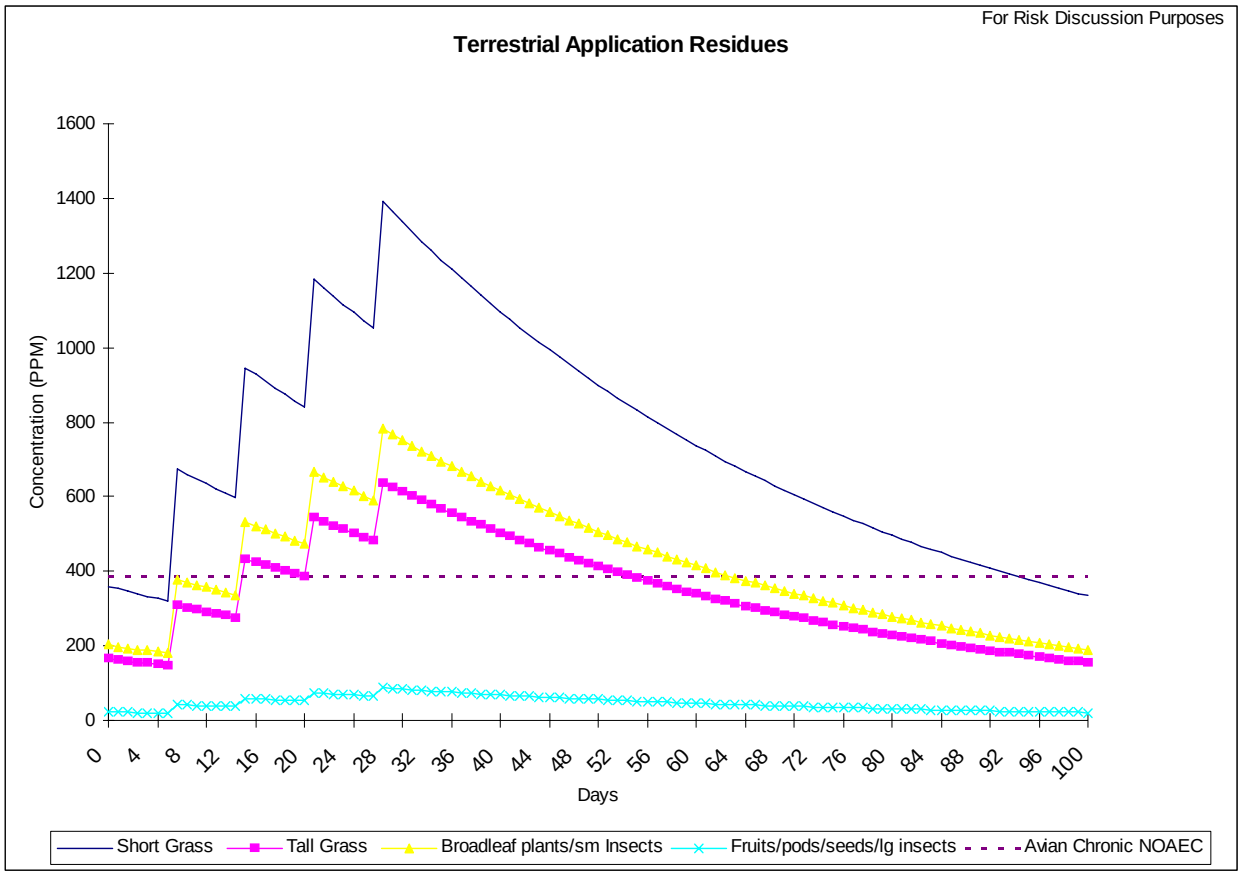

Figure 3. Terrestrial residues from 5 applications of 1.5 lb ai/acre DCNA to potatoes

If EECs based on mean Fletcher and Kenaga residues are considered, the maximum potato application scheme results in an RQ above the chronic LOC for short grass only. This indicates that chronic risk is possible for some birds any time DCNA is applied at maximum annual rate and minimum interval for potatoes, and not just under circumstances under which greater than average residues occur.

Foliar dissipation data for DCNA, which are currently unavailable, would allow an improved understanding of the maximum residues that would be expected from multiple applications of DCNA. If one assumes the 95th percentile residues as reported by Fletcher and Kenaga, a foliar dissipation half-life of approximately 1.6 days would be needed to reduce peak residues below the chronic LOC.

Acute Risk to Mammals

Risk quotients for mammals do not exceed the acute LOC, but exceed the listed-species acute risk LOC ($\geq$ 0.1) for 15-gram and 100-gram mammals which feed on short grass. If less than maximum

rates are considered, or if RQs are calculated with mean instead of 95th percentile anticipated residues, then resulting RQs would not exceed the listed species LOC.

Since the submitted acute oral rat study (guideline study, 81-1) used a 48.8 % formulation of DCNA and not the TGAI, there is some uncertainty regarding the magnitude of acute mammalian risk quotients for DCNA. Calculated RQs for the representative crops in this screening level assessment did not exceed the acute risk LOC, although the acute endangered species LOC was exceeded on short grass in at least two weight classes for all crops and also on tall grass and broadleaf plants/small insects for the potato use. The LD_{50} from that study (3400 mg/kg-bw) is in the range of LD_{50} values for DCNA reported in the open literature (Jones *et al.*, 1968), but the lower end of that range was 1500 mg/kg-bw. If that endpoint were used quantitatively, the mammalian acute RQs would be higher, but still would be below the acute mammalian LOC. Submission of an acute oral rat study using technical DCNA would be most useful in assessing the potential risk to individual endangered mammals which is suggested by the exceedence of the endangered species LOC.

The data from the acute oral study do not provide insight to whether mammals might avoid DCNA-treated feed. The acute oral toxicity study is a gavage study; treated rats do not have the option to refuse the food in this study. However, the Agency review of the two-generation rat reproduction study, described below, states that "overall average food consumption ... did not appear to show any differences of toxicological concern for any generation during premating, gestation or lactation". Food avoidance was also not described as an observed adverse effect in the two-year chronic toxicity study with dogs (MRID's 00029056, 00082718, 00026810). It appears, then, that mammals are not repulsed by DCNA-treated feed in the way birds were in laboratory studies.

Chronic Risk to Mammals

Chronic risks to mammals were evaluated using a chronic parental and reproductive NOAEC of 250 mg/kg-diet. This NOAEC value is based on reduction in pup body weights and adult body weight gain. The decrease in mean litter body weight gain was measured at 80.9% for the F_1 generation and 86.6% for the F_2 generation compared to corresponding controls. During the pre-mating period, there was a decrease in body weight gain of F0 females (88.4% of the controls) at 1250 ppm, compared with control values. In both generations, weight gain during gestation at 1250 ppm was lower than control (F0 animals - 90% of the controls; F_1 animals - 93% of the controls).

Chronic LOCs are exceeded for all modeled scenarios (application rates ranging from 1.5 to 4.0 lb ai/A) and categories of consumed food, except for seeds (granivores). A non-granular DCNA application rate of 0.11 lb ai/A would be required to achieve RQ values for mammals that are less than chronic LOCs. This value is 68 times less than the maximum non-granular annual application rate of 7.5 lb ai/A. The magnitude of the RQs are such that the chronic LOC is exceeded for all crops (short grass feed item), even if mean residues are considered.

Risk to Terrestrial Plants

No terrestrial plant toxicity data were available to quantitatively assess the risk of DCNA exposure to non-target terrestrial plants or semi-aquatic plants. However, as detailed in the Effects Characterization, Fischer and Landis observed stem injury to blue spruce (*Picea pungens*) seedlings from post-sowing applications of DCNA (Fischer and Landis, 1990). The eventual stem damage reported in this study, and a subsequent confirmatory study, are effects that would not necessarily be noticed in guideline vegetative vigor and seedling emergence studies. However, given these data, and the fact that two of the major proposed non-food uses of DCNA in this assessment are to Christmas trees and forest conifers, the value of guideline plant data for DCNA would be high.

Endocrine Disruption Potential

Based on possible endocrine effects to mammals and birds (via reproductive effects), DCNA may be classified as a potential endocrine disruptor. This is based on increased vaginal proestrus and decreased metestrus morphology, and increased abnormal sperm morphology in the mammals; and decreased reproductive capacity in the birds. There is uncertainty regarding whether these effects on a broad range of taxonomic groups are indicative of DCNA's capacity to act on endocrine-mediated processes; however, the sublethal effects observed in chronic toxicity studies are sufficient to trigger concerns regarding the endocrine disrupting potential of DCNA.

EPA is required under the Federal Food, Drug, and Cosmetic Act (FFDCA), as amended by the Food Quality Protection Act (FQPA), to develop a screening program to determine whether certain substances (including all pesticide active and other ingredients) "*may have an effect in humans that is similar to an effect produced by a naturally occurring estrogen, or other such endocrine effects as the Administrator may designate.*" Following the recommendations of its Endocrine Disruptor Screening and Testing Advisory Committee (EDSTAC), EPA determined that there was a scientific basis for including, as part of the program, the androgen and thyroid hormone systems, in addition to the estrogen hormone system. EPA also adopted EDSTAC's recommendation that the Program include evaluations of potential effects in wildlife. For pesticide chemicals, EPA will use the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and, to the extent that effects in wildlife may help determine whether a substance may have an effect in humans, FFDCA authority to require the wildlife evaluations. As the science develops and resources allow, screening of additional hormone systems may be added to the Endocrine Disruptor Screening Program (EDSP). When the appropriate screening and/or testing protocols being considered under the Agency's EDSP have been developed, DCNA may be subjected to additional screening and/or testing to better characterize effects related to endocrine disruption.

Review of Incident Data

There were no incidents for DCNA listed in the Ecological Incident Information System database.

Federally Threatened and Endangered (Listed) Species Concerns

Action Area

For listed species assessment purposes, the action area is considered to be the area affected directly or indirectly by the Federal action and not merely the immediate area involved in the action. This screening-level risk assessment considers broadly described taxonomic groups and so conservatively assumes that listed species within those broad groups are co-located with the pesticide treatment area. For example, terrestrial plants and wildlife are assumed to be located on or adjacent to the treated site and aquatic organisms are assumed to be located in a surface water body adjacent to the treated site. This assessment also assumes that the listed species are located within an assumed area which has the relatively highest potential exposure to the pesticide, and that exposures are likely to decrease with distance from the treatment area. The problem formulation section of this risk assessment presents the DCNA use sites that are used to establish initial co-location of species with treatment areas.

If the assumptions associated with the screening-level action area result in RQs that are below the listed species LOCs, a "no effect" determination conclusion is made with respect to listed species in that taxa, and no further refinement of the action area is necessary. Furthermore, RQs below the listed species LOCs for a given taxonomic group indicate no concern for indirect effects upon listed species that depend upon the taxonomic group covered by the RQ as a resource. However, in situations where the screening assumptions lead to RQs in excess of the listed species LOCs for a given taxonomic group, a potential for a "may affect" conclusion exists and may be associated with direct effects on listed species belonging to that taxonomic group or may extend to indirect effects upon listed species that depend upon that taxonomic group as a resource. In such cases, additional information on the biology of listed species, the locations of these species, and the locations of DCNA use sites will be considered to determine the extent to which screening assumptions regarding an action area apply to a particular listed organism. These subsequent refinement steps will consider how this information would impact the action area for a particular listed organism and may potentially include areas of exposure that are downwind and downstream of the pesticide use site.

Taxonomic Groups Potentially at Risk

The Agency's levels of concern for Federally listed freshwater fish, birds, and mammals are exceeded for the use of DCNA. Given the known usage patterns of DCNA in the U.S. (i.e., ~81 % in California (23% in Monterey Co. alone), ~18% in the Pacific northwest, and ~1% for the rest of the country) and the expected large number of listed species that are likely to occur in counties where DCNA is used, a list of endangered/threatened species and crop acreage at the county level for the taxonomic groups and crops of concern is not included in this phase of the risk assessment process. It is assumed that LOCs are exceeded for listed species within these broad taxonomic groups co-located with the DCNA treatment areas.

The preliminary risk assessment for Federally listed species indicates that DCNA exceeds the endangered species LOCs for the following combinations of analyzed uses and species:

Critical Habitats and Indirect Effects

In the evaluation of pesticide effects on designated critical habitat, consideration is given to the physical and biological features (constituent elements) of a critical habitat identified by the U.S. Fish and Wildlife and National Marine Fisheries Services as essential to the conservation of a listed species and which may require special management considerations or protection. The evaluation of impacts for a screening-level pesticide risk assessment focuses on the biological features that are constituent elements and is accomplished using the screening-level taxonomic analysis (RQs) and listed species LOCs that are used to evaluate direct and indirect effects to listed organisms.

The screening-level risk assessment has identified potential concerns for indirect effects on listed species for those organisms dependant upon freshwater fish (including amphibians), birds (including reptiles), and mammals. In light of the potential for indirect effects, the next step for EPA and the Service(s) is to identify which listed species and critical habitat are potentially implicated. Analytically, the identification of such species and critical habitat can occur in either of two ways. First, the agencies could determine whether the action area overlaps critical habitat or the occupied range of any listed species. If so, EPA would examine whether the pesticide's potential impacts on non-endangered species would affect the listed species indirectly or directly affect a constituent element of the critical habitat. Alternatively, the agencies could determine which listed species depend on biological resources, or have constituent elements that fall into, the taxa that may be directly or indirectly impacted by DCNA. EPA would then determine whether DCNA usage overlaps the critical habitat or the occupied range of those listed species. At present, the information reviewed by EPA does not permit use of either analytical approach to make a definitive identification of species that are potentially impacted indirectly or of critical habitats that are potentially impacted directly by the use of DCNA. EPA and the Service(s) are working together to conduct the necessary analysis.

This screening-level risk assessment for critical habitat provides a listing of potential biological features that, if they are constituent elements of one or more critical habitats, would be of concern. These correspond to the taxa identified above as being of potential concern for indirect effects and include the following: freshwater fish (including amphibians), birds (including reptiles), and mammals. This list should serve as an initial step in problem formulation for further assessment of critical habitat impacts outlined above, should additional work be necessary.

Risk to Individual Organisms

To lend a perspective on how RQ values and/or the level of concern relate to the likelihood of effects to a single individual, EFED has developed a model (**Appendix**) that makes use of the probit dose-response curve slope and relates the probability of effect to normal z-distributions. In the case of acute avian toxicity, the slope of the acute bobwhite quail probit dose-response curve is 17.13; based on the model output, the chance of a single bird dying is 1 in 10^{16} when the RQ value equals the endangered species level of concern (LOC=0.1). At the maximum RQ value estimated for bobwhite quail (RQ= 2.49) following acute exposure to DCNA, the risk of a single aquatic vertebrate dying is approximately 1 in 1 (**Appendix**).

Acute effects were also observed in the freshwater fish and freshwater invertebrate acute toxicity studies. In the case of acute freshwater fish toxicity, the slope of the acute rainbow trout probit dose-

response curve is 2.73; based on the model output, the chance of a single fish dying is 1 in 5,230 when the RQ value equals the endangered species level of concern (LOC=0.05). At the maximum RQ value estimated for rainbow trout (RQ= 0.05) following acute exposure to DCNA, the risk of a single aquatic vertebrate dying is the same as at the LOC and is approximately 1 in 5,230 (**Appendix**). In the case of acute freshwater invertebrate toxicity, the slope of the acute daphnia probit dose-response curve is 8.6; based on the model output, the chance of a single aquatic invertebrate dying is 1 in 10^{16} when the RQ value equals the endangered species level of concern (LOC=0.05). At the maximum RQ value estimated for *Daphnia magna* (RQ= 0.02) following acute exposure to DCNA, the risk of a single aquatic vertebrate dying is also approximately 1 in 10^{16} (**Appendix**).

Descriptions of Assumptions, Limitations, Uncertainties, Strengths and Data Gaps

Assumptions, Limitations, Uncertainties, Strengths and Data Gaps Related to Exposure for All Taxa

This screening-level risk assessment relies on labeled statements of the maximum rate of DCNA application, the maximum number of applications, and the shortest interval between applications. Together, these assumptions constitute a maximum use scenario. The frequency at which actual uses approach these maximums is dependant on the number and timing of applications, and market forces. In addition, rates of application less than the maximum rate are also considered.

Assumptions, Limitations, Uncertainties, Strengths and Data Gaps Related to Exposure for Aquatic Species

For the aquatic exposure characterization, uncertainty in the EEC's lies primarily in the uncertainty of how well the OPP models reflect reality and how well the laboratory study data represent environmental fate characteristics of DCNA. Also, although the environmental fate database was fairly complete, the metabolic degradation rate of the parent in aerobic aquatic environments is uncertain. However, even with consideration for these uncertainties, the concentrations presented are OPP's best conservative estimates given the currently available tools. A strength of the exposure characterization was the availability of standard modeling scenarios for most of the main uses of DCNA, with the exception of celery, although the head lettuce use scenario was used as a surrogate.

The main environmental fate data gap is the lack of accurate information on the aerobic aquatic metabolism of DCNA, as the submitted study was classified as not acceptable. Thus, an estimated aerobic aquatic metabolism half-life input value was used in modeling. EFED used current input parameter guidance and conducted the modeling using an input value which is twice that of the input value (the 90th percentile of the upper confidence bound) for aerobic *soil* metabolism. However, it is likely that DCNA will degrade more rapidly in aquatic environments than is apparent from the aquatic metabolism half-life input value of 1828 days. This is supported by the results of other submitted studies in which the *anaerobic* aquatic metabolism of DCNA was observed to occur relatively rapidly, with half-lives ranging from approximately 0.5 to 10 days. While aerobic aquatic metabolism is not expected to occur as rapidly as anaerobic aquatic metabolism for an organochlorine such as DCNA, it is unlikely that the compound will be as persistent in the environment under aquatic conditions as suggested by the 1828-day aerobic half-life. How much less persistent the compound may be in aerobic aquatic environments is an uncertainty.

Assumptions, Limitations, Uncertainties, Strengths and Data Gaps Related to Exposure for Terrestrial Species

For screening terrestrial risk assessments for listed species, a generic bird or mammal is assumed to occupy either the treated field or adjacent areas receiving pesticide at a rate commensurate with the treatment rate on the field. Spray drift model predictions suggest that this assumption leads to an overestimation of exposure to species that do not occupy the treated field. For screening risk assessment purposes, the actual habitat requirements of any particular terrestrial species are not considered, and it assumed that species occupy, exclusively and permanently, the treated area being modeled. This assumption leads to a maximum level of exposure in the risk characterization.

Screening-level risk assessments for spray applications of pesticides consider dietary exposure alone. Other routes of exposure, not considered in this assessment, are discussed below:

This risk assessment does not consider incidental soil ingestion. Available data suggests that up to 15% of the diet can consist of incidentally ingested soil depending on the species and feeding strategy (Beyer et al., 1994). A simple first approximation of soil concentration of pesticide from spray application shows the effect of not considering incidental soil ingestion:

Assuming the maximum application rate of non-granular DCNA of 7.5lb/acre (~8.3 kg/ha) to a bare, very low density soil (1 g/cm^3) incorporated to 1-cm depth (actual incorporation depths may range from 5 to 20 cm), the following soil concentrations can be calculated for a depth of 1 cm:

soil concentration =

8.3 kg/ha x 1,000,000 mg/kg ÷ 100,000,000 cm^3/ha x 1 cm^3/0.001 kg = 83 mg/kg

Including this concentration into the standard screening-level method and assumptions for food item pesticide residues (e.g., 240 ppm residue assumption for short grass) shows that ingestion of soil at an incidental rate of up to 15% of the diet would not significantly increase dietary exposure.

The screening risk assessment does not consider inhalation exposure. Such exposure may occur through three potential sources: (1) spray material in droplet form at the time of application (2) vapor phase pesticide volatilizing from treated surfaces, and (3) airborne particulate (soil, vegetative material, and pesticide dusts).

Available data suggest that inhalation exposure at the time of application is not an appreciable route of exposure for birds. According to research on mallards and bobwhite quail, respirable particle size in birds (particles reaching the lung) is limited to a maximum diameter of 2 to 5 microns (U.S. Environmental Protection Agency, 1990). The spray droplet spectra covering the majority of pesticide application situations (AgDrift model scenarios for very-fine to coarse droplet applications) suggests that less than 1% of the applied material is within the respirable particle size.

Theoretically, inhalation of pesticide active ingredient in the vapor phase may be another source of exposure for some pesticides under some exposure situations. However, considering its low vapor pressure value, it is very unlikely that DCNA will exist in the gaseous phase at any considerable amount to cause any adverse effects via inhalation.

The impact from exposure to dusts contaminated with the pesticide cannot be assessed generically as partitioning issues related to application site soils and chemical properties render the exposure potential from this route highly situation specific.

The screening assessment does not consider dermal exposure, except as it is indirectly included in calculations of RQs based on lethal doses per unit of pesticide treated area. Dermal exposure may occur through three potential sources: (1) direct application of spray to terrestrial wildlife in the treated area or within the drift footprint, (2) incidental contact with contaminated vegetation, or (3) contact with contaminated water or soil.

The available measured data related to wildlife dermal contact with pesticides are extremely limited. The Agency is actively pursuing modeling techniques to account for dermal exposure via direct application of spray and by incidental contact with vegetation.

This risk assessment is based on the assumption that the entire treatment area is subject to DCNA application at the rates specified on the label. In reality, there is the potential for uneven application of DCNA through such plausible incidents as changes in calibration of application equipment, spillage, and localized releases at specific areas of the treated field that are associated with specifics of the type of application equipment used (e.g., increased application at turnabouts when using older ground application equipment).

As discussed earlier in the exposure section of this document, the Agency relies on the work of Fletcher et al. (1994) for setting the assumed pesticide residues in wildlife dietary items. The Agency believes that these residue assumptions reflect a realistic upper-bound residue estimate, although the degree to which this assumption reflects a specific percentile estimate is difficult to quantify. It is important to note that the field measurement efforts used to develop the Fletcher estimates of exposure involve highly varied sampling techniques. It is entirely possible that much of these data reflect residues averaged over entire above ground plants in the case of grass and forage sampling. Depending upon a specific wildlife species' foraging habits, whole aboveground plant samples may either underestimate or overestimate actual exposure.

One of the ways EFED characterizes acute and chronic risk is to rely on comparisons of wildlife dietary residues with LC_{50} or NOAEC values expressed in concentrations of pesticides in laboratory feed. These comparisons assume that ingestion of food items in the field occurs at rates commensurate with those in the laboratory. Although the screening assessment process adjusts dry-weight estimates of food intake to reflect the increased mass in fresh-weight wildlife food intake estimates, it does not allow for gross energy and assimilative efficiency differences between wildlife food items and laboratory feed.

On gross energy content alone, direct comparison of a laboratory dietary concentration- based effects threshold to a fresh-weight pesticide residue estimate would result in an underestimation of field exposure by food consumption by a factor of 1.25 - 2.5 for most food items. Only for seeds would the direct comparison of dietary threshold to residue estimate lead to an overestimate of exposure.

Differences in assimilative efficiency between laboratory and wild diets suggest that current screening assessment methods do not account for a potentially important aspect of food requirements. Depending upon species and dietary matrix, bird assimilation of wild diet energy ranges from 23 - 80%, and mammal's assimilation ranges from 41 - 85% (U.S. Environmental Protection Agency, 1993). If it is assumed that laboratory chow is formulated to maximize assimilative efficiency (e.g., a value of 85%), a potential for underestimation of exposure may exist by assuming that consumption of food in the wild is comparable with consumption during laboratory testing. In the screening process, exposure may be underestimated because metabolic rates are not related to food consumption.

Finally, the screening procedure does not account for situations where the feeding rate may be above or below requirements to meet free living metabolic requirements. Gorging behavior is a possibility under some specific wildlife scenarios (e.g., bird migration) where the food intake rate may be greatly increased. Kirkwood (1983) has suggested that an upper-bound limit to this behavior might be the typical intake rate multiplied by a factor of 5.

In contrast is the potential for avoidance, operationally defined as animals responding to the presence of noxious chemicals in their food by reducing consumption of treated dietary elements. This response is seen in nature where herbivores avoid plant secondary compounds.

Assumptions, Limitations, Uncertainties, Strengths and Data Gaps Related to Effects Assessment

The following data gaps were identified with respect to the submitted ecotoxicity effects data:

- Acute risks for mammals were derived based on data for the 48.8% formulated product because no data on the TGAI was submitted by the registrants. Chronic toxicity studies for mammals using the TGAI of DCNA should be submitted to the Agency by the registrant as part of the data requirements.

- Although a freshwater fish chronic toxicity study was submitted, it did not meet guideline criteria; a guideline freshwater fish chronic toxicity study should be submitted to the Agency by the registrant as part of the data requirements.

- Chronic data for estuarine/marine fish and invertebrates were not submitted by the registrant or located in the open literature; therefore, measures of effect were not available for these taxonomic groups. Chronic toxicity studies for estuarine/marine fish and invertebrates using the TGAI of DCNA should be submitted to the Agency by the registrant as part of the data requirements.

- Acute data for estuarine/marine fish and invertebrates were not submitted by the registrant and only one study for an estuarine shrimp (a non-guideline species) was located in the open literature. Measures of effect were not available for estuarine/marine fish. Acute toxicity studies for estuarine/marine fish and invertebrates using the TGAI of DCNA should be submitted to the Agency by the registrant as part of the data requirements.

- Because DCNA is expected to partition to sediment, based on available fate data, and the toxicity level of DCNA to aquatic organisms, guideline sediment toxicity studies with Chironomus sp. or similar organisms should be submitted to the Agency by the registrant as part of the data requirements. Although a sediment toxicity study with Chironomus sp. was submitted, it did not meet guideline requirements.

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[1]All environmental fate and ecotoxicity MRIDs used in the assessment are cited in Appendix H. All ECOTOX studies considered for the assessment are cited in Appendix I.

APPENDIX A
MAXIMUM USE RATES AND APPLICATION INFORMATION

(see table starting next page)

Use Site	Max. Rate per App	Max. Rate Unit/Area *UG	Form	Max.# Apps cc & yr	Max. App Rate/ cc & yr	Min. App Interval (days)	Application Equipment //Type (Reg # Code)
NON-FOOD/NON-FEED USES							
christmas tree plantations	2.0025	lb A	WP	NS	NS	10 AN	Sprayer //Spray (a)
	1	lb/100 gal *C1 I1	FlC	NS	NS	10 AN	Dip tank/ Sprayer //Dip treatment/ Spray (b)
	1.33	lb (L) *I1	WP	NS	NS	10	Sprayer //Spray (c)
	2	qt (L) *C1 I1	FlC	NS	NS	10 AN	Dip tank/ Sprayer //Dip treatment/ Spray (d)
forest trees (softwoods, conifers)	2.0025	lb A	WP	NS	NS	10 AN	Sprayer //Spray (a)
	1.95~	lb/100 gal *I1 J1	WP	NS	NS	10 NS	Sprayer //Spray (b)
	1.33	lb (L) *I1	WP	NS	NS	10	Sprayer //Spray (c)
	2	qt (L) *I1 J1	FlC	NS	NS	10 AN	Dip tank/ Sprayer //Dip treatment/ Spray (d)
ornamental herbaceous plants	4	lb A	FlC	NS	NS	NS	Band sprayer/ Sprayer/ Sprinkler irrigation //Chemigation/ Soil in-furrow treatment/ Spray (a)
	1	lb/100 gal *C2	FlC	NS	NS	NS	Sprayer //Spray (b)
	.7500	lb/150 gal	FlC	NS	NS	5	Ground/ Sprayer

Use Site	Max. Rate per App	Max. Rate Unit/Area *UG	Form	Max.# Apps cc & yr	Max. App Rate/ cc & yr	Min. App Interval (days)	Application Equipment //Type (Reg # Code)
		*C1 C2 I1	WP			NS	//Spray (c)
	.7500	lb/75 gal *C1 C2	FlC WP	NS	NS	NS	Dip tank //Bulb treatment/ Dip treatment (d)
ornamental woody shrubs and vines	1.8	lb A	D	NS	NS	5 AN NS	Aircraft/ Duster/ Ground //Broadcast/ Dust (a)
	1	lb/100 gal *C2	FlC	NS	NS	NS	Dip tank/ Sprayer //Dip treatment/ Spray (b)
	1	lb/150 gal *C2	FlC	NS	NS	5	Sprayer //Spray (c)
	.7500	lb/75 gal *C1	FlC	NS	NS	AN	Sprayer //Spray (d)
FOOD/FEED USES							
apricot	4	lb A	FlC	2/cc	NS	8	Aircraft/ High volume ground sprayer/ Low volume ground sprayer/ Sprinkler irrigation //Chemigation/ High volume spray (dilute)/ Low volume spray (concentrate) (a)
	3	lb A	D	NS	NS	NS	Aircraft/ Ground //Broadcast (b)
beans, succulent (snap)	3.75	lb A	D	NS	NS	7	Aircraft/ Ground //Broadcast (a)
carrot (including tops)	.7500	lb/100 gal *A1	WP	NS	NS	NS	Dip tank //Dip treatment (a)

Use Site	Max. Rate per App	Max. Rate Unit/Area *UG	Form	Max.# Apps cc & yr	Max. App Rate/ cc & yr	Min. App Interval (days)	Application Equipment //Type (Reg # Code)
celery	4	lb A	FlC	1/cc	NS	NS	Sprayer //Directed spray (a)
	2.5	lb A	FlC	NS	NS	7	Aircraft/ High volume ground sprayer/ Sprinkler irrigation //Chemigation/ High volume spray (dilute)/ Low volume spray (concentrate) (b)
cherry	3	lb A	D	NS	3.9996 lb/yr	10	Aircraft/ Ground //Broadcast (a)
	4	lb A	FlC	NS	NS	NS	Aircraft/ High volume ground sprayer/ Low volume ground sprayer/ Sprinkler irrigation //Chemigation/ High volume spray (dilute)/ Low volume spray (concentrate) (b)
cucumber	.0230	lb 1K sq.ft *H1	FlC	NS	NS	14	High volume ground sprayer/ Low volume ground sprayer/ Sprinkler irrigation //Chemigation/ High volume spray (dilute)/ Low volume spray (concentrate) (a)
endive (escarole)	2	lb A	FlC	2/cc	NS	7 NS	Aircraft/ High volume ground sprayer/ Low volume

Use Site	Max. Rate per App	Max. Rate Unit/Area *UG	Form	Max.# Apps cc & yr	Max. App Rate/ cc & yr	Min. App Interval (days)	Application Equipment //Type (Reg # Code)
							ground sprayer/ Sprayer/ Sprinkler irrigation //Chemigation/ Directed spray/ High volume spray (dilute)/ Low volume spray (concentrate) (a)
fennel	4	lb A	FlC	1/cc	NS	NS	Sprayer //Directed spray (a)
	2.5	lb A	FlC	NS	NS	7 14 NS	Aircraft/ High volume ground sprayer/ Low volume ground sprayer/ Sprinkler irrigation //Chemigation/ High volume spray (dilute)/ Low volume spray (concentrate) (b)
	1.5~	lb/100 gal *A1	WP	NS	NS	7	Ground //Directed spray (c)
garlic	3	lb A	D	1/cc	3 lb/yr	NS	Aircraft/ Ground //Soil in-furrow treatment/ Soil incorporated treatment (a)
	3	lb A	D	1/cc	NS	NS	Aircraft/ Ground //Broadcast (b)
	2	lb A	FlC	NS	2.5 lb/cc	14	Aircraft/ High volume ground sprayer/ Low volume ground sprayer/ Sprinkler irrigation

Use Site	Max. Rate per App	Max. Rate Unit/Area *UG	Form	Max.# Apps cc & yr	Max. App Rate/ cc & yr	Min. App Interval (days)	Application Equipment //Type (Reg # Code)
							//Chemigation/ High volume spray (dilute)/ Low volume spray (concentrate) (c)
	3.9975	lb A	WP	NS	3.9975 lb/cc	NS	Band sprayer/ Low pressure ground sprayer/ Soil incorporation equipment //Band treatment/ Soil band treatment/ Soil in-furrow treatment (d)
	24	lb A	D	NS	NS	NS	Ground //Soil incorporated treatment (e)
	.5510	lb 1K linear ft *A1	D	NS	NS	NS	Ground //Soil broadcast treatment (f)
grapes	3.5	lb A	FlC	NS	3.2 lb (L)/cc	7	Aircraft/ High volume ground sprayer/ Low volume ground sprayer/ Sprinkler irrigation //Chemigation/ High volume spray (dilute)/ Low volume spray (concentrate) (a)
	3.495	lb A	WP	NS	3.9975 lb/cc	7	Aircraft/ High volume ground sprayer/ Low volume ground sprayer/ Sprinkler irrigation //Chemigation/ High

Use Site	Max. Rate per App	Max. Rate Unit/Area *UG	Form	Max.# Apps cc & yr	Max. App Rate/ cc & yr	Min. App Interval (days)	Application Equipment //Type (Reg # Code)
							volume spray (dilute)/ Low volume spray (concentrate) (b)
	3.5	lb A	FlC	NS	4 lb/cc	7	Aircraft/ High volume ground sprayer/ Low volume ground sprayer/ Sprinkler irrigation //Chemigation/ High volume spray (dilute)/ Low volume spray (concentrate) (c)
	1.8	lb A	D	NS	3.9996 lb/yr	14	Aircraft/ Ground //Broadcast (d)
	1.8	lb A	D	NS	NS	14	Aircraft/ Duster/ Ground //Broadcast/ Dust (e)
lettuce, head	3.9975	lb A	WP	1/cc	3.9975 lb/cc	NS	High volume ground sprayer //High volume spray (dilute) (a)
	4	lb A	FlC	1/cc	4 lb/cc	NS	High volume ground sprayer/ Low volume ground sprayer/ Sprinkler irrigation //Chemigation/ High volume spray (dilute)/ Low volume spray (concentrate) (b)
	1.995	lb A	WP	2/cc	3.9975 lb/cc	NS	Sprayer //Directed spray (c)

Use Site	Max. Rate per App	Max. Rate Unit/Area *UG	Form	Max.# Apps cc & yr	Max. App Rate/ cc & yr	Min. App Interval (days)	Application Equipment //Type (Reg # Code)
	4	lb A	FlC	2/cc	4 lb/cc	NS	Drencher //Basal spray treatment (d)
	1.998	lb A	D	2/cc	NS	7	Duster //Dust (e)
	2.4975	lb A	WP	NS	3.997 5 lb/cc	NS	Band sprayer //Band treatment (f)
	4	lb A	FlC	NS	4 lb/cc	NS	Band sprayer //Band treatment (g)
	1.998	lb A	D	NS	3.999 6 lb/yr	7	Aircraft/ Ground //Broadcast (h)
	2.25	lb A	FlC	NS	NS	NS	Sprayer //Directed spray (i)
lettuce, leaf (black seeded simpson, salad bowl, etc.)	3.9975	lb A	WP	1/cc	3.997 5 lb/cc	NS	High volume ground sprayer //High volume spray (dilute) (a)
	4	lb A	FlC	1/cc	4 lb/cc	NS	High volume ground sprayer/ Low volume ground sprayer/ Sprinkler irrigation //Chemigation/ High volume spray (dilute)/ Low volume spray (concentrate) (b)
	1.995	lb A	WP	2/cc	3.997 5 lb/cc	NS	Sprayer //Directed spray (c)
	4	lb A	FlC	2/cc	4 lb/cc	NS	Drencher //Basal spray treatment (d)
	1.8	lb A	D	2/cc	NS	7	Aircraft/ Ground

Use Site	Max. Rate per App	Max. Rate Unit/Area *UG	Form	Max.# Apps cc & yr	Max. App Rate/ cc & yr	Min. App Interval (days)	Application Equipment //Type (Reg # Code)
							//Broadcast (e)
	2.4975	lb A	WP	NS	3.997 5 lb/cc	NS	Band sprayer //Band treatment (f)
	.7500	lb A	FlC	NS	4 lb/cc	NS	Band sprayer //Band treatment (g)
	2.25	lb A	FlC	NS	NS	NS	Sprayer //Directed spray (h)
	.0413	lb 1K sq.ft *H1	D	2/cc	NS	7 NS	Ground //Broadcast (i)
	.0413	lb 1K sq.ft *H1	D	NS	.0918 2 lb/yr	NS	Ground //Broadcast (j)
	.0460	lb 1K sq.ft *H1	FlC	NS	NS	NS	High volume ground sprayer/ Low volume ground sprayer/ Sprinkler irrigation //Chemigation/ High volume spray (dilute)/ Low volume spray (concentrate) (k)
nectarine	4	lb A	FlC	2/cc	NS	8	Aircraft/ High volume ground sprayer/ Low volume ground sprayer/ Sprinkler irrigation //Chemigation/ High volume spray (dilute)/ Low volume spray (concentrate) (a)
	3.6	lb A	D	3/cc	3.999 6 lb/yr	NS	Aircraft/ Ground //Broadcast (b)

Use Site	Max. Rate per App	Max. Rate Unit/Area *UG	Form	Max.# Apps cc & yr	Max. App Rate/ cc & yr	Min. App Interval (days)	Application Equipment //Type (Reg # Code)
	3.6	lb A	D	3/cc	NS	NS	Duster //Dust (c)
	4	lb A	FlC	NS	NS	NS	Aircraft/ High volume ground sprayer/ Low volume ground sprayer/ Sprinkler irrigation //Chemigation/ High volume spray (dilute)/ Low volume spray (concentrate) (d)
onion	3	lb A	D	1/cc	3 lb/yr	NS	Aircraft/ Ground //Soil in-furrow treatment/ Soil incorporated treatment (a)
	3	lb A	D	1/cc	NS	NS	Aircraft/ Ground //Broadcast (b)
	2	lb A	FlC	NS	2.5 lb/cc	14	Aircraft/ High volume ground sprayer/ Low volume ground sprayer/ Sprinkler irrigation //Chemigation/ High volume spray (dilute)/ Low volume spray (concentrate) (c)
	3.9975	lb A	WP	NS	3.997 5 lb/cc	NS	Band sprayer/ Low pressure ground sprayer/ Soil incorporation equipment //Band treatment/ Soil band treatment/ Soil in-furrow

Use Site	Max. Rate per App	Max. Rate Unit/Area *UG	Form	Max.# Apps cc & yr	Max. App Rate/ cc & yr	Min. App Interval (days)	Application Equipment //Type (Reg # Code)
							treatment/ Soil incorporated treatment (d)
	24	lb A	D	NS	NS	NS	Ground //Soil incorporated treatment (e)
	.5510	lb 1K linear ft *A1	D	NS	NS	NS	Ground //Soil broadcast treatment (f)
peach	4	lb A	FlC	2/cc	NS	8	Aircraft/ High volume ground sprayer/ Low volume ground sprayer/ Sprinkler irrigation //Chemigation/ High volume spray (dilute)/ Low volume spray (concentrate) (a)
	3.6	lb A	D	3/cc	3.9996 lb/yr	NS	Aircraft/ Ground //Broadcast (b)
	3.6	lb A	D	3/cc	NS	NS	Duster //Dust (c)
	4	lb A	FlC	NS	NS	NS	Aircraft/ High volume ground sprayer/ Low volume ground sprayer/ Sprinkler irrigation //Chemigation/ High volume spray (dilute)/ Low volume spray (concentrate) (d)
plum	4	lb A	FlC	NS	NS	NS	Aircraft/ High volume

Use Site	Max. Rate per App	Max. Rate Unit/Area *UG	Form	Max.# Apps cc & yr	Max. App Rate/ cc & yr	Min. App Interval (days)	Application Equipment //Type (Reg # Code)
							ground sprayer/ Low volume ground sprayer/ Sprinkler irrigation //Chemigation/ High volume spray (dilute)/ Low volume spray (concentrate) (a)
potato, white/irish	4.5~	lb A	FlC WP	NS	7.5 lb/cc	7 NS	Aircraft/ Ground/ Low volume ground sprayer/ Sprinkler irrigation //Chemigation/ Directed spray/ Low volume spray (concentrate)/ Spray (a)
	1.5	lb A	FlC WP	NS	NS	10	Aircraft/ High volume ground sprayer/ Low volume ground sprayer/ Sprinkler irrigation //Chemigation/ High volume spray (dilute)/ Low volume spray (concentrate) (b)
	.0059~	gal/1 gal *H1	WP	9/cc	NS	7	Hand held sprayer //Spray (c)
prune	4	lb A	FlC	NS	NS	NS	Aircraft/ High volume ground sprayer/ Low volume ground sprayer/ Sprinkler irrigation //Chemigation/ High

Use Site	Max. Rate per App	Max. Rate Unit/Area *UG	Form	Max.# Apps cc & yr	Max. App Rate/ cc & yr	Min. App Interval (days)	Application Equipment //Type (Reg # Code)
							volume spray (dilute)/ Low volume spray (concentrate) (a)
rhubarb	.0230	lb 1K sq.ft *H1	FlC	NS	NS	7	High volume ground sprayer/ Low volume ground sprayer/ Sprinkler irrigation //Chemigation/ High volume spray (dilute)/ Low volume spray (concentrate) (a)
shallot	3	lb A	D	1/cc	3 lb/yr	NS	Aircraft/ Ground //Soil in-furrow treatment/ Soil incorporated treatment (a)
	3	lb A	D	1/cc	NS	NS	Aircraft/ Ground //Broadcast (b)
	2	lb A	FlC	NS	2.5 lb/cc	14	Aircraft/ High volume ground sprayer/ Low volume ground sprayer/ Sprinkler irrigation //Chemigation/ High volume spray (dilute)/ Low volume spray (concentrate) (c)
	3.9975	lb A	WP	NS	3.9975 lb/cc	NS	Band sprayer/ Low pressure ground sprayer/ Soil incorporation equipment //Band treatment/ Soil band

Use Site	Max. Rate per App	Max. Rate Unit/Area *UG	Form	Max.# Apps cc & yr	Max. App Rate/ cc & yr	Min. App Interval (days)	Application Equipment //Type (Reg # Code)
							treatment/ Soil in-furrow treatment/ Soil incorporated treatment (d)
	2.5	lb A	FlC	NS	NS	NS	Band sprayer/ Low pressure ground sprayer/ Soil incorporation equipment //Band treatment/ Soil band treatment/ Soil in-furrow treatment (e)
sweet potato	122.5* (Incorrect value)	lb A	FlC WP	NS	NS	NS	Sprayer //Spray (a)
	.0015	lb bu *A1	FlC	NS	NS	NS	Not on label //Dip treatment (b)
	.7500	lb/100 gal *A1	FlC WP	NS	NS	NS	Dip tank/ Not on label/ Sprayer //Dip treatment/ Spray (c)
	.7500	lb/7.5 gal *A1	FlC WP	NS	NS	NS	Dip tank //Dip treatment (d)
	.7500	lb/75 gal *A1	FlC	NS	NS	NS	Not on label //Seed treatment (e)
	1	lb (L) *A1	WP	NS	NS	NS	Dip tank //Dip treatment (f)
tomato	.0413	lb 1K sq.ft *H1	D	4/cc	.0918 2 lb/yr	7	Duster //Dust (a)

Use Site	Max. Rate per App	Max. Rate Unit/Area *UG	Form	Max.# Apps cc & yr	Max. App Rate/ cc & yr	Min. App Interval (days)	Application Equipment //Type (Reg # Code)
	.0413	lb 1K sq.ft	D	4/cc	NS	NS	Duster //Dust (b)
	.0413	lb 1K sq.ft *H1	D	NS	NS	7	Duster //Dust (c)

Use Site/Registration Number(s) for Maximum Dosages with Reg # Codes

NON-FOOD/NON-FEED USES

christmas tree plantations	10163-189(a,c), 10163-221(d), 10163-226(b)
forest trees (softwoods, conifers)	10163-189(a,c), 10163-221(d), CA95001100(b), MT94000300(b), OR94001700(b), WA94001700(b)
ornamental herbaceous plants	10163-189(c,d), 10163-221(a,c), 10163-226(a,b,c,d)
ornamental woody shrubs and vines	10163-188(a), 10163-190(a), 10163-191(a), 10163-192(a), 10163-193(a), 10163-221(d), 10163-226(b,c)

FOOD/FEED USES

apricot	10163-188(b), 10163-190(b), 10163-191(b), 10163-192(b), 10163-193(b), 10163-221(a), 10163-226(a)
beans, succulent (snap)	10163-191(a)
carrot (including tops)	10163-189(a)
celery	10163-221(a), 10163-226(a,b)
cherry	2935-529(a), 10163-221(b), 10163-226(b)
cucumber	10163-221(a), 10163-226(a)
endive (escarole)	10163-221(a), 10163-226(a)

fennel	10163-226(a,b), CA93002300(c)
garlic	2935-529(a), 10163-188(b), 10163-189(d), 10163-190(b), 10163-191(b), 10163-192(b), 10163-193(b), 10163-207(d), 10163-226(c), 10951-13(e,f)
grapes	2935-529(d), 10163-188(e), 10163-189(b), 10163-190(e), 10163-191(e), 10163-192(e), 10163-193(e), 10163-207(b), 10163-221(c), 10163-226(a), 10951-13(e), 10951-14(e)
lettuce, head	2935-529(h), 10163-189(a,c,f), 10163-207(a,f), 10163-221(b,g), 10163-226(d,i), 10951-13(e)
lettuce, leaf (black seeded simpson, salad bowl, etc.)	2935-529(j), 10163-188(e,i), 10163-189(a,c), 10163-190(e,i), 10163-191(e,i), 10163-192(e,i), 10163-193(e,i), 10163-207(a,f), 10163-221(b,k), 10163-226(d,g,h)
nectarine	2935-529(b), 10163-221(a,d), 10163-226(a,d), 10951-14(c)
onion	2935-529(a), 10163-188(b), 10163-189(d), 10163-190(b), 10163-191(b), 10163-192(b), 10163-193(b), 10163-207(d), 10163-226(c), 10951-13(e,f)
peach	2935-529(b), 10163-221(a,d), 10163-226(a,d), 10951-14(c)
plum	10163-221(a), 10163-226(a)
potato, white/irish	10163-189(b), 10163-207(b), 10163-221(b), 10163-226(b), CA94000700(c), ID94000600(a), ID97000200(a), OR99005500(a), OR99005600(a), WA94000900(a), WA96003700(a)
prune	10163-221(a), 10163-226(a)
rhubarb	10163-221(a), 10163-226(a)
shallot	2935-529(a), 10163-188(b), 10163-189(d), 10163-190(b), 10163-191(b), 10163-192(b), 10163-193(b), 10163-207(d), 10163-226(c,e)
sweet potato	10163-189(a,c,d,f), 10163-207(a,c,d), 10163-221(b,c,e), 10163-226(a,d)
tomato	2935-529(a), 10163-188(b), 10163-190(b), 10163-191(b), 10163-192(b), 10163-193(b), 10951-13(c)

LEGEND

HEADER ABBREVIATIONS

Use Site : The use site refers to the entity (crop, building, surface or article) where a pesticide is applied and/or which is being protected.

Max.Rate per App : Maximum dose for a single application to a single site. System calculated.

Max.Rate Unit/Area : Units and Area associated with the maximum dose.

*UG : Use Group codes.
Form : The physical form of the end use product found in the container.
Max. # Apps cc & yr : The maximum number of applications.
Max. App Rate/cc & yr : The maximum amount of pesticide product that can be applied to a site in one growing season (/cc) or during the span of one year (/yr).
Min. App Interval (days): The minimum retreatment interval between applications in days (aggregated).
Application Equipment : The equipment used to apply pesticide (aggregated).
Application Type : The type of pesticide application (aggregated).
Current as of - : The label data for the listed products in this report is current as of this date.

ABBREVIATIONS
AN - As Needed.
NA - Not Applicable.
NS - Not Specified (on label).
(L) - The dosage information provided is from the label in terms of product (e.g., ounces, gallons, or pounds of the product) because there was insufficient information (e.g., missing density, area, or active ingredient percentages) to provide converted dosage information.
~ - The tilde in "Max. Rate per App" indicates a dosage that includes information from a SLN label.
UC - Unconverted due to lack of data (on label).

APPLICATION RATE
W : PPM calculated by weight
V : PPM calculated by volume
U : Unknown whether PPM is given by weight or by volume
cwt : Hundred Weight.
nnE-xx : nn times (10 power -xx), for instance, "1.234E-4" is equivalent to ".0001234".
-- : No description available in LUIS unit conversion vocabulary.
~ : The dosage information includes a contribution from one or more (TQ, CL, BR, I) active ingredients.

FORMULATION CODES
D : Dust
FlC : Flowable Concentrate
WP : Wettable Powder

USE GROUP CODES
A1 : TERRESTRIAL FOOD CROP

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C1      : TERRESTRIAL NON-FOOD CROP
C2      : TERRESTRIAL NON-FOOD+OUTDOOR RESIDENTIAL
H1      : GREENHOUSE FOOD CROP
I1      : GREENHOUSE NON-FOOD CROP
J1      : FORESTRY
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APPENDIX B
ENVIRONMENTAL FATE DATA

Abiotic Degradation

Hydrolysis

DCNA is stable to hydrolysis at environmentally relevant pHs and temperatures. In a study conducted for 72 days in darkness at 25HC, DCNA (at 2 ppm) did not hydrolyze in sterile pH 5, 7 and 9 aqueous buffer solutions (both 0.05 and 0.01 M buffers; ACC No. 253963). The submitted study was classified as acceptable and provides adequate data for the risk assessment.

Aqueous Photodegradation

DCNA is relatively rapidly photodegraded in water under favorable light conditions. A guideline study (MRID 43891901) was submitted and additional information on the study was presented in a rebuttal document (MRID 45575001; also apparently submitted as MRID 45525801) submitted by the registrant in response to their review of the DERs generated for six environmental fate studies. Nonradiolabeled plus uniformly phenyl-ring labeled [^{14}C]DCNA, at 3.0 mg/L, photodegraded with a half-life (adjusted for continuous irradiation) of 47.2 hours (r^2 = 1.0; 0-65 hour data) in sterile pH 7 aqueous buffer solution which was continuously irradiated with a xenon arc lamp for up to 360 hours while maintained at 25 ºC. The parent compound was present at 58.5% of the applied at 20 hours of continuous irradiation and was last detected at 65 hours posttreatment. Despite extensive characterization of the degradates (and comparisons of HPLC retention times to those of 11 known or potential DCNA metabolites in plants, animals or soil), there were no major or minor degradates identified. Many of the photoproducts were reported to be more water soluble than the parent compound and consisted of primarily highly polar, open-ring acids (present as salts). Other residues were conjectured to consist of organosoluble polymers, of various degrees of polarity, which could not be characterized. Data showed the occurrence of at least the trimerization of DCNA, although potential dechlorination prior to polymerization could have occurred, and up to six molecules of DCNA could have been involved in the formation of the isolated residues which were not identified. The degradate designated “Unknown 1" was reported to actually consist of at least six compounds. The submitted study was classified as acceptable and provides adequate data for the risk assessment. Although individual degradates were not isolated and identified in the usual sense, an adequate attempt was made at characterizing the photoproducts of DCNA, and an additional study would probably not be able to provide new useful information.

In an another submitted guideline study (MRID 40508809), found to be “unacceptable” due to problems with degradate identification and the adequacy of the artificial light source, an aqueous photodegradation half-life of 82 hours (corrected for continuous irradiation) was found. Because the adequacy of the artificial light source in the second study was questionable, that half-life value (i.e., 82 hours) will not be considered in the risk assessment. Degradates were not identified in the study.

Soil Photodegradation

DCNA is photodegraded on soil under favorable light conditions. A guideline study (MRID 43893601) was submitted and additional information on the study was presented in a rebuttal document (MRID 45575001; also apparently submitted as MRID 45525801) submitted by the registrant in response

to their review of the DERs generated for six environmental fate studies. Nonradiolabeled plus uniformly phenyl-ring labeled [^{14}C]DCNA, at 5 ppm, photodegraded with a half-life (adjusted for continuous irradiation) of 263.2 hours (approx. 11 days; $r^2 = 0.99$) on sandy loam soil which was at 75% of field moisture capacity and was continuously irradiated with a xenon arc lamp for up to 360 hours while maintained at 25 °C. The parent compound was initially 97.4% of the applied radioactivity, decreased to 55.5% by 64 hours and 41.7% by 136 hours, and was 12.1% at 360 hours posttreatment. An unidentified major degradate (Unknown #1) was initially 3.1% of the applied (individual replicate) and was 7.4-11.3% (range for individual replicates) at 236-360 hours posttreatment. An unidentified minor degradate (Unknown #2) was a maximum of 6.0% (range of 2.4-9.6%) at 360 hours posttreatment. Nonextractable [^{14}C]residues in the irradiated samples were a maximum of 19.5% at 236 hours and were 18.1% at 360 hours posttreatment. Evolved $^{14}CO_2$ accounted for 0.81% of the applied radioactivity at 24 hours, increased to 10.5% by 136 hours, and was 23.3% at 360 hours. [^{14}C]Organic volatiles accounted for 4.1% of the applied radioactivity at 360 hours posttreatment. Characterization data for the dark control samples were not provided. For the dark control samples, $^{14}CO_2$ accounted for 0.53% of the applied radioactivity at 360 hours posttreatment; [^{14}C]organic volatiles were negligible.

Although the study had problems with incomplete material balances, the registrant provided a reasonable explanation and additional data which indicate that the losses were due to escaped volatiles which consisted mainly of CO_2. Despite extensive characterization of the degradates (and comparisons of HPLC retention times to those of 11 known or potential DCNA metabolites in plants, animals or soil), the study was technically deficient in that there was a major degradate (based on the definition that a major degradate is any compound detected at ' 10% of the applied *in any single replicate at any sampling interval*) that was not identified. The registrant stated in the rebuttal document that the HPLC peak corresponding to the unknown "eluted close to the solvent front, indicating very polar material, and likely consisted of multiple degradates." However, additional evidence was not provided in the original report in support of this conclusion. Because a major degradate was not identified, this study was classified as supplemental.

In an another submitted guideline study (MRID 40508810), found to be "unacceptable" due to problems with degradate identification and the adequacy of the analytical method, a soil photodegradation half-life of 82 hours (corrected for continuous irradiation) was found. Because the adequacy of the analytical method used in the second study was questionable, that half-life value (i.e., 82 hours) will not be considered in the risk assessment. Degradates were not identified in the study.

Metabolism

Aerobic Soil

DCNA is only slowly degraded in aerobic soils. In a submitted guideline study (MRID 40894801), uniformly phenyl-ring labeled [^{14}C]DCNA, at approximately 2.25 ppm (4.5 kg ai/ha), degraded with approximate half-lives of 18 and 6 months in aerobic sandy loam and sand soils, respectively, which were maintained at 75% of field moisture capacity and incubated in darkness for up to 12 months at 25 °C. No major degradates were detected; the majority of the radioactivity not identified as parent was present as non-extractable residues. The three minor degradates 2,6-dichloro-p-phenylenediamine (DCPD); 4-amino-3,5-dichloroacetanilide (DCAA); and 2,6-dichloro-4-hydroxyaniline (DCHA) were each detected at &0.4% of the applied in both soils. In the sandy loam soil, [^{14}C]DCNA was a maximum of 93.9% of the applied at 14 days, was 63.1% at 6 months, and was 58.3% at one year posttreatment. In that soil, non-extractable residues were 3.0% of the applied at one month, 13.8% at six

months, and 19.4% at one year posttreatment. In the sand soil, [^{14}C]DCNA was a maximum of 89.9% of the applied at 7 days, was 64.7% at 3 months, was 41.6% at 6 months, and was 21.8% at one year posttreatment. In that soil, non-extractable residues were 4.2% of the applied at one month, 22.0% at two months, 36.9% at six months, and 50.7% at one year posttreatment. At the end of the study, [^{14}C]CO_2 was 2.8% in the sandy loam soil and 7.6% in the sand soil. This study is classified as acceptable and provides adequate information for the risk assessment.

In a second submitted aerobic soil metabolism study (Accession #00086942), DCNA degraded rapidly in aerobic soil that was flooded with 1% glucose solution. The study is classified supplemental, as the soil should not have been flooded and glucose should not have been added to the soil. Because the study does not meet the data guideline requirements for an aerobic soil metabolism study, will not be considered in the risk assessment.

Anaerobic Soil

DCNA is degraded moderately rapidly in anaerobic soils. In a submitted guideline study (MRID 40894801), uniformly phenyl-ring labeled [^{14}C]DCNA, at approximately 2.25 ppm (4.5 kg ai/ha), degraded with approximate half-lives of 38 days and 24 days in anaerobic sandy loam and sand soils, respectively, which were initially incubated aerobically (75% of field moisture capacity) for 30 days, and then flooded and incubated in darkness for up to 6 months, all in darkness and at 25 ^{o}C. No major degradates were detected; the majority of the radioactivity not identified as parent was present as non-extractable residues. The three minor degradates 2,6-dichloro-p-phenylenediamine (DCPD); 4-amino-3,5-dichloroacetanilide (DCAA); and 2,6-dichloro-4-hydroxyaniline (DCHA) were each detected at &1.6% of the applied in both soils, with the exception of DCPD which was a maximum of 7.5% in the sand soil at one month postflooding. In the sandy loam soil, [^{14}C]DCNA was a maximum of 75.2% of the applied at 2 hours postflooding, was 28.6% at 2 months, was 4.5% at 4 months, and was 4.1% at 6 months. In that soil, non-extractable residues were 3.8% of the applied at 2 hours postflooding, 22.9% at one month, 54.0% at 3 months and 63.8-65.4% at 4-6 months. In the sand soil, [^{14}C]DCNA was a maximum of 71.4% of the applied at 2 hours postflooding, was 29.8% at one month, was 7.7% at 2 months, and was 1.6% at 6 months. In that soil, non-extractable residues were 4.9% of the applied 2 hours postflooding, 35.0% at one month, 67.3% at 3 months, and 70.8-78.5% at 4-6 months. At the end of the study, [^{14}C]CO_2 was 2.5% in the sandy loam soil and 6.3% in the sand soil. In additional sandy loam and sand soil samples (*supplemental study*) which were flooded immediately posttreament and then maintained anaerobically as described above, [^{14}C]DCNA degraded with half-lives of 10.1 and 5.6 days, respectively. However, these two values represent anaerobic *aquatic* metabolism rather than anaerobic soil metabolism, as defined by Subdivision N Guidelines. This study is classified as acceptable and provides adequate information for the risk assessment. Originally classified as "unacceptable," the study status was upgraded to reflect the current guideline data requirements with regard to residue identification. Previously, degradates present at the lesser of 0.01 ppm or ′10% of the applied, or those of toxicological concern, were considered major degradates. Using the current definition that major degradates are those present at ′10% of the applied, or those of toxicological concern, there were no major degradates detected in the study.

Anaerobic Aquatic

DCNA is rapidly biotransformed in flooded, anaerobic sediment, with the majority of the radiolabeled residues present as nonextractable residues. One guideline study was submitted, along with an addendum and additional information which was included in Gowan's Comprehensive Response to Six Environmental Fate Study DER's for DCNA (MRID 45575001; also apparently submitted as MRID

45525801). In the submitted guideline study (MRIDs 43866501, 45333301), uniformly phenyl-ring labeled [^{14}C]DCNA, at 2.25 ppm, biotransformed with a half-life of 0.45 days (r^2 = 0.95; 0 to 12 hour data) in flooded sandy loam sediment that was incubated anaerobically in darkness at 25 ^{o}C for up to 59 days. Although three separate sample sets were treated and incubated, data used to determine a valid half-life must be obtained from the same sample set; the 0-12 hour sample set was adequate for use in determining the parent half-life. No major degradates were detected; by 3 days posttreatment, the majority of the residues (55.4% out of 95.1%) in the sediment/water system were present in the sediment as nonextractable residues. In the total sediment/water system, the parent compound was initially 98.0% of the applied, and was 58.2% at 8 hours and 45.7% at 12 hours. In the total sediment/water system, the minor degradates DCPD, DCAA, DCHA, and 3,5-dichloro-4-hydroxyacetanilide (3,5HA) were respective maximums of 7.4% (12 hours), 6.2% (14 days), 5.1% (3 days), and 0.4% (14 days) of the applied. An unidentified minor degradate was detected at a maximum of 5.8% of the applied at 8 hours. In the sediment phase, the parent was initially 75.1% of the applied, was a maximum of 77.4% at 2 hours posttreatment, was 21.2% at 3 days, and was 0.9% at 30-59 days. In the sediment phase, the minor degradates DCAA, DCPD, DCHA, and 3,5HA were maximums of 5.0% (14 days), 4.0% (4 hours), 4.0% (3 days), and 0.4% (14 days) of the applied radioactivity, respectively. Nonextractable [^{14}C]residues were 18.6% of the applied at 4 hours posttreatment, and were 34.8% at 12 hours, 39.9% at 1 day, 70.7% at days 7, and a maximum of 86.2% at 59 days. [^{14}C]Residues removed by acid hydrolysis were 11.2% of the applied at 59 days posttreatment. [^{14}C]Residues associated with the humic acid, fulvic acid, and humin fractions were 25.7%, 11.2%, and 32.1% of the applied, respectively, at 59 days posttreatment. Total [^{14}C]volatiles were negligible. The distribution ratio of [^{14}C]residues between the sediment and water phases was initially 3:1, was 11:1 at 1 day posttreatment, and was 70:1 at 59 days.

While nonextractable residue levels were very high, and could theoretically include parent material which could potentially be desorbed, it is likely in this specific case that the DCNA residues were actually transformed prior to being associated with the soil organic matter. Generally, nonextractable residues of this magnitude are considered to be potentially available for exposure, and the concentrations of such are added to parent concentrations to determine the half-life. For DCNA, however, there is evidence from the aerobic and anaerobic soil metabolism studies (which were conducted together; MRID 40894801) that the initiation of anaerobic (flooded) conditions results in increased levels of nonextractable residues, ostensibly through some sort of transformation of the parent compound. In the anaerobic soil metabolism study, in sand and sandy loam soils that were aged aerobically for 30 days prior to establishment of anaerobic conditions (flooding), nonextractable residues in the two soils increased from 3.8% and 4.9% at two hours postflooding to 22.9% and 35.0% by 30 days.

This study is classified as acceptable and provides useful data for the risk assessment. While not a flaw in the conduct of the study, the half-life determined in the study **might not be representative of the anaerobic aquatic metabolism of DCNA in the environment.** The reported half-life of 0.45 days was determined in a sediment with a very high organic matter content of 13.4%. Because the majority of the compound is eventually present as nonextractable residues which are assumed to be associated with the soil organic matter, it is possible that in anaerobic soils or sediments with lower organic matter contents, the rate of biotransformation of the parent compound may not be as rapid. In an aged soil column leaching study (MRID 43809001) in which the soil was aged under anaerobic conditions (rather than aerobic, as usually done) prior to placement on the leaching columns, the half-lives of DCNA in sandy loam (2.8% o.m.), sand (0.59% o.m.), silt loam (0.54% o.m.) and clay (1.41% o.m.) soils, respectively, were 0.8, 8.5, 9.2 and 5.9 days. In an anaerobic soil metabolism study (MRID 40894801) in which some of the soils were treated and flooded simultaneously (as done for an anaerobic aquatic metabolism study), DCNA degraded with half-lives of 10.1 and 5.6 days, respectively, in sandy loam

(3.1% o.m.) and sand (1.6% o.m.) soils. Thus, in addition to the 0.45-day half-life determined in the submitted anaerobic aquatic metabolism study, these applicable values from the other submitted studies will also be utilized in the OPP risk assessment; specifically, they will be used to determine the PRZM/EXAMS input parameter value for the anaerobic aquatic metabolism half-life.

Aerobic Aquatic

DCNA is biotransformed in flooded sediments, with the majority of the radiolabeled residues present as nonextractable residues. However, the submitted study did not accurately assess the **aerobic** aquatic metabolism of DCNA, as the sediments were flooded prior to treatment and were already anaerobic at the start of the experiment. In the submitted guideline study (MRID 46216001), [U-^{14}C]DCNA, at 0.33 mg a.i./L (based on water volume), biotransformed with a half-lives of 13.5 and 13.2 days, respectively, in flooded river water/loam sediment and pond water/silty clay loam sediment systems from Switzerland that were incubated under aerobic conditions in darkness at 20 ±2 ºC for up to 100 days. Half-lives in the water layer were 2.4 and 2.0 days, in the river and pond respectively, and in the sediment were 22.7 and 22.1 days, respectively. The total system half-lives are of limited value because the correlation coefficients ranged from 0.69-0.73. The DT_{50}'s in the total system were between 3 and 7 days for both water-sediment systems. A transformation pathway was proposed by the study author involving degradation to the polar transformation product 2,6-dichlorobenzoic acid (M4) and 4-amino-3,5-dichloroacetanilide (M2) with ultimate production of CO_2 and bound residues. For both systems, conditions in the water layers and sediments were moderately reducing throughout the study. In the river water-loam sediment systems, redox potentials, dissolved oxygen and pH in the water layers were +104 to +146 mV, 4.0-8.9 mg/L and 7.86-8.41, respectively, while redox potentials in the sediment were -109 to -92 mV (reducing conditions). In pond water-silty clay loam sediment systems, redox potentials, dissolved oxygen and pH in the water layers were +116 to +171 mV, 4.5-7.8 mg/L and 7.82-8.52, respectively, while redox potentials in the sediment were -118 to -87 mV (reducing conditions).

In river water-loam sediment systems, total [^{14}C]residues partitioned from the water layer into the sediment with distribution ratios (water:sediment) of 32:1 at 0 days, 1:1.2 at 3 days, 1:15.3 at 30 days and were 1:40 at 100 days. [^{14}C]Dicloran in the total system decreased from an average 100.1% of the applied at day 0 to 59.8% at 3 days, 21.9% at 7 days, 3.6% at 14 days and was 0.6% at 100 days (study termination). [^{14}C]Dicloran in the water layer decreased from 97.9% at day 0 to 41.6% at 3 days, 14.4% at 7 days, and was not detected at 14-100 days. In the sediment, [^{14}C]dicloran increased from 2.2% at day 0 to 18.2% at 3 days, then decreased to 7.5% at 7 days and was 0.6% at 100 days. Parent [^{14}C]dicloran partitioned from the water layer into the sediment with distribution ratios (water:sediment) of 44.5:1 at 0 days, 2.3:1 at 3 days, and was undetected in the water by 14 days. One major non-volatile transformation product was identified. 2,6-dichlorobenzoic acid (M4) was detected at a maximum average 12.8% (maximums of 9.0% and 3.9% in water and sediment, respectively) of the applied at 7 days. One minor transformation product was identified. 4-Amino 3,5-dichloroacetanilide (M2) was a maximum average at 6.2% (1.8% and 4.4% in water and sediment, respectively). Ten peaks were isolated. HPLC peaks M1, M3, M5, M6, M7, M8, M9, and M10 were detected only in the sediment and were a maximum average of &1.5% of the applied; peaks M11 and M12 were detected only in the water and were a maximum average of &2.5% of the applied. Radioactivity extracted, but not analyzed was a maximum 3.0% and 3.2% of the applied in the water and sediment, respectively. Extractable [^{14}C]residues in the sediment increased from 2.2% of the applied at day 0 to 26.1% at 3 days, then decreased to 5.5% at 100 days. Nonextractable [^{14}C]residues increased from 1.0% at day 0 to 86.7% at 100 days. Organic matter fractionation of 100-day extracted sediment found 11.3%, 11.7% and 58.2% of the applied associated with the fulvic acids, humic

acids and humins, respectively. Formation of volatilized of $^{14}CO_2$ was insignificant, totaling 2.2% of the applied at study termination; volatile [^{14}C]organic compounds were &0.1% at any sampling interval.

In pond water-silty clay loam sediment systems, total [^{14}C]residues partitioned from the water layer into the sediment with distribution ratios (water:sediment) of 35.7:1 at 0 days, 3.5:1 at 1 day, 1:2.4 at 7 days 1:25 at 29 days and were 1:46 at 100 days. [^{14}C]Dicloran in the total system decreased from an average 101.7% of the applied at 0 days to 65.7% at 3 days, 20.0% at 7 days, 3.7% at 14 days and was 0.5% at 100 days (study termination). In the water layer, [^{14}C]dicloran was detected at 99.9% at day 0 day, then decreased to 54.0% at 3 days, 15.2% at 7 days, 0.3% at 14 days and was not detected at 29-100 days. In the sediment, [^{14}C]dicloran increased from 1.8% at day 0 to 14.8% at 1 days, then decreased to 4.8% at 7 days and was 0.5% at 100 days. Parent [^{14}C]dicloran partitioned from the water layer into the sediment with distribution ratios (water:sediment) of 55.5:1 at 0 days, 4.6:1 at 3 days, and was undetected in the water by 29 days. No major non-volatile transformation products were identified. Two minor transformation products were identified. M2 (4-amino 3,5-dichloroacetanilide) was a maximum average at 7.5% (day 7; 1.8% and 5.7% in water and sediment, respectively) and M4 (2,6-dichlorobenzoic acid) was detected at a maximum average 9.4% (day 7; maximums of 7.9% and 1.6% in water and sediment, respectively). Seven peaks were isolated. HPLC peaks M1, M3, M5, M6, and M9, were detected only in the sediment and were a maximum average 4.0% of the applied; peaks M11 and M12 were detected only in the water and were a maximum average of 2.1% of the applied. Radioactivity extracted, but not analyzed, was a maximum 2.0% and 4.0% of the applied in the water and sediment, respectively. Extractable [^{14}C]residues in the sediment increased from 1.8% of the applied at day 0 to 21.3% at 14 days, then decreased to 6.1% at 100 days. Nonextractable [^{14}C]residues increased from 1.0% at day 0 to 85.9% at 100 days. Organic matter fractionation of 100-day extracted sediment found 7.8%, 23.5% and 50.9% of the applied associated with the fulvic acids, humic acids and humin, respectively. Formation of volatilized of $^{14}CO_2$ was totaled 3.4% of the applied at study termination; volatile [^{14}C]organic compounds were &0.1% at any sampling interval.

This study was classified as not acceptable. It does not provide adequate information on the aerobic aquatic metabolism of DCNA because the experimental design was inadequate to assess aerobic aquatic degradation; the sediment was anaerobic at the time of treatment and remained anaerobic throughout the study. While nonextractable residues totaled up to >85% of the applied at study termination, high levels of such have also been observed in multiple other submitted studies (despite extensive work on the analytical method).

Mobility and Persistence

Leaching and Adsorption/Desorption

Based on soil adsorption coefficient (K_d) values determined using Freundlich adsorption isotherms with batch equilibrium study data (MRID 40538202), DCNA is expected to be mobile to slightly mobile in soils. However, based on the corresponding K_{oc} values and the McCall mobility classification scheme (Swann et al., 1983), the pesticide is expected to have low mobility in soils. Because adsorption is correlated with organic carbon content, DCNA is likely to be somewhat more mobile in soils with lower organic matter content, such as coarse sand soils. Based on a column leaching study (unaged; MRID 40538201), DCNA is expected to be slightly mobile (in sand soil) to relatively immobile in soil. Determinations of the mobility of the DCNA degradates using aged column leaching studies were inconclusive due to problems with the submitted studies (MRIDs 43809001, 40863001). Batch equilibrium studies of the degradates were not submitted. A fifth study (Acc. No. 00065859) was

submitted, but is not included in this review since TLC is not a currently accepted method of determining pesticide mobility; also, the study was determined to be scientifically invalid.

Soil characteristics and batch equilibrium study results for adsorption are presented in **Table A1**. The adsorption of DCNA was studied in four soils treated at four concentrations ranging from 0.04 to 5.0 µg/mL and maintained in darkness at 25 ºC for 24 hours (MRID 40538202). After the equilibration period, adsorption of DCNA, across all soils, was 35 – 92%. Desorption was conducted in series, with four desorptions each following 1.5 hours of agitation. Following desorption, only 4.9 – 14.4% of the applied radioactivity was present in solution across all soils. The desorption K values ranged from 0.63 – 16.6 mL/g; desorption K_{oc} values were not determined. This study was classified as acceptable and provides adequate data on the parent compound for use in the risk assessment. However, for both adsorption and desorption, the 1/n values were low (0.75 – 0.80 for adsorption and 0.27 – 0.47), indicating that the Freundlich model may not accurately represent adsorption of the test compound to the test soils at the high and low ends of the range of test concentrations. Also, the soils used in the study were non-naturally occurring (laboratory-mixed, standard soil) soils that may not be directly representative of those found in nature.

Table A1. Freundlich adsorption constants for DCNA in four soils.

Soil type (% organic carbon, pH)	K (mL/g)	1/n	r^2	K_{oc}
sand/German standard soil 2.1 (0.48%, 6.0)	3.7	0.77	0.998	760
loamy sand/German standard soil 2.2 (2.06%, 6.0)	13.6	0.80	1.0	660
loamy sand/Schering soil 165 (1.32%, 7.0)	9.7	0.80	0.999	735
sandy clay loam/Schering soil 170 (1.45%, 5.2)	15.4	0.75	0.998	1062

In the second study, the mobility of DCNA was studied in columns of sand (0.56% o.c., pH 5.8), loamy sand (1.32% o.c., pH 7.0), sandy loam (1.45% o.c., pH 5.2) and sandy clay loam soils (3.88% o.c., pH 7.3; MRID 40538201) using ring-labeled [^{14}C]DCNA at a rate of approximately 6 – 7 mg/column and 56 cm of water for leaching. Based on column leaching, unaged parent was determined to be slightly mobile in the sand soil, and relatively immobile in the other three soils. In all columns, the majority of the applied [^{14}C]residues were retained in the upper 4 – 5 cm of soil (66.4-75.2% for the sand soil; 76.3-81.3% and 81.6-86.8% for the loamy sand soils; and 77.6-90.9% for the sandy clay loam soil). The bottom 10 cm of the columns retained 0.4% of the applied for the sand soil and &0.1% for all others. Total [^{14}C]residues in the leachate were <0.1% of the applied for all soils. This study was classified as acceptable. However, as with the first mobility study, the soils used in this study were non-naturally occurring (laboratory-mixed, standard soil) soils that may not be directly representative of those found in nature.

In the third study, the mobility of aged DCNA, at 2.25 ppm was studied in columns of sandy loam, sand, silt loam, and clay soils using non-radiolabeled plus ring-labeled [U-^{14}C]DCNA. Prior to application to the columns, the parent was aged (0.8-9.2 days) in soil under anaerobic aquatic conditions. Following leaching with 0.01 M $CaCl_2$ solution, soils were analyzed for the parent and the degradates DCAA; DCHA; 3,5HA; and DCPD. Most of the radiolabeled residues retained in all of the columns following leaching remained in the application layers, with some residues also detected at 0-6 cm in all columns and at 6-12 cm in the sand soil column. However, aged soil (slurry) samples were not

adequately analyzed for the parent and degradates prior to leaching so the initial distribution of the parent and individual degradates in the application layer prior to leaching could not be determined. Also, the parent was not aged in the sand soil for a sufficient length of time. Nonextractable [^{14}C]residues were relatively high (26.0-65.5% of the applied) in the application layers of the columns, and were 37.0-73.1% for the whole columns. In the clay soil column, DCNA was present in the application layer at 11.0% of the applied radioactivity and was 16.1% at 0-6 cm. The minor degradates DCPD, DCAA and DCHA were present in the application layer at 1.5%, 1.8% and 0.83% of the applied, respectively; DCHA was 0.29% at 0-6 cm. Total radioactivity was 0.06-0.13% of the applied in each of the 6-cm depths from 6 to 30 cm. Nonextractable [^{14}C]residues were 50.1% of the applied in the application layer and were 6.2% at 0-6 cm. Radioactivity in the leachate was 0.06% of the applied. In the sand soil column, DCNA was present in the application layer at 41.2% of the applied, was 15.2% at 0-6 cm and was 4.9% at 6-12 cm. No degradates were detected in the applied (aged) soil layer. Total radioactivity was 0.04-0.13% of the applied in each of the 6-cm depths from 12 to 30 cm. Nonextractable [^{14}C]residues were 26.0% of the applied in the application layer, were 8.6% at 0-6 cm and were 2.3% at 6-12 cm. Radioactivity in the leachate was 0.07% of the applied. In the silt loam soil column, DCNA was 24.0% of the applied in the application layer, and was 21.2% at 0-6 cm. The minor degradates DCPD, DCAA and DCHA were present in the application layer at 0.17%, 1.1% and 0.48% of the applied, respectively. Total radioactivity was 0.05-1.3% of the applied in each of the 6-cm depths from 6 to 30 cm. Nonextractable [^{14}C]residues were 43.0% of the applied in the application layer and were 8.8% at 0-6 cm. Radioactivity in the leachate was 0.39% of the applied radioactivity. In the sandy loam soil column, DCNA was present in the application layer at 19.1% of the applied and was 2.7% at 0-6 cm. The minor degradates DCAA, 3,5HA and DCHA were present in the application layer at 1.2%, 0.4% and 0.3% of the applied, respectively; DCAA was 0.23% at 0-6 cm. Total radioactivity was 0.05-0.14% of the applied in each of the 6-cm depths from 6 to 30 cm. Nonextractable [^{14}C]residues were 65.5% of the applied in the application layer and were 7.6% at 0-6 cm. Radioactivity in the leachate was 0.10% of the applied. This study was classified as supplemental, as it did not provide the required information on the mobility of the degradates. Only parent dicloran was present in the aged sand soil and only minimal amounts (<2%) of the identified degradates were detected in the leached columns of all soils studied.

In the fourth study, the mobility of aged DCNA, at 2.25 ppm was studied in columns of sand and sandy loam soils using ring-labeled [U-^{14}C]DCNA. Prior to application to the columns, the parent was aged (30 days) in aerobic soil at 25ºC and 75% of 0.33 bar moisture content. Prior to leaching, 81-83% of the [^{14}C]residues were present as DCNA, &0.1% were DCPC, 3-4% were nonextractable, and 4-5% were unidentified; the degradates DCAA and DCHA were not detected in the aged soil. Following leaching with 0.01 M $CaCl_2$ solution, soils were analyzed for the parent and the degradates DCAA, DCHA, and DCPD. Residues of [U-^{14}C]DCNA were found to be mobile in sand soil and moderately mobile in sandy loam soil. Approximately 68% and 80% of the applied, respectively, was retained in the sand and sandy loam soil columns and was present as DCNA, while 19.5% and 8.8% of the applied was present in the respective columns as nonextractable residues. The degradates DCPD, DCAA and DCHA were detected in the soil column at &0.2% of the applied based on TLC analysis; however, these identifications could not be confirmed by HPLC analysis. In the sand soil following leaching, 8.7% of the applied remained in the application layer, 18.1% was in the 0- to 5-cm layer, 42.1% was in the 5- to 10-cm layer, 23.1% was in the 10- to 15-cm layer, 1.1% was in the 15- to 30-cm layer, and 0.2% was in the leachate. In the sandy loam soil following leaching, 54.3% of the applied remained in the application layer, 40.2% was in the 0- to 5-cm layer, <0.4% was in the 5- to 30-cm segment, and 0.1% was in the leachate. This study was classified as unacceptable. The aging period was not long enough to produce a sufficient level of degradates for which to assess the leaching potential of DCNA degradates. Consequently, the study did not provide the required information on the mobility of the degradates

Terrestrial Field Dissipation

As of August 31, 1990, the requirement for a 164-1 TFD study was waived in lieu of requiring a small-scale prospective groundwater monitoring study. The registrant did conduct and submitted reports for a small-scale prospective groundwater monitoring study conducted in Monterey Co., CA, which was started in Sept. 1996 and continued for approximately 20 months. The four studies summarized below were submitted prior to the time the 164-1 data requirement was waived in lieu of an acceptable small-scale prospective groundwater monitoring study.

Based on a submitted study that was initially classified as supplemental (10/2000) and later upgraded to acceptable (6/2004), DCNA is expected to be moderately persistent in field soil, with a first-order dissipation half-life of 95 days (r^2 =0.83). DCNA (Botran® 75W, 75.6% a.i.) was broadcast applied once as a spray at a rate of 4.0 lb a.i./A to bare ground plot of Foster sandy loam soil in California (MRID 44414201). The observed DT_{50} was less than the first-order half-life and occurred between 29 and 60 days. DCNA was initially 1.9 ppm in the 0- to 6-inch depth, decreased to 1.6 ppm by 1 day and 0.84 ppm by 7 days, was 0.89-1.3 ppm from 14 to 29 days, was next detected at 0.40-0.51 ppm from 62 to 119 days, decreased to 0.08-0.15 ppm by 273 to 364 days, and was last detected at 0.05 ppm (one of three replicates) at 452 days posttreatment. The parent was detected twice in the 6- to 12-inch depth (one of three replicates each), at 0.09 ppm (14 days) and at 0.18 ppm (20 days). The parent compound was not detected below the 6- to 12-inch depth. The degradate DCHA was detected only once, in the 0- to 6-inch depth at 0.54 ppm (one of three replicates) immediately following the application of dicloran. The degradate DCAA was not detected at any sampling interval or depth. Because of poor storage stability and analytical method problems, degradate results are questionable. However, storage stability problems are not likely to be corrected in a new study. This study was classified as acceptable. While the analytical method was inadequate for the analysis of the degradates DCHA and DCAA, the reviewer concluded that a reasonable attempt was made to develop the best analytical method available.

In the second study (conducted at two sites), DCNA (75% WP) dissipated with a mean half-life of 39 days in the 0- to 3-inch depth of a bare ground plot of Tifton fine sandy loam soil in Florida that was treated in nine weekly applications of 3.36 kg ai/ha/application (MRID 40583101). Downward movement of the pesticide could not determined due to contamination of the lower horizons during sampling. In a plot of fallow Hanford fine sandy loam soil in California that was treated with DCNA (75% WP) in one application at 33.6 kg ai/ha, the pesticide dissipated with a mean half-life of 78 days in the 0- to 3-inch depth. The study (for both sites) is classified as not acceptable. For both sites, there were multiple deficiencies in both the experimental (both design and field technique) and analytical methods, many of which preclude the study from being upgraded.

In the third study, the terrestrial field dissipation of DCNA (Botran, 75% WP) was studied in field plots of sand, loamy sand, and sandy loam soils in peanut fields of North Carolina and Virginia. At application rates of 5.2 and 10.4 lb/A, respective DCNA levels were 7.89 and 15.83 ppm in sand soil at 49 days posttreatment; 1.39 and 7.10 ppm in loamy sand soil at 46 days posttreatment, and 2.92 and 8.63 ppm in sandy loam soil at 28 days posttreatment (Acc. No. 00086953). Degradates were not monitored. This study is classified as not acceptable. The experimental methods had several deficiencies, including sampling inadequacies, which preclude the study from being upgraded.

In the fourth study, the terrestrial field dissipation of DCNA (Botran, 50% WP) was studied in a sand soil, a sandy loam soil and a muck in Michigan (Acc. No. 00082668). This study is classified as not

acceptable. Both the experimental and analytical methods had deficiencies which preclude the study from being upgraded.

Small Scale Prospective Groundwater

A small-scale prospective ground-water monitoring study was performed in which DCNA was applied as Botran 75W to head lettuce in Monterey County, California. DCNA was applied at a rate of 4.0 lb ai/acre along with a bromide tracer in September 1996 (MRID 45237401). Soil-water and ground-water samples were collected for 26 months after application. After the harvest of the lettuce crop to which DCNA was applied, the surface soil was disced a number of times for rotation of the field to broccoli culture.

The soil at the site was sandy, particularly near the surface. Most soil samples taken from the monitoring well and soil characterization cores were classified as sand, loamy sand, sandy loam, or loam, with few samples classified with a finer texture. The depth to ground water at the study site was between 9 and 16 feet during site instrumentation, which occurred soon after the rainy winter season in that area of California.

Detection of the bromide tracer indicated that the surface water from the treated field had penetrated to the deepest monitoring wells by 240 days after application. However, neither DCNA nor its degradates DCPD, DCAA and DCHA were detected in ground water taken from the monitoring wells. DCNA was detected in soil water, with a maximum concentration of 31.6 ppb detected at a depth of 3 feet, 30 days after application. DCPD, DCHA and DCAA were detected in the same suction lysimeter at concentrations of 6.8 ppb, 6.2 ppb and 0.16 ppb at 63 days after application

The results of the prospective ground-water monitoring study indicate that DCNA and its degradates are not likely to be transported to ground water. The results of environmental fate studies suggest that this might be due largely to the propensity for DCNA to bind to soil as nonextractable residues.

Bioaccumulation

Bioaccumulation in Fish

DCNA has a moderate to high potential to bioconcentrate in fish based on the results (BCF values for whole fish tissue) of a submitted guideline study and a classification scheme (Franke, C. et al., 1994). The classification scheme used indicates that compounds with BCF values of 30-100 have a moderate potential to bioaccumulate and those with values of >100-1000 have a high potential to bioaccumulate. Two separate guideline studies were submitted, and additional information was provided on the one study in a rebuttal document (MRID 45575001; also apparently submitted as MRID 45525801) submitted by the registrant in response to their review of the DERs generated for six environmental fate studies.

In the first study, radiolabeled residues accumulated in bluegill sunfish that were exposed to nonradiolabeled plus phenyl ring-labeled [U-^{14}C]DCNA at 11 µg/L (ppb) under flow-through aquarium conditions (MRID 43782001). Maximum bioconcentration factors (BCF) based on total radioactivity were 49X for edible, 264X for nonedible and **136X** for whole fish tissue samples. Mean total [^{14}C]residues at steady state were highest in the nonedible tissue (2235 µg/kg) compared with the edible and whole fish tissues (558 µg/kg and 1263 µg/kg, respectively). Maximum mean total [^{14}C]residues at

steady state were 615 ± 94.5 µg/kg in the edible, 2720 ± 692 µg/kg in the nonedible, and 1530 ± 333 µg/kg in the whole fish tissue samples at exposure day 29. Accumulation plateaus were reached by 7 days for the fillet, viscera, and whole fish tissues. [^{14}C]Residues were characterized in the viscera and edible tissues collected at exposure day 37 (metabolite identification exposure). Total radiolabeled [^{14}C]residues were 6.6 mg/kg and 0.63 mg/kg in the viscera and edible tissue portions, respectively. The parent was present at 1.3 ppm and 0.33 ppm in the viscera and edible tissues, respectively. The major degradate 2,6-dichloro-1,4-phenylenediamine was present at 1.8 ppm in the viscera and 0.051 ppm in the edible tissue samples. The major degradate 3,5-dichloro-4-aminoacetanilide was present at 0.46 ppm in the viscera and 0.057 ppm in the edible tissue samples. Unidentified major degradates (designated glucuronide #1 and #2 and metabolite D) were present, respectively, at 1.3, 0.79, and 1.10 ppm in the visceral tissue; and at 0.064, ND, and 0.014 ppm in the edible tissue. During depuration, 69%, 77% and 76% of the total [^{14}C]residues accumulated by exposure day 29 were eliminated from the edible, nonedible, and whole body fish tissues, respectively, by day 1; by 7 to 14 days of depuration, 79-83%, 88-89% and 86-88% of the total [^{14}C]residues were eliminated from the respective tissues. The registrant subsequently provided information which demonstrated that the unidentified residues were glucuronides of the parent and the two major degradates DCPD and DCAA. This study is classified as acceptable and provides adequate data for the risk assessment.

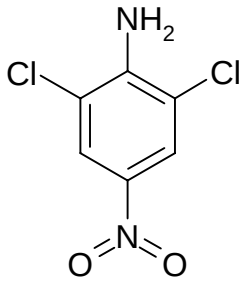
In the second study, radiolabeled residues accumulated in bluegill sunfish that were exposed to [^{14}C]DCNA at 0.38 ppm under flow-through aquarium conditions (MRID 40508808). Average bioconcentration factors (BCF) based on total radioactivity were 268X for viscera, 12X for edible, 29X for nonedible and **46X** for whole fish tissue samples; however, the visceral tissue residues did not reach a plateau concentration during the 14-day exposure period. The [^{14}C]residues in the fish tissues were not identified. During depuration, >96% of the accumulated [^{14}C]residues in whole fish were eliminated within 3 days, and 98% was eliminated in 7 days.

Chemical Structures for DCNA and its Environmental Fate Degradates

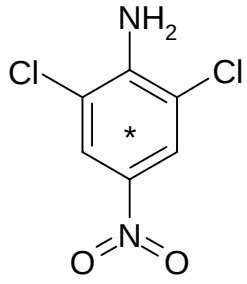
Dicloran

IUPAC name: 2,6-Dichloro-4-nitroaniline.
CAS name: 2,6-Dichloro-4-nitrobenzenamine.
CAS No.: 99-30-9.
SMILES string: Nc1c(cc(cc1Cl)N(=O)=O)Cl.

Unlabeled



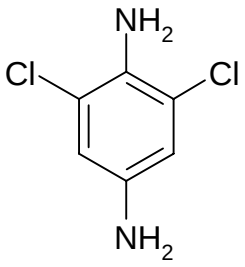
[Ring-U-^{14}C]dicloran or [Nitroaniline-U-^{14}C]dicloran



*Position of radiolabel.

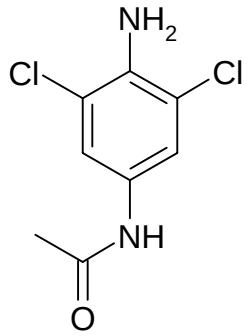
2,6-Dichloro-p-phenylene-diamine (DCPD)

IUPAC name: Not reported.
CAS name: 2,6-Dichloro-p-phenylene-diamine.
CAS No.: Not reported.



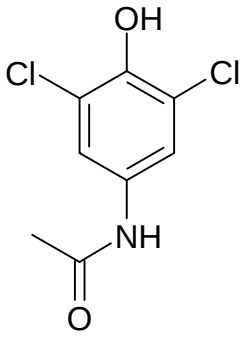
4-Amino-3,5-dichloroacetanilide (DCAA)

IUPAC name: Not reported.
CAS name: 4-Amino-3,5-dichloroacetanilide.
CAS No.: Not reported.



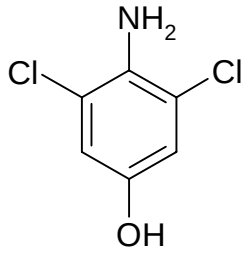
3,5-Dichloro-4-hydroxyacetanilide (3,5HA)

IUPAC name: Not reported.
CAS name: 3,5-Dichloro-4-hydroxyacetanilide.
CAS No.: Not reported.



2,6-Dichloro-4-hydroxyaniline (DCHA)

IUPAC name: Not reported.
CAS name: 2,6-Dichloro-4-hydroxyacetanilide.
CAS No.: Not reported.



APPENDIX C
AQUATIC EXPOSURE

I. Tier I Screening Level Model (SCI-GROW) Results for Groundwater

1. Single application of 4.0 lb ai/A (Note: Tier I groundwater modeling is not crop, application type or region specific)

SCIGROW
VERSION 2.3
ENVIRONMENTAL FATE AND EFFECTS DIVISION
OFFICE OF PESTICIDE PROGRAMS
U.S. ENVIRONMENTAL PROTECTION AGENCY
SCREENING MODEL
FOR AQUATIC PESTICIDE EXPOSURE

SciGrow version 2.3
chemical:dcna
time is 2/28/2005 17: 1:28

Application rate (lb/acre)	Number of applications	Total Use (lb/acre/yr)	Koc (ml/g)	Soil Aerobic metabolism (days)
4.000	1.0	4.000	7.48E+02	360.0

groundwater screening cond (ppb) = 1.28E+00
****

II. Tier II Screening Level Model (PRZM/EXAMS) Results for Surface Water

1. California lettuce (1 application of 4.0 lb ai/A)

stored as lettuce dcna.out
Chemical: dcna
PRZM environment: CAlettuceC.txt modified Monday, 11 October 2004 at 16:23:40
EXAMS environment: pond298.exv modified Thuday, 29 August 2002 at 16:33:30
Metfile: w23273.dvf modified Wedday, 3 July 2002 at 09:04:22
Water segment concentrations (ppb)

Year	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
1961	55.7	54.22	49.09	29.36	19.64	5.292
1962	63.12	61.96	57.25	48.85	45.1	20.58
1963	53.77	52.39	48.25	41.92	38.49	19.24
1964	28.69	28.03	25.37	21.51	15.74	8.511
1965	37.5	36.49	32.97	26.66	23.01	13.31
1966	51.97	50.54	45.43	28.26	19.14	9.32

1967	54.31	52.94	48.35	40.11	37.23	18.33
1968	25.63	24.89	22.82	20.19	16.81	6.57
1969	34.98	34.07	30.68	24.83	24.35	14.05
1970	62.56	60.96	51.23	30.86	21.06	11.01
1971	54.48	53.18	48.23	39.4	34.45	16.99
1972	57.73	56.09	50.52	38.4	27.09	9.821
1973	45.21	44.15	40.38	36.2	32.94	16.76
1974	52	50.87	45.5	33.07	30.08	19.46
1975	43.4	42.34	38.34	35.47	32.59	14.05
1976	50.98	49.94	45.1	36.17	32.14	18.66
1977	37.41	36.37	32.71	26.49	22.79	13.84
1978	41.11	40.23	39.03	34.08	30.44	17.82
1979	24.58	23.93	21.64	17.5	15.1	8.147
1980	25.7	25.15	23.2	20.37	18.64	9.246
1981	42.09	41.4	37.62	35.57	32.62	15.26
1982	39.84	38.77	34.79	29.57	25.97	13.27
1983	13.23	12.91	11.73	10.87	9.819	6.799
1984	34.08	33.18	26.94	15.75	10.8	4.842
1985	37.47	36.46	33.2	22.75	19.51	11.74
1986	35.41	34.5	31.07	25.08	23.89	15.6
1987	24.24	23.68	20.11	17.97	14.62	10.22
1988	30.86	30.04	27.13	22.24	19.17	12.43
1989	19.89	19.37	17.48	14.43	12.88	5.687
1990	13.53	13.18	12.27	11.36	10.69	4.935

Sorted results

Prob.	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
0.032258064516129	63.12	61.96	57.25	48.85	45.1	20.58
0.0645161290322581	62.56	60.96	51.23	41.92	38.49	19.46
0.0967741935483871	57.73	56.09	50.52	40.11	37.23	19.24
0.129032258064516	55.7	54.22	49.09	39.4	34.45	18.66
0.161290322580645	54.48	53.18	48.35	38.4	32.94	18.33
0.193548387096774	54.31	52.94	48.25	36.2	32.62	17.82
0.225806451612903	53.77	52.39	48.23	36.17	32.59	16.99
0.258064516129032	52	50.87	45.5	35.57	32.14	16.76
0.290322580645161	51.97	50.54	45.43	35.47	30.44	15.6
0.32258064516129	50.98	49.94	45.1	34.08	30.08	15.26
0.354838709677419	45.21	44.15	40.38	33.07	27.09	14.05
0.387096774193548	43.4	42.34	39.03	30.86	25.97	14.05
0.419354838709677	42.09	41.4	38.34	29.57	24.35	13.84
0.451612903225806	41.11	40.23	37.62	29.36	23.89	13.31
0.483870967741936	39.84	38.77	34.79	28.26	23.01	13.27
0.516129032258065	37.5	36.49	33.2	26.66	22.79	12.43
0.548387096774194	37.47	36.46	32.97	26.49	21.06	11.74
0.580645161290323	37.41	36.37	32.71	25.08	19.64	11.01
0.612903225806452	35.41	34.5	31.07	24.83	19.51	10.22
0.645161290322581	34.98	34.07	30.68	22.75	19.17	9.821
0.67741935483871	34.08	33.18	27.13	22.24	19.14	9.32
0.709677419354839	30.86	30.04	26.94	21.51	18.64	9.246

0.741935483870968 28.69 28.03 25.37 20.37 16.81 8.511
0.774193548387097 25.7 25.15 23.2 20.19 15.74 8.147
0.806451612903226 25.63 24.89 22.82 17.97 15.1 6.799
0.838709677419355 24.58 23.93 21.64 17.5 14.62 6.57
0.870967741935484 24.24 23.68 20.11 15.75 12.88 5.687
0.903225806451613 19.89 19.37 17.48 14.43 10.8 5.292
0.935483870967742 13.53 13.18 12.27 11.36 10.69 4.935
0.967741935483871 13.23 12.91 11.73 10.87 9.819 4.842

0.1 57.527 55.903 50.377 40.039 36.952 19.182
Average of yearly averages: 12.393

Inputs generated by pe4.pl - 8-August-2003

Data used for this run:
Output File: lettuce dcna
Metfile:w23273.dvf
PRZM scenario: CAlettuceC.txt
EXAMS environment file: pond298.exv
Chemical Name: dcna
Description Variable Name Value Units Comments
Molecular weight mwt 207 g/mol
Henry's Law Const. henry 7.78E-08 atm-m^3/mol
Vapor Pressure vapr 1.96E-06 torr
Solubility sol 70 mg/L
Kd Kd mg/L
Koc Koc 660 mg/L
Photolysis half-life kdp 1.97 days Half-life
Aerobic Aquatic Metabolism kbacw 1828 days Halfife
Anaerobic Aquatic Metabolism kbacs 7.9 days Halfife
Aerobic Soil Metabolism asm914 days Halfife
Hydrolysis: pH 5 0 days Half-life
Hydrolysis: pH 7 0 days Half-life
Hydrolysis: pH 9 0 days Half-life
Method: CAM 2 integer See PRZM manual
Incorporation Depth: DEPI 0 cm
Application Rate: TAPP4.48 kg/ha
Application Efficiency: APPEFF 0.99 fraction
Spray Drift DRFT 0.01 fraction of application rate applied to pond
Application Date Date 21-3 dd/mm or dd/mmm or dd-mm or dd-mmm
Record 17: FILTRA
IPSCND 3
UPTKF
Record 18: PLVKRT
PLDKRT
FEXTRC 0.5
Flag for Index Res. Run IR Pond
Flag for runoff calc. RUNOFF none none, monthly or total(average of entire run)

2. California grapes (1 application of 3.5 lb ai/A)

stored as grapes dcna.out
Chemical: dcna
PRZM environment: CAgrapesC.txt modified Satday, 12 October 2002 at 16:36:14
EXAMS environment: pond298.exv modified Thuday, 29 August 2002 at 16:33:30
Metfile: w93193.dvf modified Wedday, 3 July 2002 at 09:04:24
Water segment concentrations (ppb)

Year	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
1961	9.784	9.48	8.423	6.634	5.589	1.928
1962	10.3	9.993	8.887	7.005	5.907	2.248
1963	10.71	10.4	9.268	7.324	6.19	2.535
1964	9.981	9.685	8.607	6.788	5.734	2.161
1965	10.05	9.75	8.648	6.794	5.739	2.154
1966	10.01	9.713	8.624	6.766	5.701	2.207
1967	10.49	10.19	9.053	7.125	6.013	2.457
1968	9.923	9.626	8.543	6.704	5.645	2.181
1969	10.6	10.29	9.125	7.16	6.043	2.528
1970	10.72	10.41	9.237	7.242	6.101	2.735
1971	10.38	10.08	8.987	7.127	6.019	2.426
1972	9.951	9.65	8.556	6.745	5.698	2.134
1973	10.11	9.811	8.707	6.822	5.741	2.144
1974	10.14	9.831	8.712	6.818	5.737	2.254
1975	10.08	9.78	8.674	6.802	5.734	2.139
1976	10.21	9.907	8.791	6.901	5.823	2.46
1977	10.13	9.83	8.751	6.913	5.829	2.209
1978	10.11	9.805	8.691	6.8	5.72	2.219
1979	10.09	9.789	8.678	6.788	5.706	2.121
1980	10.21	9.913	8.814	6.944	5.859	2.22
1981	10.51	10.2	9.058	7.088	5.946	2.34
1982	10.28	9.976	8.851	6.95	5.867	2.507
1983	10.4	10.09	8.955	7.022	5.914	2.442
1984	10.03	9.729	8.612	6.715	5.64	2.089
1985	10.03	9.732	8.628	6.749	5.668	2.092
1986	10.02	9.716	8.619	6.744	5.668	2.17
1987	10.98	10.66	9.72	7.872	6.663	3.072
1988	9.93	9.634	8.557	6.737	5.68	2.013
1989	10.02	9.723	8.748	6.896	5.807	2.122
1990	10.1	9.796	8.702	7.715	6.68	2.49

Sorted results

Prob.	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
0.032258064516129	10.98	10.66	9.72	7.872	6.68	3.072
0.0645161290322581	10.72	10.41	9.268	7.715	6.663	2.735
0.0967741935483871	10.71	10.4	9.237	7.324	6.19	2.535
0.129032258064516	10.6	10.29	9.125	7.242	6.101	2.528
0.161290322580645	10.51	10.2	9.058	7.16	6.043	2.507

0.193548387096774	10.49	10.19	9.053	7.127	6.019	2.49
0.225806451612903	10.4	10.09	8.987	7.125	6.013	2.46
0.258064516129032	10.38	10.08	8.955	7.088	5.946	2.457
0.290322580645161	10.3	9.993	8.887	7.022	5.914	2.442
0.32258064516129	10.28	9.976	8.851	7.005	5.907	2.426
0.354838709677419	10.21	9.913	8.814	6.95	5.867	2.34
0.387096774193548	10.21	9.907	8.791	6.944	5.859	2.254
0.419354838709677	10.14	9.831	8.751	6.913	5.829	2.248
0.451612903225806	10.13	9.83	8.748	6.901	5.823	2.22
0.483870967741936	10.11	9.811	8.712	6.896	5.807	2.219
0.516129032258065	10.11	9.805	8.707	6.822	5.741	2.209
0.548387096774194	10.1	9.796	8.702	6.818	5.739	2.207
0.580645161290323	10.09	9.789	8.691	6.802	5.737	2.181
0.612903225806452	10.08	9.78	8.678	6.8	5.734	2.17
0.645161290322581	10.05	9.75	8.674	6.794	5.734	2.161
0.67741935483871	10.03	9.732	8.648	6.788	5.72	2.154
0.709677419354839	10.03	9.729	8.628	6.788	5.706	2.144
0.741935483870968	10.02	9.723	8.624	6.766	5.701	2.139
0.774193548387097	10.02	9.716	8.619	6.749	5.698	2.134
0.806451612903226	10.01	9.713	8.612	6.745	5.68	2.122
0.838709677419355	9.981	9.685	8.607	6.744	5.668	2.121
0.870967741935484	9.951	9.65	8.557	6.737	5.668	2.092
0.903225806451613	9.93	9.634	8.556	6.715	5.645	2.089
0.935483870967742	9.923	9.626	8.543	6.704	5.64	2.013
0.967741935483871	9.784	9.48	8.423	6.634	5.589	1.928

0.1	10.699	10.389	9.2258	7.3158	6.1811	2.5343

Average of yearly averages: 2.29323333333333

Inputs generated by pe4.pl - 8-August-2003

Data used for this run:
Output File: grapes dcna
Metfile:w93193.dvf
PRZM scenario: CAgrapesC.txt
EXAMS environment file: pond298.exv
Chemical Name: dcna

Description	Variable Name	Value	Units	Comments
Molecular weight	mwt	207	g/mol	
Henry's Law Const.	henry	7.78E-08	atm-m^3/mol	
Vapor Pressure	vapr	1.96E-06	torr	
Solubility	sol	70	mg/L	
Kd	Kd		mg/L	
Koc	Koc	660	mg/L	
Photolysis half-life	kdp	1.97	days	Half-life
Aerobic Aquatic Metabolism	kbacw	1828	days	Halfife
Anaerobic Aquatic Metabolism	kbacs	7.9	days	Halfife
Aerobic Soil Metabolism	asm	914	days	Halfife
Hydrolysis: pH 5		0	days	Half-life

Hydrolysis: pH 7 0 days Half-life
Hydrolysis: pH 9 0 days Half-life
Method: CAM 2 integer See PRZM manual
Incorporation Depth: DEPI 0 cm
Application Rate: TAPP3.92 kg/ha
Application Efficiency: APPEFF 0.95 fraction
Spray Drift DRFT 0.05 fraction of application rate applied to pond
Application Date Date 1-05 dd/mm or dd/mmm or dd-mm or dd-mmm
Record 17: FILTRA
IPSCND 3
UPTKF
Record 18: PLVKRT
PLDKRT
FEXTRC 0.5
Flag for Index Res. Run IR Pond
Flag for runoff calc. RUNOFF none none, monthly or total(average of entire run)

3. Idaho potatoes (5 applications of 1.5 lb ai/A/applic; total application of 7.5 lb ai/A)

stored as potatoes 5 apps pond.out
Chemical: dcna
PRZM environment: IDpotatoC.txt modified Satday, 12 October 2002 at 17:00:44
EXAMS environment: pond298.exv modified Thuday, 29 August 2002 at 16:33:30
Metfile: w93193.dvf modified Wedday, 3 July 2002 at 09:04:24
Water segment concentrations (ppb)

Year	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
1961	20.29	19.77	17.85	10.71	7.522	2.397
1962	18.72	18.38	16.97	14.11	13.61	6.775
1963	25.03	24.39	22.85	20.08	18.05	9.082
1964	23.72	23.02	21.78	18.55	13.47	5.901
1965	15.16	14.85	13.65	11.42	10.14	5.763
1966	24.53	23.86	21.44	10	7.131	4.424
1967	17.77	17.38	15.89	14.78	13.3	6.686
1968	25.57	24.88	23.06	19.95	15.29	5.849
1969	17.75	17.51	16.86	15.28	13.66	6.115
1970	24.58	23.91	21.47	17.86	15.81	8.178
1971	16.34	15.97	14.58	12.11	10.6	5.063
1972	30.18	29.7	26.91	20.12	13.89	6.107
1973	18.24	17.88	16.56	14.12	12.51	5.95
1974	15.79	15.33	13.69	12.3	9.164	4.914
1975	11.22	10.99	10.17	8.822	7.828	4.173
1976	42.86	41.6	37.02	30.35	26.8	14.45
1977	31.04	30.24	19.16	13.57	11.92	6.304
1978	29.28	28.66	27.65	24.64	21.88	10.82
1979	9.269	9.13	8.482	7.364	6.656	3.613
1980	12	11.7	10.57	9.59	8.688	4.172
1981	24.98	24.3	21.99	18.11	15.88	6.801

1982	23.14	22.53	20.97	20.37	19.5	8.654
1983	18.86	18.49	17.12	15.31	13.58	7.141
1984	8.403	8.201	6.988	5.523	4.838	3.165
1985	8.935	8.769	8.161	6.722	5.16	3.581
1986	48.04	46.7	25.67	9.592	6.856	4.208
1987	43.33	42.59	39.41	32.96	29.13	11.76
1988	9.497	9.254	6.486	3.11	2.674	2.326
1989	11.75	11.4	10.13	8.016	6.882	4.868
1990	22.55	22.13	19.97	16.6	14.47	6.268

Sorted results

Prob.	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
0.032258064516129	48.04	46.7	39.41	32.96	29.13	14.45
0.0645161290322581	43.33	42.59	37.02	30.35	26.8	11.76
0.0967741935483871	42.86	41.6	27.65	24.64	21.88	10.82
0.129032258064516	31.04	30.24	26.91	20.37	19.5	9.082
0.161290322580645	30.18	29.7	25.67	20.12	18.05	8.654
0.193548387096774	29.28	28.66	23.06	20.08	15.88	8.178
0.225806451612903	25.57	24.88	22.85	19.95	15.81	7.141
0.258064516129032	25.03	24.39	21.99	18.55	15.29	6.801
0.290322580645161	24.98	24.3	21.78	18.11	14.47	6.775
0.32258064516129	24.58	23.91	21.47	17.86	13.89	6.686
0.354838709677419	24.53	23.86	21.44	16.6	13.66	6.304
0.387096774193548	23.72	23.02	20.97	15.31	13.61	6.268
0.419354838709677	23.14	22.53	19.97	15.28	13.58	6.115
0.451612903225806	22.55	22.13	19.16	14.78	13.47	6.107
0.483870967741936	20.29	19.77	17.85	14.12	13.3	5.95
0.516129032258065	18.86	18.49	17.12	14.11	12.51	5.901
0.548387096774194	18.72	18.38	16.97	13.57	11.92	5.849
0.580645161290323	18.24	17.88	16.86	12.3	10.6	5.763
0.612903225806452	17.77	17.51	16.56	12.11	10.14	5.063
0.645161290322581	17.75	17.38	15.89	11.42	9.164	4.914
0.67741935483871	16.34	15.97	14.58	10.71	8.688	4.868
0.709677419354839	15.79	15.33	13.69	10	7.828	4.424
0.741935483870968	15.16	14.85	13.65	9.592	7.522	4.208
0.774193548387097	12	11.7	10.57	9.59	7.131	4.173
0.806451612903226	11.75	11.4	10.17	8.822	6.882	4.172
0.838709677419355	11.22	10.99	10.13	8.016	6.856	3.613
0.870967741935484	9.497	9.254	8.482	7.364	6.656	3.581
0.903225806451613	9.269	9.13	8.161	6.722	5.16	3.165
0.935483870967742	8.935	8.769	6.988	5.523	4.838	2.397
0.967741935483871	8.403	8.201	6.486	3.11	2.674	2.326

0.1	41.678	40.464	27.576	24.213	21.642	10.6462

Average of yearly averages: 6.1836

Inputs generated by pe4.pl - 8-August-2003

Data used for this run:

Output File: potatoes 5 apps pond
Metfile:w93193.dvf
PRZM scenario: IDpotatoC.txt
EXAMS environment file: pond298.exv
Chemical Name: dcna
Description Variable Name Value Units Comments
Molecular weight mwt 207 g/mol
Henry's Law Const. henry 7.78E-08 atm-m^3/mol
Vapor Pressure vapr 1.96E-06 torr
Solubility sol 70 mg/L
Kd Kd mg/L
Koc Koc 660 mg/L
Photolysis half-life kdp 1.97 days Half-life
Aerobic Aquatic Metabolism kbacw 1828 days Halfife
Anaerobic Aquatic Metabolism kbacs 7.9 days Halfife
Aerobic Soil Metabolism asm914 days Halfife
Hydrolysis: pH 5 0 days Half-life
Hydrolysis: pH 7 0 days Half-life
Hydrolysis: pH 9 0 days Half-life
Method: CAM 2 integer See PRZM manual
Incorporation Depth: DEPI 0 cm
Application Rate: TAPP1.68 kg/ha
Application Efficiency: APPEFF 0.99 fraction
Spray Drift DRFT 0.01 fraction of application rate applied to pond
Application Date Date 1-07 dd/mm or dd/mmm or dd-mm or dd-mmm
Interval 1 interval 7 days Set to 0 or delete line for single app.
Interval 2 interval 7 days Set to 0 or delete line for single app.
Interval 3 interval 7 days Set to 0 or delete line for single app.
Interval 4 interval 7 days Set to 0 or delete line for single app.
Record 17: FILTRA
IPSCND 3
UPTKF
Record 18: PLVKRT
PLDKRT
FEXTRC 0.5
Flag for Index Res. Run IR Pond
Flag for runoff calc. RUNOFF none none, monthly or total(average of entire run)

4. California onions (1 application of 4.0 lb ai/A)

stored as onions pond.out
Chemical: dcna
PRZM environment: CAonionC.txt modified Monday, 23 December 2002 at 06:48:48
EXAMS environment: pond298.exv modified Thuday, 29 August 2002 at 16:33:30
Metfile: w23155.dvf modified Wedday, 3 July 2002 at 09:04:20
Water segment concentrations (ppb)

Year Peak 96 hr 21 Day 60 Day 90 Day Yearly

1961	0	0	0	0	0	0
1962	0	0	0	0	0	0
1963	0.01276	0.01242	0.01118	0.00834	0.006425	0.001584
1964	0.229	0.2207	0.1974	0.1589	0.1388	0.07085
1965	0.1697	0.165	0.1479	0.1286	0.1173	0.05383
1966	0.1528	0.1488	0.1403	0.1219	0.1108	0.07141
1967	0.1647	0.1603	0.1453	0.1217	0.1068	0.06543
1968	0.2239	0.2181	0.1967	0.1601	0.1465	0.07182
1969	0.0349	0.03402	0.03106	0.02713	0.02598	0.01555
1970	0.2049	0.1992	0.1824	0.1377	0.1197	0.06174
1971	0.2647	0.2581	0.2335	0.191	0.1817	0.08254
1972	0.258	0.251	0.2246	0.187	0.1937	0.09618
1973	0.07382	0.07211	0.06565	0.05611	0.05087	0.02512
1974	0.2835	0.2752	0.2449	0.2149	0.2138	0.09394
1975	0.2959	0.2888	0.2624	0.2185	0.1979	0.08178
1976	0.2745	0.2665	0.2388	0.1931	0.1822	0.07471
1977	0.2138	0.208	0.1985	0.1701	0.1473	0.07117
1978	0.3337	0.3249	0.2942	0.2389	0.2078	0.08883
1979	0.05501	0.05353	0.0503	0.04318	0.03708	0.01755
1980	0.06953	0.06774	0.06516	0.05572	0.0492	0.02261
1981	0.176	0.1713	0.1605	0.1307	0.1224	0.06771
1982	0.09143	0.08894	0.07989	0.05457	0.04664	0.0302
1983	0.1145	0.1116	0.08693	0.07296	0.06688	0.03769
1984	0.2469	0.2405	0.217	0.1769	0.1687	0.08132
1985	0.1617	0.1574	0.1485	0.1281	0.1115	0.06502
1986	0.08845	0.08696	0.08024	0.06687	0.05945	0.0352
1987	0.2235	0.2172	0.1944	0.1687	0.1163	0.08736
1988	0.2474	0.2411	0.2172	0.1813	0.1721	0.07738
1989	0.2328	0.2261	0.202	0.1653	0.1493	0.0673
1990	0.1953	0.1901	0.1802	0.1568	0.1361	0.05313

Sorted results

Prob.	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
0.032258064516129	0.3337	0.3249	0.2942	0.2389	0.2138	0.09618
0.0645161290322581	0.2959	0.2888	0.2624	0.2185	0.2078	0.09394
0.0967741935483871	0.2835	0.2752	0.2449	0.2149	0.1979	0.08883
0.129032258064516	0.2745	0.2665	0.2388	0.1931	0.1937	0.08736
0.161290322580645	0.2647	0.2581	0.2335	0.191	0.1822	0.08254
0.193548387096774	0.258	0.251	0.2246	0.187	0.1817	0.08178
0.225806451612903	0.2474	0.2411	0.2172	0.1813	0.1721	0.08132
0.258064516129032	0.2469	0.2405	0.217	0.1769	0.1687	0.07738
0.290322580645161	0.2328	0.2261	0.202	0.1701	0.1493	0.07471
0.32258064516129	0.229	0.2207	0.1985	0.1687	0.1473	0.07182
0.354838709677419	0.2239	0.2181	0.1974	0.1653	0.1465	0.07141
0.387096774193548	0.2235	0.2172	0.1967	0.1601	0.1388	0.07117
0.419354838709677	0.2138	0.208	0.1944	0.1589	0.1361	0.07085
0.451612903225806	0.2049	0.1992	0.1824	0.1568	0.1224	0.06771
0.483870967741936	0.1953	0.1901	0.1802	0.1377	0.1197	0.0673
0.516129032258065	0.176	0.1713	0.1605	0.1307	0.1173	0.06543

0.548387096774194 0.1697 0.165 0.1485 0.1286 0.1163 0.06502
0.580645161290323 0.1647 0.1603 0.1479 0.1281 0.1115 0.06174
0.612903225806452 0.1617 0.1574 0.1453 0.1219 0.1108 0.05383
0.645161290322581 0.1528 0.1488 0.1403 0.1217 0.1068 0.05313
0.67741935483871 0.1145 0.1116 0.086930.072960.066880.03769
0.709677419354839 0.09143 0.088940.080240.066870.059450.0352
0.741935483870968 0.08845 0.086960.079890.056110.050870.0302
0.774193548387097 0.07382 0.072110.065650.055720.0492 0.02512
0.806451612903226 0.06953 0.067740.065160.054570.046640.02261
0.838709677419355 0.05501 0.053530.0503 0.043180.037080.01755
0.870967741935484 0.0349 0.034020.031060.027130.025980.01555
0.903225806451613 0.01276 0.012420.011180.008340.006425 0.001584
0.935483870967742 0 0 0 0 0 0
0.967741935483871 0 0 0 0 0 0

0.1 0.2826 0.274330.244290.212720.197480.088683
Average of yearly averages: 0.0556318

Inputs generated by pe4.pl - 8-August-2003

Data used for this run:
Output File: onions pond
Metfile:w23155.dvf
PRZM scenario: CAonionC.txt
EXAMS environment file: pond298.exv
Chemical Name: dcna
Description Variable Name Value Units Comments
Molecular weight mwt 207 g/mol
Henry's Law Const. henry 7.78E-08 atm-m^3/mol
Vapor Pressure vapr 1.96E-06 torr
Solubility sol 70 mg/L
Kd Kd mg/L
Koc Koc 660 mg/L
Photolysis half-life kdp 1.97 days Half-life
Aerobic Aquatic Metabolism kbacw 1828 days Halfife
Anaerobic Aquatic Metabolism kbacs 7.9 days Halfife
Aerobic Soil Metabolism asm914 days Halfife
Hydrolysis: pH 5 0 days Half-life
Hydrolysis: pH 7 0 days Half-life
Hydrolysis: pH 9 0 days Half-life
Method: CAM 7 integer See PRZM manual
Incorporation Depth: DEPI 5 cm
Application Rate: TAPP4.48 kg/ha
Application Efficiency: APPEFF 0.99 fraction
Spray Drift DRFT 0.01 fraction of application rate applied to pond
Application Date Date 1-10 dd/mm or dd/mmm or dd-mm or dd-mmm
Record 17: FILTRA
IPSCND 1
UPTKF

Record 18: PLVKRT
PLDKRT
FEXTRC 0.5
Flag for Index Res. Run IR Pond
Flag for runoff calc. RUNOFF none none, monthly or total(average of entire run)

5. Oregon vegetables (snapbean; 1 application of 3.75 lb ai/A)

stored as snap beans pond.out
Chemical: dcna
PRZM environment: ORsnbeansC.txt modified Satday, 12 October 2002 at 17:20:58
EXAMS environment: pond298.exv modified Thuday, 29 August 2002 at 16:33:30
Metfile: w24232.dvf modified Wedday, 3 July 2002 at 09:06:10
Water segment concentrations (ppb)

Year	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
1961	31.05	30.41	25.83	19.38	15.82	5.13
1962	40.6	39.81	37.88	33.13	31.1	17.41
1963	38.59	37.92	35.2	32.03	26.27	18.23
1964	48.95	48.13	39.64	28.46	24.44	16.51
1965	45.38	44.71	41.43	36.39	32.52	19.81
1966	43.15	42.61	39.97	34.04	30.56	19.21
1967	38.6	38.01	35.44	28.88	25.26	17.67
1968	37.47	36.96	35.3	33.82	32.42	22.6
1969	45.98	45	43.27	40.38	38.27	20.17
1970	41.86	41.07	39.76	35.9	32.23	20.32
1971	34.91	34.22	32.99	30.69	29.77	20.72
1972	39.41	38.7	29.56	25.41	22.91	15.13
1973	48.62	47.79	45.79	39.17	31.19	20.86
1974	50.4	49.51	46.58	39.87	29.02	18.86
1975	44.14	43.48	41.09	36.36	32.84	20.52
1976	28.08	27.54	26.82	23.37	21.16	11.93
1977	39.17	38.44	35.64	26.74	21.87	10.95
1978	33.95	33.34	31.79	27.49	24.52	15.47
1979	41.02	40.42	38.29	37.38	33.46	18.68
1980	56.33	55.1	45.91	31.77	26.82	17.93
1981	55.99	55.05	53.26	48.88	45.28	27.65
1982	47.81	47.37	44.32	38.61	34.65	20.32
1983	38.1	37.46	35.68	31.84	25.19	18.09
1984	48.49	47.84	44.87	42.28	33.86	19.23
1985	36.67	36	33.38	28.96	26.15	17.1
1986	34.07	33.49	30.94	25.61	21.66	15.09
1987	65	63.53	58.58	33.84	24.48	16.28
1988	57	55.88	53.06	47.21	42.42	24.04
1989	43.54	42.64	38.95	29.7	26.7	18.23
1990	41.53	40.67	38.18	36.73	33.93	21.98

Sorted results

Prob.	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
0.032258064516129	65	63.53	58.58	48.88	45.28	27.65
0.0645161290322581	57	55.88	53.26	47.21	42.42	24.04
0.0967741935483871	56.33	55.1	53.06	42.28	38.27	22.6
0.129032258064516	55.99	55.05	46.58	40.38	34.65	21.98
0.161290322580645	50.4	49.51	45.91	39.87	33.93	20.86
0.193548387096774	48.95	48.13	45.79	39.17	33.86	20.72
0.225806451612903	48.62	47.84	44.87	38.61	33.46	20.52
0.258064516129032	48.49	47.79	44.32	37.38	32.84	20.32
0.290322580645161	47.81	47.37	43.27	36.73	32.52	20.32
0.32258064516129	45.98	45	41.43	36.39	32.42	20.17
0.354838709677419	45.38	44.71	41.09	36.36	32.23	19.81
0.387096774193548	44.14	43.48	39.97	35.9	31.19	19.23
0.419354838709677	43.54	42.64	39.76	34.04	31.1	19.21
0.451612903225806	43.15	42.61	39.64	33.84	30.56	18.86
0.483870967741936	41.86	41.07	38.95	33.82	29.77	18.68
0.516129032258065	41.53	40.67	38.29	33.13	29.02	18.23
0.548387096774194	41.02	40.42	38.18	32.03	26.82	18.23
0.580645161290323	40.6	39.81	37.88	31.84	26.7	18.09
0.612903225806452	39.41	38.7	35.68	31.77	26.27	17.93
0.645161290322581	39.17	38.44	35.64	30.69	26.15	17.67
0.67741935483871	38.6	38.01	35.44	29.7	25.26	17.41
0.709677419354839	38.59	37.92	35.3	28.96	25.19	17.1
0.741935483870968	38.1	37.46	35.2	28.88	24.52	16.51
0.774193548387097	37.47	36.96	33.38	28.46	24.48	16.28
0.806451612903226	36.67	36	32.99	27.49	24.44	15.47
0.838709677419355	34.91	34.22	31.79	26.74	22.91	15.13
0.870967741935484	34.07	33.49	30.94	25.61	21.87	15.09
0.903225806451613	33.95	33.34	29.56	25.41	21.66	11.93
0.935483870967742	31.05	30.41	26.82	23.37	21.16	10.95
0.967741935483871	28.08	27.54	25.83	19.38	15.82	5.13
0.1	56.296	55.095	52.412	42.09	37.908	22.538

Average of yearly averages: 18.204

Inputs generated by pe4.pl - 8-August-2003

Data used for this run:
Output File: snap beans pond
Metfile:w24232.dvf
PRZM scenario: ORsnbeansC.txt
EXAMS environment file: pond298.exv
Chemical Name: dcna

Description	Variable Name	Value	Units	Comments
Molecular weight	mwt	207	g/mol	
Henry's Law Const.	henry	7.78E-08	atm-m^3/mol	
Vapor Pressure	vapr	1.96E-06	torr	
Solubility	sol	70	mg/L	
Kd	Kd		mg/L	

Koc Koc 660 mg/L
Photolysis half-life kdp 1.97 days Half-life
Aerobic Aquatic Metabolism kbacw 1828 days Halfife
Anaerobic Aquatic Metabolism kbacs 7.9 days Halfife
Aerobic Soil Metabolism asm914 days Halfife
Hydrolysis: pH 5 0 days Half-life
Hydrolysis: pH 7 0 days Half-life
Hydrolysis: pH 9 0 days Half-life
Method: CAM 2 integer See PRZM manual
Incorporation Depth: DEPI 0 cm
Application Rate: TAPP4.2 kg/ha
Application Efficiency: APPEFF 0.95 fraction
Spray Drift DRFT 0.05 fraction of application rate applied to pond
Application Date Date 1-08 dd/mm or dd/mmm or dd-mm or dd-mmm
Record 17: FILTRA
IPSCND 3
UPTKF
Record 18: PLVKRT
PLDKRT
FEXTRC 0.5
Flag for Index Res. Run IR Pond
Flag for runoff calc. RUNOFF none none, monthly or total(average of entire run)

6. North Carolina peanuts (1 application of 4.0 lb ai/A)

stored as peanuts pond.out
Chemical: dcna
PRZM environment: NCpeanutC.txt modified Satday, 12 October 2002 at 17:12:46
EXAMS environment: pond298.exv modified Thuday, 29 August 2002 at 16:33:30
Metfile: w13737.dvf modified Wedday, 3 July 2002 at 09:06:30
Water segment concentrations (ppb)

Year	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
1961	43.77	42.64	38.12	32.81	31.11	11.79
1962	48.61	47.27	43.34	38.98	34.29	14.22
1963	28.93	28.11	25.09	20.3	18.19	8.954
1964	30.38	29.55	27.22	22.58	22.99	12
1965	37.36	36.37	32.67	27.49	24.08	10.11
1966	48.09	46.78	42.42	35.25	30.43	11.88
1967	32.55	31.65	28.32	25.97	22.98	10.87
1968	18.72	18.23	16.52	14.08	12.43	6.204
1969	42.8	41.83	38.04	33.38	31.89	12.67
1970	49.3	47.99	44.33	38.87	33.56	13.28
1971	21.74	21.15	19.18	17.33	16.15	8.702
1972	16.79	16.34	15.62	14.06	12.5	6.44
1973	43.48	42.29	39.08	36.12	32.44	12.45
1974	43.49	42.56	39.33	33.8	30.56	13.32
1975	70.25	68.31	61.61	50.42	43.86	17.05

1976	25.36	24.69	23.4	19.73	17.27	8.87
1977	26.49	25.77	22.93	18.93	16.87	8.282
1978	33.9	32.98	29.63	26.44	23.36	9.98
1979	28.25	27.47	25.4	22.71	20.6	9.736
1980	38.6	37.47	33.3	26.35	23.69	11.19
1981	52.6	51.65	46.22	38.07	34.02	15.3
1982	21.85	21.26	19.66	18.96	17.48	8.66
1983	16.81	16.35	14.69	11.91	10.65	6.002
1984	18.64	18.14	16.31	14.24	13.02	6.066
1985	21.35	20.77	18.57	16.39	15.52	7.373
1986	12.14	11.79	10.5	9.553	9.405	4.954
1987	12.51	12.17	10.93	9.194	8.332	4.997
1988	25.91	25.2	23.05	19.62	18.05	7.682
1989	23.29	22.81	21.4	18.44	17.03	7.705
1990	22.26	21.67	19.78	17.15	16.51	7.803

Sorted results

Prob.	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
0.032258064516129	70.25	68.31	61.61	50.42	43.86	17.05
0.0645161290322581	52.6	51.65	46.22	38.98	34.29	15.3
0.0967741935483871	49.3	47.99	44.33	38.87	34.02	14.22
0.129032258064516	48.61	47.27	43.34	38.07	33.56	13.32
0.161290322580645	48.09	46.78	42.42	36.12	32.44	13.28
0.193548387096774	43.77	42.64	39.33	35.25	31.89	12.67
0.225806451612903	43.49	42.56	39.08	33.8	31.11	12.45
0.258064516129032	43.48	42.29	38.12	33.38	30.56	12
0.290322580645161	42.8	41.83	38.04	32.81	30.43	11.88
0.32258064516129	38.6	37.47	33.3	27.49	24.08	11.79
0.354838709677419	37.36	36.37	32.67	26.44	23.69	11.19
0.387096774193548	33.9	32.98	29.63	26.35	23.36	10.87
0.419354838709677	32.55	31.65	28.32	25.97	22.99	10.11
0.451612903225806	30.38	29.55	27.22	22.71	22.98	9.98
0.483870967741936	28.93	28.11	25.4	22.58	20.6	9.736
0.516129032258065	28.25	27.47	25.09	20.3	18.19	8.954
0.548387096774194	26.49	25.77	23.4	19.73	18.05	8.87
0.580645161290323	25.91	25.2	23.05	19.62	17.48	8.702
0.612903225806452	25.36	24.69	22.93	18.96	17.27	8.66
0.645161290322581	23.29	22.81	21.4	18.93	17.03	8.282
0.67741935483871	22.26	21.67	19.78	18.44	16.87	7.803
0.709677419354839	21.85	21.26	19.66	17.33	16.51	7.705
0.741935483870968	21.74	21.15	19.18	17.15	16.15	7.682
0.774193548387097	21.35	20.77	18.57	16.39	15.52	7.373
0.806451612903226	18.72	18.23	16.52	14.24	13.02	6.44
0.838709677419355	18.64	18.14	16.31	14.08	12.5	6.204
0.870967741935484	16.81	16.35	15.62	14.06	12.43	6.066
0.903225806451613	16.79	16.34	14.69	11.91	10.65	6.002
0.935483870967742	12.51	12.17	10.93	9.553	9.405	4.997
0.967741935483871	12.14	11.79	10.5	9.194	8.332	4.954

0.1 49.231 47.918 44.231 38.79 33.974 14.13
Average of yearly averages: 9.818

Inputs generated by pe4.pl - 8-August-2003

Data used for this run:
Output File: peanuts pond
Metfile:w13737.dvf
PRZM scenario: NCpeanutC.txt
EXAMS environment file: pond298.exv
Chemical Name: dcna
Description Variable Name Value Units Comments
Molecular weight mwt 207 g/mol
Henry's Law Const. henry 7.78E-08 atm-m^3/mol
Vapor Pressure vapr 1.96E-06 torr
Solubility sol 70 mg/L
Kd Kd mg/L
Koc Koc 660 mg/L
Photolysis half-life kdp 1.97 days Half-life
Aerobic Aquatic Metabolism kbacw 1828 days Halfife
Anaerobic Aquatic Metabolism kbacs 7.9 days Halfife
Aerobic Soil Metabolism asm914 days Halfife
Hydrolysis: pH 5 0 days Half-life
Hydrolysis: pH 7 0 days Half-life
Hydrolysis: pH 9 0 days Half-life
Method: CAM 2 integer See PRZM manual
Incorporation Depth: DEPI 0 cm
Application Rate: TAPP4.48 kg/ha
Application Efficiency: APPEFF 0.95 fraction
Spray Drift DRFT 0.05 fraction of application rate applied to pond
Application Date Date 15-06 dd/mm or dd/mmm or dd-mm or dd-mmm
Record 17: FILTRA
IPSCND 3
UPTKF
Record 18: PLVKRT
PLDKRT
FEXTRC 0.5
Flag for Index Res. Run IR Pond
Flag for runoff calc. RUNOFF none none, monthly or total(average of entire run)

APPENDIX D
TERRESTRIAL EXPOSURE MODELING RESULTS

SPREADSHEET-BASED TERRESTRIAL EXPOSURE VALUES

A first-order decay assumption is used to determine the concentration at each day after initial application based on the concentration resulting from the initial and additional applications. The decay is calculated from the first order rate equation:

$$\mathbf{C_T = C_i e^{-kT}}$$

or in log-transformed form:

$$\mathbf{\ln (C_T/C_i) = -kT}$$

Where:

$\mathbf{C_T}$ = concentration at time T

$\mathbf{C_i}$ = concentration in parts per million (ppm) present initially (on day zero) on the surfaces. C_i is calculated based on Kenaga and Fletcher by multiplying the application rate, in pounds active ingredient per acre, by 240 for short grass, 110 for tall grass, and 135 for broad-leaf plants/insects and 15 for seeds. Additional applications are converted from pounds active ingredient per acre to parts per million (PPM) on the plant surface and the additional mass added to the mass of the chemical still present on the surfaces on the day of application.

k= degradation rate constant determined from studies of hydrolysis, photolysis, microbial degradation, etc. Since degradation rate is generally reported in terms of half-life, the rate constant is calculated from the input half-life ($k = \ln 2/t_{½}$) instead of being input directly. Choosing which process controls the degradation rate and which half-life to use in terrestrial exposure calculations is open for debate and should be done by a qualified scientist.

T= time, in days, since the start of the simulation. The initial application is on day 0. The simulation is set to run for 365 days.

The program calculates concentration on each type of surface on a daily interval for one year. The maximum concentration during the year and the average concentration during the first 56 days are calculated.

Upper Bound Kenaga Residues For RQ Calculation

Acute and Chronic RQs are based on the Upper Bound Kenaga Residues.

The maximum single day residue estimation is used for both the acute and reproduction RQs.

Chemical Name:	DCNA	
Use	Celery	
Formulation	0	
Application Rate	4	lbs a.i./acre
Half-life	35	days
Application Interval		days
Maximum # Apps./Year	1	
Length of Simulation	1	year
Concentration of Concern	250.00	(ppm)
Name of Concentration of Concern	Mammal chronic NOAEC	

Endpoints

Avian	Bobwhite quail LD50 (mg/kg-bw)	900
	Bobwhite quail LC50 (mg/kg-diet)	1219
	Bobwhite quail NOAEL (mg/kg-bw)	0
	Bobwhite quail NOAEC (mg/kg-diet)	387

Note: To provide risk management with the maximum possible information, it is recommended that both the dose-based and concentration-based RQs be calculated when data are available

Mammals	LD50 (mg/kg-bw)	3400
	LC50 (mg/kg-diet)	0
	NOAEL (mg/kg-bw)	12.5
	NOAEC (mg/kg-diet)	250

Note: To provide risk management with the maximum possible information, it is recommended that both the dose-based and concentration-based RQs be calculated when data are available

EECs (ppm)	Kenaga Values
Short Grass	960.00
Tall Grass	440.00
Broadleaf plants/sm Insects	540.00
Fruits/pods/seeds/lg insects	60.00

Avian Results

Avian Class	Body Weight	% body wgt consumed	Adjusted LD50
Small	20	114	637
Mid	100	65	811
Large	1000	29	1146

EEC equivalent dose (mg/kg-bw)	Avian Classes and Body Weights		
	small 20 g	mid 100 g	large 1000 g
Short Grass	1094	624	278
Tall Grass	502	286	128
Broadleaf plants/sm Insects	616	351	157
Fruits/pods/lg insects	68	39	17

Dose-based RQs (daily dose/LD50)	Avian Acute RQs		
	20 g	100 g	1000 g
Short Grass	1.72	0.77	0.24
Tall Grass	0.79	0.35	0.11
Broadleaf plants/sm insects	0.97	0.43	0.14
Fruits/pods/lg insects	0.11	0.05	0.02

Dietary-based RQs (EEC/LC50 or NOAEC)	RQs	
	Acute	Chronic
Short Grass	0.79	2.48
Tall Grass	0.36	1.14
Broadleaf plants/sm Insects	0.44	1.40
Fruits/pods/lg insects	0.05	0.16

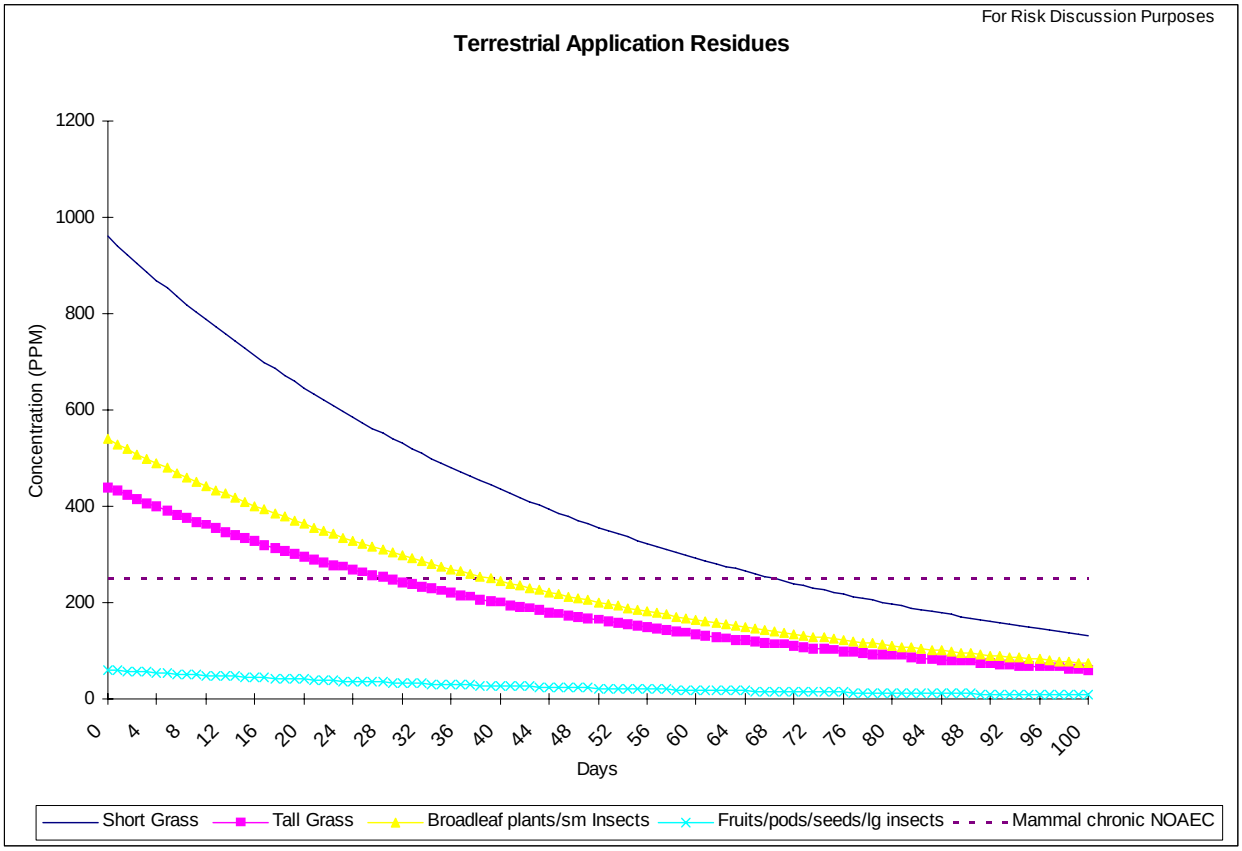
Mammalian Results

Mammalian Class	Body Weight	% body wgt consumed	Adjusted LD50	Adjusted NOAEL
Herbivores/ insectivores	15	95	7473	27
	35	66	6046	22
	1000	15	2615	10
Grainvores	15	21	7473	27
	35	15	6046	22
	1000	3	2615	10

EEC equivalent dose (mg/kg-bw)	Mammalian Classes and Body weight					
	Herbivores/ insectivores			Granivores		
	15 g	35 g	1000 g	15 g	35 g	1000 g
Short Grass	912	634	144			
Tall Grass	418	290	66			
Broadleaf plants/sm Insects	513	356	81			
Fruits/pods/seeds/lg insects	57	40	9	13	9	2

Dose-based RQs (daily dose/LD50 or NOAEL)	15 g mammal		35 g mammal		1000 g mammal	
	Acute	Chronic	Acute	Chronic	Acute	Chronic
Short Grass	0.12	33.20	0.10	28.50	0.06	14.98
Tall Grass	0.06	15.22	0.05	13.06	0.03	6.86
Broadleaf plants/sm insects	0.07	18.67	0.06	16.03	0.03	8.42
Fruits/pods/lg insects	0.01	2.07	0.01	1.78	0.00	0.94
Seeds (granivore)	0.00	0.46	0.00	0.40	0.00	0.19

Dietary-based RQs (EEC/LC50 or NOAEC)	Mammal RQs					
	Acute	Chronic				
Short Grass	#DIV/0!	3.84				
Tall Grass	#DIV/0!	1.76				
Broadleaf plants/sm insects	#DIV/0!	2.16				
Fruits/pods/seeds/lg insects	#DIV/0!	0.24				


For Risk Discussion Purposes
Terrestrial Application Residues
Concentration (PPM)
1200
1000
800
600
400
200
0
0 4 8 12 16 20 24 28 32 36 40 44 48 52 56 60 64 68 72 76 80 84 88 92 96 100
Days
Short Grass
Tall Grass
Broadleaf plants/sm Insects
Fruits/pods/seeds/lg insects
Mammal chronic NOAEC

Upper Bound Kenaga Residues For RQ Calculation

Acute and Chronic RQs are based on the Upper Bound Kenaga Residues.

The maximum single day residue estimation is used for both the acute and reproduction RQs.

Chemical Name:	DCNA	
Use	Celery	
Formulation	0	
Application Rate	2	lbs a.i./acre
Half-life	35	days
Application Interval	7	days
Maximum # Apps./Year	2	
Length of Simulation	1	year
Concentration of Concern		(ppm)
Name of Concentration of Concern		

Endpoints

Avian	Bobwhite quail LD50 (mg/kg-bw)	900
	Bobwhite quail LC50 (mg/kg-diet)	1219
	Bobwhite quail NOAEL (mg/kg-bw)	0
	Bobwhite quail NOAEC (mg/kg-diet)	387
Mammals	LD50 (mg/kg-bw)	3400
	LC50 (mg/kg-diet)	0
	NOAEL (mg/kg-bw)	12.5
	NOAEC (mg/kg-diet)	250

Note: To provide risk management with the maximum possible information, it is recommended that both the dose-based and concentration-based RQs be calculated when data are available

Note: To provide risk management with the maximum possible information, it is recommended that both the dose-based and concentration-based RQs be calculated when data are available

EECs (ppm)	Kenaga Values
Short Grass	897.86
Tall Grass	411.52
Broadleaf plants/sm Insects	505.05
Fruits/pods/seeds/lg insects	56.12

Avian Results

Avian Class	Body Weight	% body wgt consumed	Adjusted LD50
Small	20	114	637
Mid	100	65	811
Large	1000	29	1146

EEC equivalent dose (mg/kg-bw)	Avian Classes and Body Weights		
	small 20 g	mid 100 g	large 1000 g
Short Grass	1024	584	260
Tall Grass	469	267	119
Broadleaf plants/sm Insects	576	328	146
Fruits/pods/lg insects	64	36	16

Dose-based RQs (daily dose/LD50)	Avian Acute RQs		
	20 g	100 g	1000 g
Short Grass	1.61	0.72	0.23
Tall Grass	0.74	0.33	0.10
Broadleaf plants/sm insects	0.90	0.40	0.13
Fruits/pods/lg insects	0.10	0.04	0.01

Dietary-based RQs (EEC/LC50 or NOAEC)	RQs	
	Acute	Chronic
Short Grass	0.74	2.32
Tall Grass	0.34	1.06
Broadleaf plants/sm Insects	0.41	1.31
Fruits/pods/lg insects	0.05	0.15

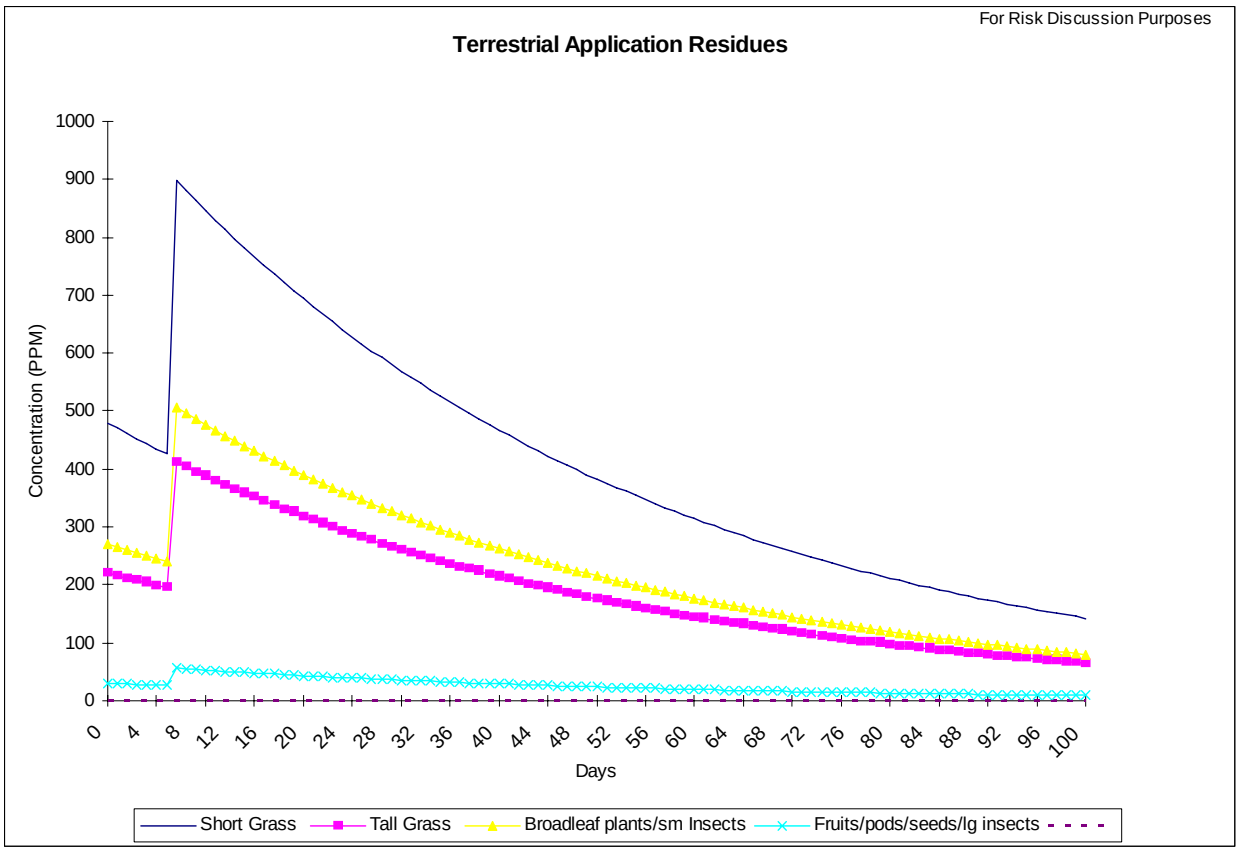
Mammalian Results

Mammalian Class	Body Weight	% body wgt consumed	Adjusted LD50	Adjusted NOAEL
Herbivores/ insectivores	15	95	7473	27
	35	66	6046	22
	1000	15	2615	10
Grainvores	15	21	7473	27
	35	15	6046	22
	1000	3	2615	10

EEC equivalent dose (mg/kg-bw)	Mammalian Classes and Body weight					
	Herbivores/ insectivores			Granivores		
	15 g	35 g	1000 g	15 g	35 g	1000 g
Short Grass	853	593	135			
Tall Grass	391	272	62			
Broadleaf plants/sm Insects	480	333	76			
Fruits/pods/seeds/lg insects	53	37	8	12	8	2

Dose-based RQs (daily dose/LD50 or NOAEL)	15 g mammal		35 g mammal		1000 g mammal	
	Acute	Chronic	Acute	Chronic	Acute	Chronic
Short Grass	0.11	31.05	0.10	26.66	0.05	14.01
Tall Grass	0.05	14.23	0.04	12.22	0.02	6.42
Broadleaf plants/sm insects	0.06	17.46	0.06	15.00	0.03	7.88
Fruits/pods/lg insects	0.01	1.94	0.01	1.67	0.00	0.88
Seeds (granivore)	0.00	0.43	0.00	0.38	0.00	0.18

Dietary-based RQs (EEC/LC50 or NOAEC)	Mammal RQs					
	Acute	Chronic				
Short Grass	#DIV/0!	3.59				
Tall Grass	#DIV/0!	1.65				
Broadleaf plants/sm insects	#DIV/0!	2.02				
Fruits/pods/seeds/lg insects	#DIV/0!	0.22				


For Risk Discussion Purposes
Terrestrial Application Residues
Concentration (PPM)
1000
900
800
700
600
500
400
300
200
100
0
0 4 8 12 16 20 24 28 32 36 40 44 48 52 56 60 64 68 72 76 80 84 88 92 96 100
Days
Short Grass
Tall Grass
Broadleaf plants/sm Insects
Fruits/pods/seeds/lg insects

Upper Bound Kenaga Residues For RQ Calculation

Acute and Chronic RQs are based on the Upper Bound Kenaga Residues.

The maximum single day residue estimation is used for both the acute and reproduction RQs.

Chemical Name:	DCNA	
Use	Potatoes	
Formulation	0	
Application Rate	1.5	lbs a.i./acre
Half-life	35	days
Application Interval	7	days
Maximum # Apps./Year	5	
Length of Simulation	1	year
Concentration of Concern	387.00	(ppm)
Name of Concentration of Concern	Avian Chronic NOAEC	

Endpoints

Avian	Bobwhite quail LD50 (mg/kg-bw)	900
	Bobwhite quail LC50 (mg/kg-diet)	1219
	Bobwhite quail NOAEL (mg/kg-bw)	0
	Bobwhite quail NOAEC (mg/kg-diet)	387
Mammals	LD50 (mg/kg-bw)	3400
	LC50 (mg/kg-diet)	0
	NOAEL (mg/kg-bw)	12.5
	NOAEC (mg/kg-diet)	250

Note: To provide risk management with the maximum possible information, it is recommended that both the dose-based and concentration-based RQs be calculated when data are available

Note: To provide risk management with the maximum possible information, it is recommended that both the dose-based and concentration-based RQs be calculated when data are available

EECs (ppm)	Kenaga Values
Short Grass	1390.50
Tall Grass	637.31
Broadleaf plants/sm Insects	782.16
Fruits/pods/seeds/lg insects	86.91

Avian Results

Avian Class	Body Weight	% body wgt consumed	Adjusted LD50
Small	20	114	637
Mid	100	65	811
Large	1000	29	1146

EEC equivalent dose (mg/kg-bw)	Avian Classes and Body Weights		
	small 20 g	mid 100 g	large 1000 g
Short Grass	1585	904	403
Tall Grass	727	414	185
Broadleaf plants/sm Insects	892	508	227
Fruits/pods/lg insects	99	56	25

Dose-based RQs (daily dose/LD50)	Avian Acute RQs		
	20 g	100 g	1000 g
Short Grass	2.49	1.11	0.35
Tall Grass	1.14	0.51	0.16
Broadleaf plants/sm insects	1.40	0.63	0.20
Fruits/pods/lg insects	0.16	0.07	0.02

Dietary-based RQs (EEC/LC50 or NOAEC)	RQs	
	Acute	Chronic
Short Grass	1.14	3.59
Tall Grass	0.52	1.65
Broadleaf plants/sm Insects	0.64	2.02
Fruits/pods/lg insects	0.07	0.22

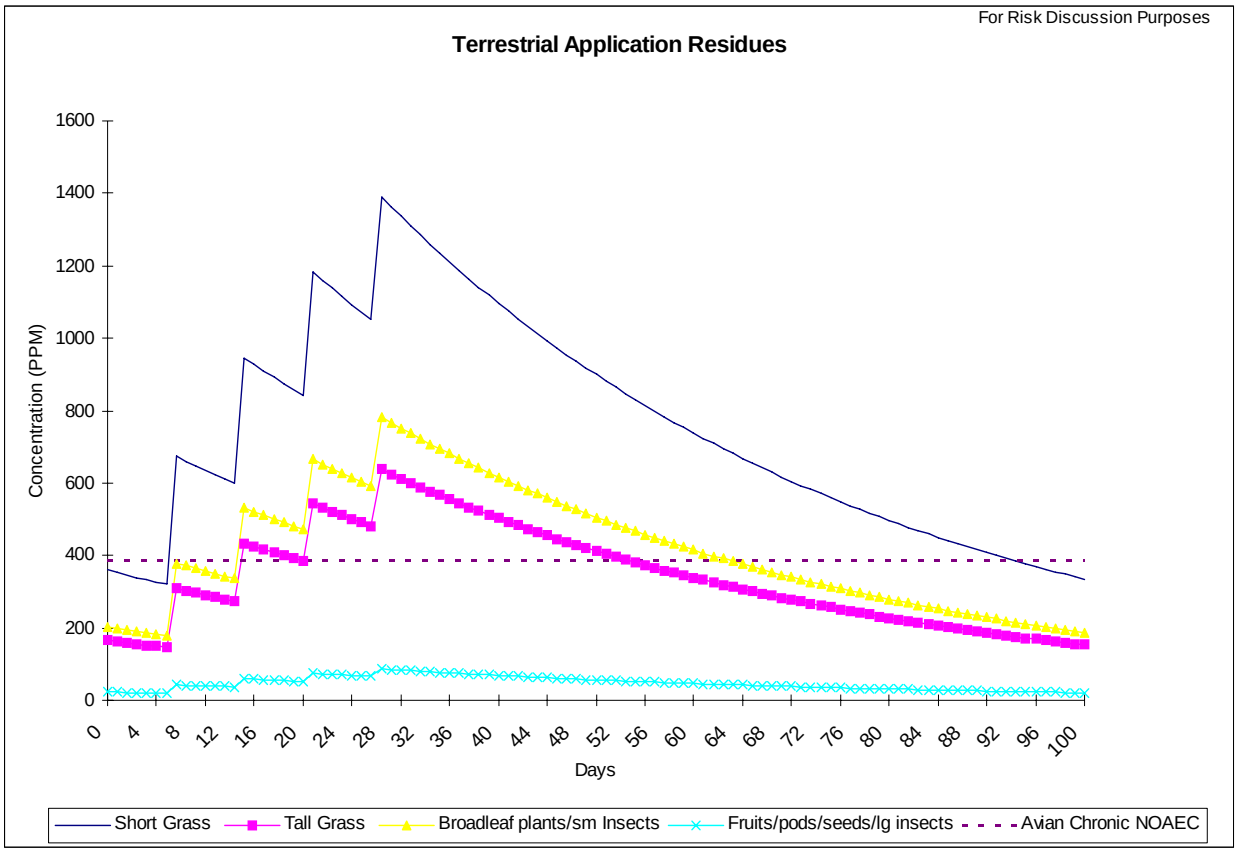
Mammalian Results

Mammalian Class	Body Weight	% body wgt consumed	Adjusted LD50	Adjusted NOAEL
	15	95	7473	27
Herbivores/	35	66	6046	22
insectivores	1000	15	2615	10
	15	21	7473	27
Grainvores	35	15	6046	22
	1000	3	2615	10

EEC equivalent dose (mg/kg-bw)	Mammalian Classes and Body weight					
	Herbivores/ insectivores			Granivores		
	15 g	35 g	1000 g	15 g	35 g	1000 g
Short Grass	1321	918	209			
Tall Grass	605	421	96			
Broadleaf plants/sm Insects	743	516	117			
Fruits/pods/seeds/lg insects	83	57	13	18	13	3

Dose-based RQs (daily dose/LD50 or NOAEL)	15 g mammal		35 g mammal		1000 g mammal	
	Acute	Chronic	Acute	Chronic	Acute	Chronic
Short Grass	0.18	48.08	0.15	41.29	0.08	21.69
Tall Grass	0.08	22.04	0.07	18.92	0.04	9.94
Broadleaf plants/sm insects	0.10	27.05	0.09	23.22	0.04	12.20
Fruits/pods/lg insects	0.01	3.01	0.01	2.58	0.00	1.36
Seeds (granivore)	0.00	0.66	0.00	0.59	0.00	0.27

Dietary-based RQs (EEC/LC50 or NOAEC)	Mammal RQs					
	Acute	Chronic				
Short Grass	#DIV/0!	5.56				
Tall Grass	#DIV/0!	2.55				
Broadleaf plants/sm insects	#DIV/0!	3.13				
Fruits/pods/seeds/lg insects	#DIV/0!	0.35				


For Risk Discussion Purposes
Terrestrial Application Residues
Concentration (PPM)
1600
1400
1200
1000
800
600
400
200
0
0 4 8 12 16 20 24 28 32 36 40 44 48 52 56 60 64 68 72 76 80 84 88 92 96 100
Days
Short Grass
Tall Grass
Broadleaf plants/sm Insects
Fruits/pods/seeds/lg insects
Avian Chronic NOAEC

Upper Bound Kenaga Residues For RQ Calculation

Acute and Chronic RQs are based on the Upper Bound Kenaga Residues.

The maximum single day residue estimation is used for both the acute and reproduction RQs.

Chemical Name:	DCNA	
Use	Snap beans	
Formulation	0	
Application Rate	3.75	lbs a.i./acre
Half-life	35	days
Application Interval		days
Maximum # Apps./Year	1	
Length of Simulation	1	year
Concentration of Concern		(ppm)
Name of Concentration of Concern		

Endpoints

Avian	Bobwhite quail LD50 (mg/kg-bw)	900
	Bobwhite quail LC50 (mg/kg-diet)	1219
	Bobwhite quail NOAEL (mg/kg-bw)	0
	Bobwhite quail NOAEC (mg/kg-diet)	387
Mammals	LD50 (mg/kg-bw)	3400
	LC50 (mg/kg-diet)	0
	NOAEL (mg/kg-bw)	12.5
	NOAEC (mg/kg-diet)	250

Note: To provide risk management with the maximum possible information, it is recommended that both the dose-based and concentration-based RQs be calculated when data are available

Note: To provide risk management with the maximum possible information, it is recommended that both the dose-based and concentration-based RQs be calculated when data are available

EECs (ppm)	Kenaga Values
Short Grass	900.00
Tall Grass	412.50
Broadleaf plants/sm Insects	506.25
Fruits/pods/seeds/lg insects	56.25

Avian Results

Avian Class	Body Weight	% body wgt consumed	Adjusted LD50
Small	20	114	637
Mid	100	65	811
Large	1000	29	1146

EEC equivalent dose (mg/kg-bw)	Avian Classes and Body Weights		
	small 20 g	mid 100 g	large 1000 g
Short Grass	1026	585	261
Tall Grass	470	268	120
Broadleaf plants/sm Insects	577	329	147
Fruits/pods/lg insects	64	37	16

Dose-based RQs (daily dose/LD50)	Avian Acute RQs		
	20 g	100 g	1000 g
Short Grass	1.61	0.72	0.23
Tall Grass	0.74	0.33	0.10
Broadleaf plants/sm insects	0.91	0.41	0.13
Fruits/pods/lg insects	0.10	0.05	0.01

Dietary-based RQs (EEC/LC50 or NOAEC)	RQs	
	Acute	Chronic
Short Grass	0.74	2.33
Tall Grass	0.34	1.07
Broadleaf plants/sm Insects	0.42	1.31
Fruits/pods/lg insects	0.05	0.15

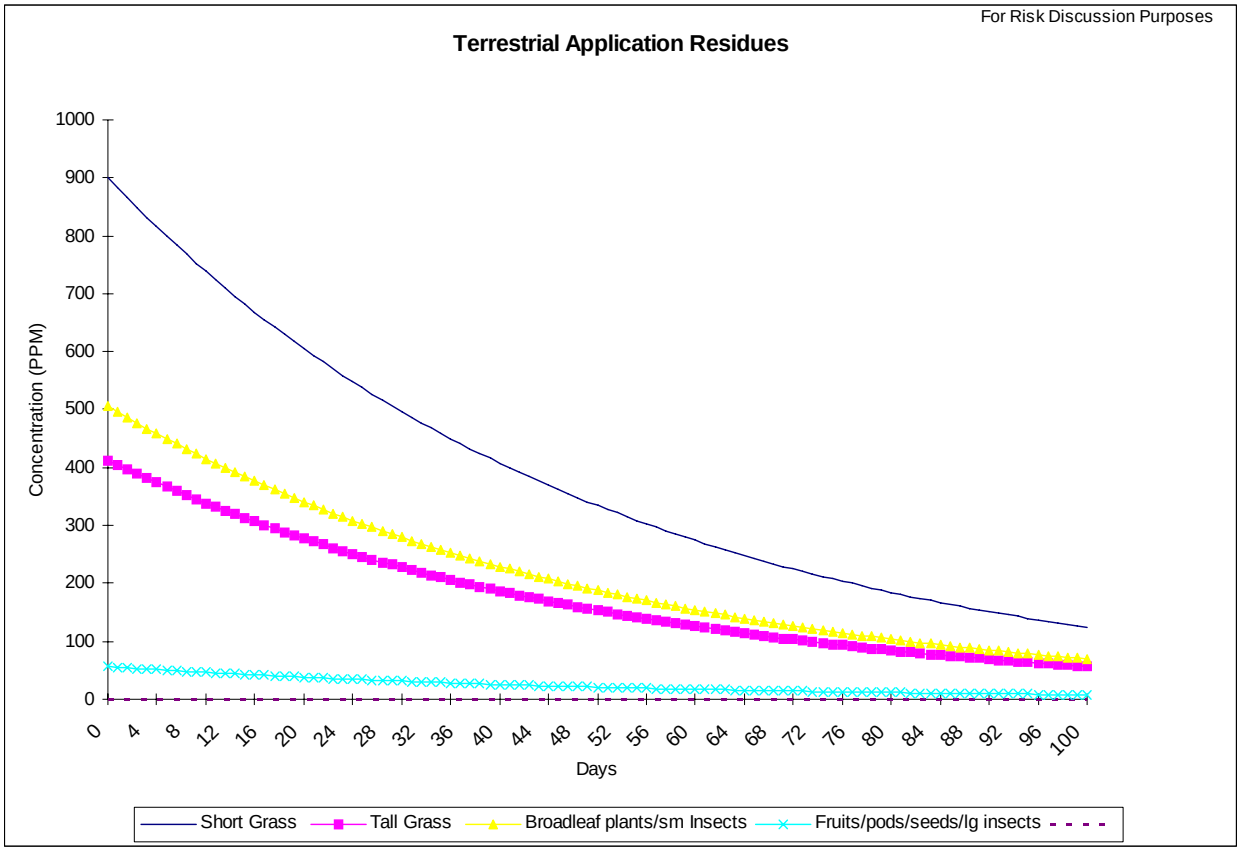
Mammalian Results

Mammalian Class	Body Weight	% body wgt consumed	Adjusted LD50	Adjusted NOAEL
	15	95	7473	27
Herbivores/	35	66	6046	22
insectivores	1000	15	2615	10
	15	21	7473	27
Grainvores	35	15	6046	22
	1000	3	2615	10

EEC equivalent dose (mg/kg-bw)	Mammalian Classes and Body weight					
	Herbivores/ insectivores			Granivores		
	15 g	35 g	1000 g	15 g	35 g	1000 g
Short Grass	855	594	135			
Tall Grass	392	272	62			
Broadleaf plants/sm Insects	481	334	76			
Fruits/pods/seeds/lg insects	53	37	8	12	8	2

Dose-based RQs (daily dose/LD50 or NOAEL)	15 g mammal		35 g mammal		1000 g mammal	
	Acute	Chronic	Acute	Chronic	Acute	Chronic
Short Grass	0.11	31.12	0.10	26.72	0.05	14.04
Tall Grass	0.05	14.26	0.05	12.25	0.02	6.44
Broadleaf plants/sm insects	0.06	17.51	0.06	15.03	0.03	7.90
Fruits/pods/lg insects	0.01	1.95	0.01	1.67	0.00	0.88
Seeds (granivore)	0.00	0.43	0.00	0.38	0.00	0.18

Dietary-based RQs (EEC/LC50 or NOAEC)	Mammal RQs					
	Acute	Chronic				
Short Grass	#DIV/0!	3.60				
Tall Grass	#DIV/0!	1.65				
Broadleaf plants/sm insects	#DIV/0!	2.03				
Fruits/pods/seeds/lg insects	#DIV/0!	0.23				


For Risk Discussion Purposes
Terrestrial Application Residues
Concentration (PPM)
1000
900
800
700
600
500
400
300
200
100
0
0 4 8 12 16 20 24 28 32 36 40 44 48 52 56 60 64 68 72 76 80 84 88 92 96 100
Days
Short Grass
Tall Grass
Broadleaf plants/sm Insects
Fruits/pods/seeds/lg insects

For Risk Description Purposes

Mean Kenaga Residues

Chemical Name:	DCNA	
Use	Celery	
Formulation	0	
Application Rate	4	lbs a.i./acre
Half-life	35	days
Application Interval		days
Maximum # Apps./Year	1	
Length of Simulation	1	year
Concentration of Concern	250.00	(ppm)
Name of Concentration of Concern	Mammal chronic NOAEC	

Endpoints

Avian	Bobwhite quail LD50 (mg/kg-bw)	900
	Bobwhite quail LC50 (mg/kg-diet)	1219
	Bobwhite quail NOAEL (mg/kg-bw)	0
	Bobwhite quail NOAEC (mg/kg-diet)	387
Mammals	LD50 (mg/kg-bw)	3400
	LC50 (mg/kg-diet)	0
	NOAEL (mg/kg-bw)	12.5
	NOAEC (mg/kg-diet)	250

EECs (ppm)	Kenaga Values
Short Grass	340.00
Tall Grass	144.00
Broadleaf plants/sm Insects	180.00
Fruits/pods/seeds/lg insects	28.00

Avian Results

Avian Class	Body Weight	% body wgt consumed	Adjusted LD50
Small	20	114	637
Mid	100	65	811
Large	1000	29	1146

EEC equivalent dose (mg/kg-bw)	Avian Classes and Body Weights		
	small 20 g	mid 100 g	large 1000 g
Short Grass	388	221	99
Tall Grass	164	94	42
Broadleaf plants/sm Insects	205	117	52
Fruits/pods/lg insects	32	18	8

Dose-based RQs (daily dose/LD50)	Avian Acute RQs		
	20 g	100 g	1000 g
Short Grass	0.61	0.27	0.09
Tall Grass	0.26	0.12	0.04
Broadleaf plants/sm insects	0.32	0.14	0.05
Fruits/pods/lg insects	0.05	0.02	0.01

Dietary-based RQs (EEC/LC50 or NOAEC)	RQs	
	Acute	Chronic
Short Grass	0.28	0.88
Tall Grass	0.12	0.37
Broadleaf plants/sm Insects	0.15	0.47
Fruits/pods/lg insects	0.02	0.07

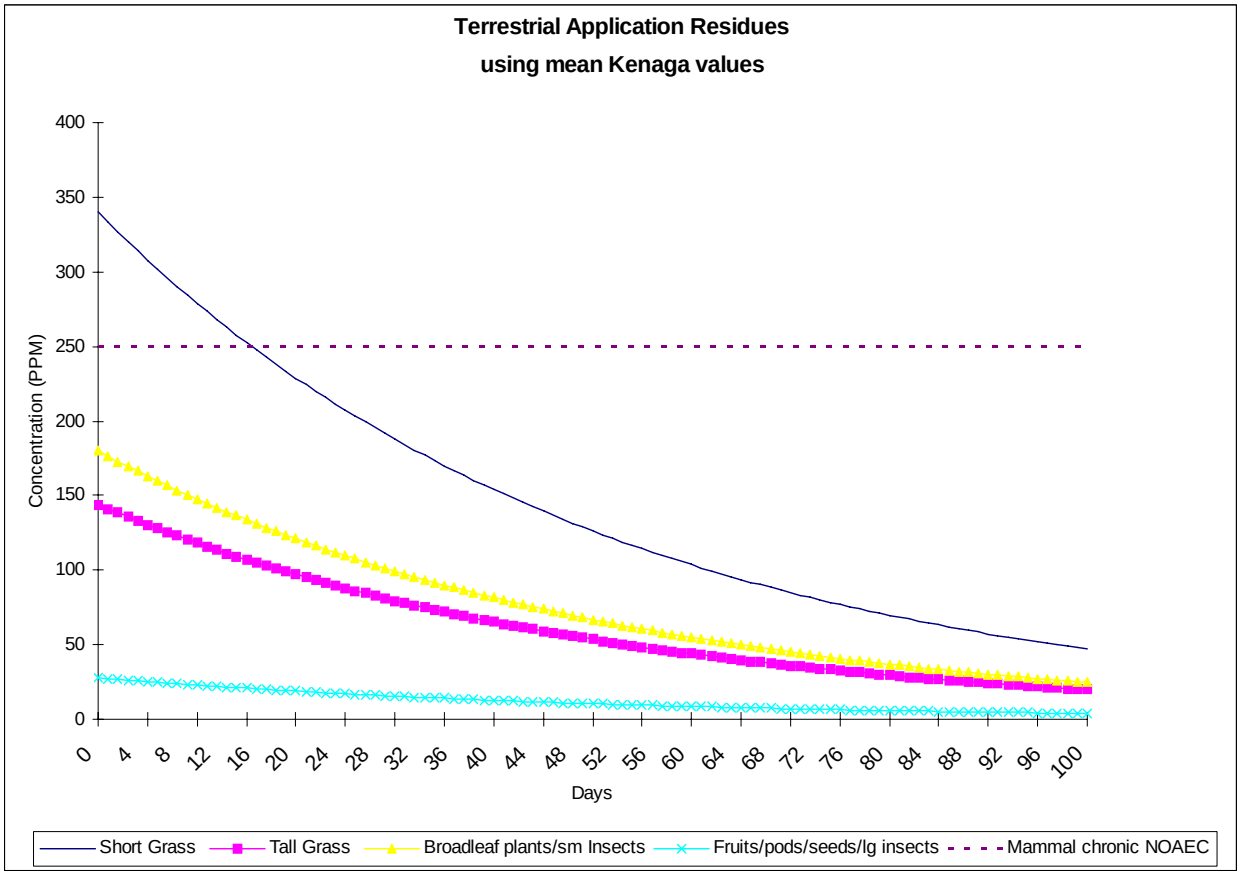
Mammalian Results

Mammalian Class	Body Weight	% body wgt consumed	Adjusted LD50	Adjusted NOAEL
	15	95	7473	27
Herbivores/	35	66	6046	22
insectivores	1000	15	2615	10
	15	21	7473	27
Grainvores	35	15	6046	22
	1000	3	2615	10

EEC equivalent dose (mg/kg-bw)	Mammalian Classes and Body weight					
	Herbivores/ insectivores			Granivores		
	15 g	35 g	1000 g	15 g	35 g	1000 g
Short Grass	323	224	51			
Tall Grass	137	95	22			
Broadleaf plants/sm Insects	171	119	27			
Fruits/pods/seeds/lg insects	27	18	4	6	4	1

Dose-based RQs (daily dose/LD50 or NOAEL)	15 g mammal		35 g mammal		1000 g mammal	
	Acute	Chronic	Acute	Chronic	Acute	Chronic
Short Grass	0.04	11.76	0.04	10.10	0.02	5.30
Tall Grass	0.02	4.98	0.02	4.28	0.01	2.25
Broadleaf plants/sm insects	0.02	6.22	0.02	5.34	0.01	2.81
Fruits/pods/lg insects	0.00	0.97	0.00	0.83	0.00	0.44
Seeds (granivore)	0.00	0.21	0.00	0.19	0.00	0.09

Dietary-based RQs (EEC/LC50 or NOAEC)	Mammal RQs					
	Acute	Chronic				
Short Grass	#DIV/0!	1.36				
Tall Grass	#DIV/0!	0.58				
Broadleaf plants/sm insects	#DIV/0!	0.72				
Fruits/pods/seeds/lg insects	#DIV/0!	0.11				


Terrestrial Application Residues
using mean Kenaga values
Concentration (PPM)
400
350
300
250
200
150
100
50
0
0
4
8
12
16
20
24
28
32
36
40
44
48
52
56
60
64
68
72
76
80
84
88
92
96
100
Days
Short Grass
Tall Grass
Broadleaf plants/sm Insects
Fruits/pods/seeds/lg insects
Mammal chronic NOAEC

For Risk Description Purposes

Mean Kenaga Residues

Chemical Name:	DCNA	
Use	Carrots	
Formulation	0	
Application Rate	2	lbs a.i./acre
Half-life	35	days
Application Interval	7	days
Maximum # Apps./Year	2	
Length of Simulation	1	year
Concentration of Concern	250.00	(ppm)
Name of Concentration of Concern	Mammal chronic NOAEC	

Endpoints

Avian	Bobwhite quail LD50 (mg/kg-bw)	900
	Bobwhite quail LC50 (mg/kg-diet)	1219
	Bobwhite quail NOAEL (mg/kg-bw)	0
	Bobwhite quail NOAEC (mg/kg-diet)	387
Mammals	LD50 (mg/kg-bw)	3400
	LC50 (mg/kg-diet)	0
	NOAEL (mg/kg-bw)	12.5
	NOAEC (mg/kg-diet)	250

EECs (ppm)	Kenaga Values
Short Grass	317.99
Tall Grass	134.68
Broadleaf plants/sm Insects	168.35
Fruits/pods/seeds/lg insects	26.19

Avian Results

Avian Class	Body Weight	% body wgt consumed	Adjusted LD50
Small	20	114	637
Mid	100	65	811
Large	1000	29	1146

EEC equivalent dose (mg/kg-bw)	Avian Classes and Body Weights		
	small 20 g	mid 100 g	large 1000 g
Short Grass	363	207	92
Tall Grass	154	88	39
Broadleaf plants/sm Insects	192	109	49
Fruits/pods/lg insects	30	17	8

Dose-based RQs (daily dose/LD50)	Avian Acute RQs		
	20 g	100 g	1000 g
Short Grass	0.57	0.25	0.08
Tall Grass	0.24	0.11	0.03
Broadleaf plants/sm insects	0.30	0.13	0.04
Fruits/pods/lg insects	0.05	0.02	0.01

Dietary-based RQs (EEC/LC50 or NOAEC)	RQs	
	Acute	Chronic
Short Grass	0.26	0.82
Tall Grass	0.11	0.35
Broadleaf plants/sm Insects	0.14	0.44
Fruits/pods/lg insects	0.02	0.07

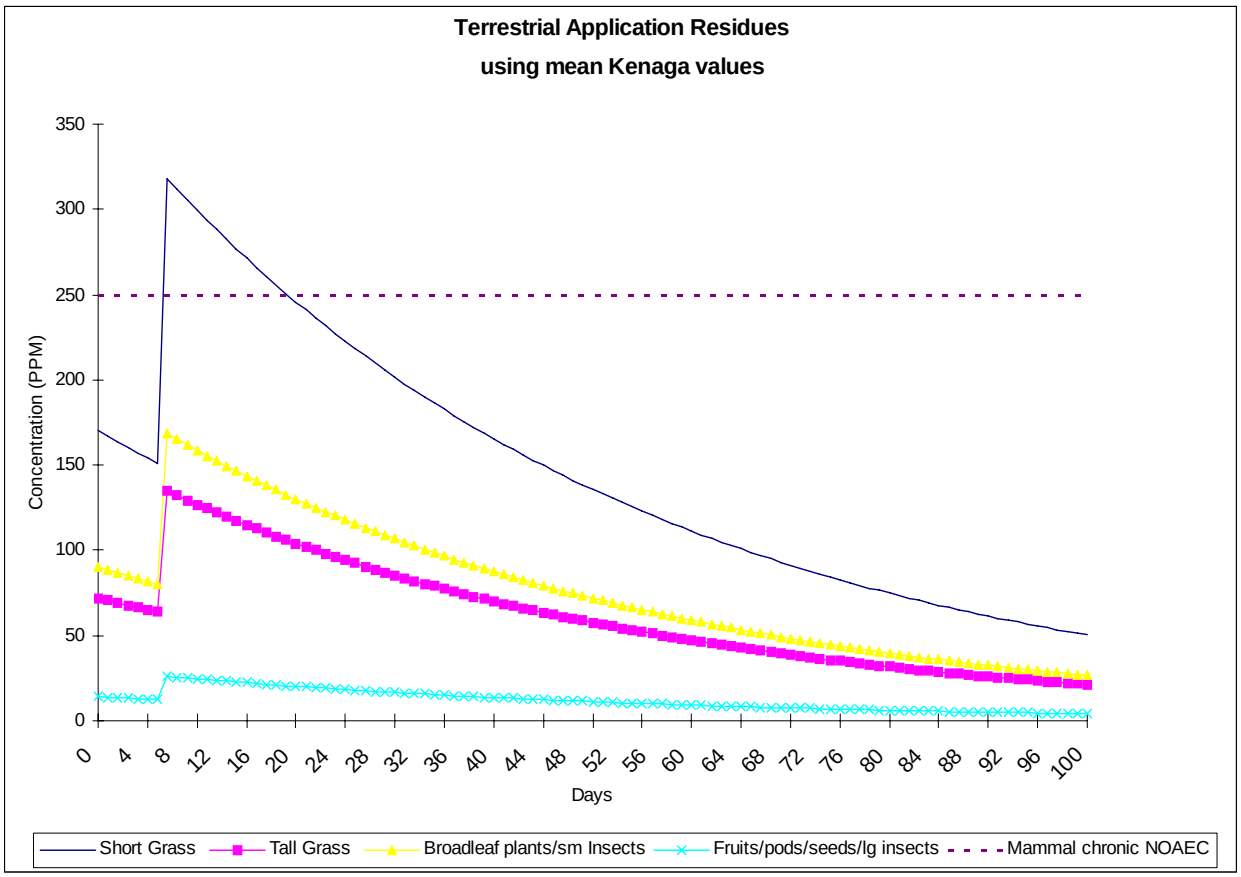
Mammalian Results

Mammalian Class	Body Weight	% body wgt consumed	Adjusted LD50	Adjusted NOAEL
Herbivores/ insectivores	15	95	7473	27
	35	66	6046	22
	1000	15	2615	10
Grainvores	15	21	7473	27
	35	15	6046	22
	1000	3	2615	10

EEC equivalent dose (mg/kg-bw)	Mammalian Classes and Body weight					
	Herbivores/ insectivores			Granivores		
	15 g	35 g	1000 g	15 g	35 g	1000 g
Short Grass	302	210	48			
Tall Grass	128	89	20			
Broadleaf plants/sm Insects	160	111	25			
Fruits/pods/seeds/lg insects	25	17	4	5	4	1

Dose-based RQs (daily dose/LD50 or NOAEL)	15 g mammal		35 g mammal		1000 g mammal	
	Acute	Chronic	Acute	Chronic	Acute	Chronic
Short Grass	0.04	11.00	0.03	9.44	0.02	4.96
Tall Grass	0.02	4.66	0.01	4.00	0.01	2.10
Broadleaf plants/sm insects	0.02	5.82	0.02	5.00	0.01	2.63
Fruits/pods/lg insects	0.00	0.91	0.00	0.78	0.00	0.41
Seeds (granivore)	0.00	0.20	0.00	0.18	0.00	0.08

Dietary-based RQs (EEC/LC50 or NOAEC)	Mammal RQs					
	Acute	Chronic				
Short Grass	#DIV/0!	1.27				
Tall Grass	#DIV/0!	0.54				
Broadleaf plants/sm insects	#DIV/0!	0.67				
Fruits/pods/seeds/lg insects	#DIV/0!	0.10				


Terrestrial Application Residues
using mean Kenaga values
Concentration (PPM)
350
300
250
200
150
100
50
0
0
4
8
12
16
20
24
28
32
36
40
44
48
52
56
60
64
68
72
76
80
84
88
92
96
100
Days
Short Grass
Tall Grass
Broadleaf plants/sm Insects
Fruits/pods/seeds/lg insects
Mammal chronic NOAEC

For Risk Description Purposes

Mean Kenaga Residues

Chemical Name:	DCNA	
Use	Potatoes	
Formulation	0	
Application Rate	1.5	lbs a.i./acre
Half-life	35	days
Application Interval	7	days
Maximum # Apps./Year	5	
Length of Simulation	1	year
Concentration of Concern	250.00	(ppm)
Name of Concentration of Concern	Mammal chronic NOAEC	

Endpoints

Avian	Bobwhite quail LD50 (mg/kg-bw)	900
	Bobwhite quail LC50 (mg/kg-diet)	1219
	Bobwhite quail NOAEL (mg/kg-bw)	0
	Bobwhite quail NOAEC (mg/kg-diet)	387
Mammals	LD50 (mg/kg-bw)	3400
	LC50 (mg/kg-diet)	0
	NOAEL (mg/kg-bw)	12.5
	NOAEC (mg/kg-diet)	250

EECs (ppm)	Kenaga Values
Short Grass	492.47
Tall Grass	208.58
Broadleaf plants/sm Insects	260.72
Fruits/pods/seeds/lg insects	40.56

Avian Results

Avian Class	Body Weight	% body wgt consumed	Adjusted LD50
Small	20	114	637
Mid	100	65	811
Large	1000	29	1146

EEC equivalent dose (mg/kg-bw)	Avian Classes and Body Weights		
	small 20 g	mid 100 g	large 1000 g
Short Grass	561	320	143
Tall Grass	238	136	60
Broadleaf plants/sm Insects	297	169	76
Fruits/pods/lg insects	46	26	12

Dose-based RQs (daily dose/LD50)	Avian Acute RQs		
	20 g	100 g	1000 g
Short Grass	0.88	0.39	0.12
Tall Grass	0.37	0.17	0.05
Broadleaf plants/sm insects	0.47	0.21	0.07
Fruits/pods/lg insects	0.07	0.03	0.01

Dietary-based RQs (EEC/LC50 or NOAEC)	RQs	
	Acute	Chronic
Short Grass	0.40	1.27
Tall Grass	0.17	0.54
Broadleaf plants/sm Insects	0.21	0.67
Fruits/pods/lg insects	0.03	0.10

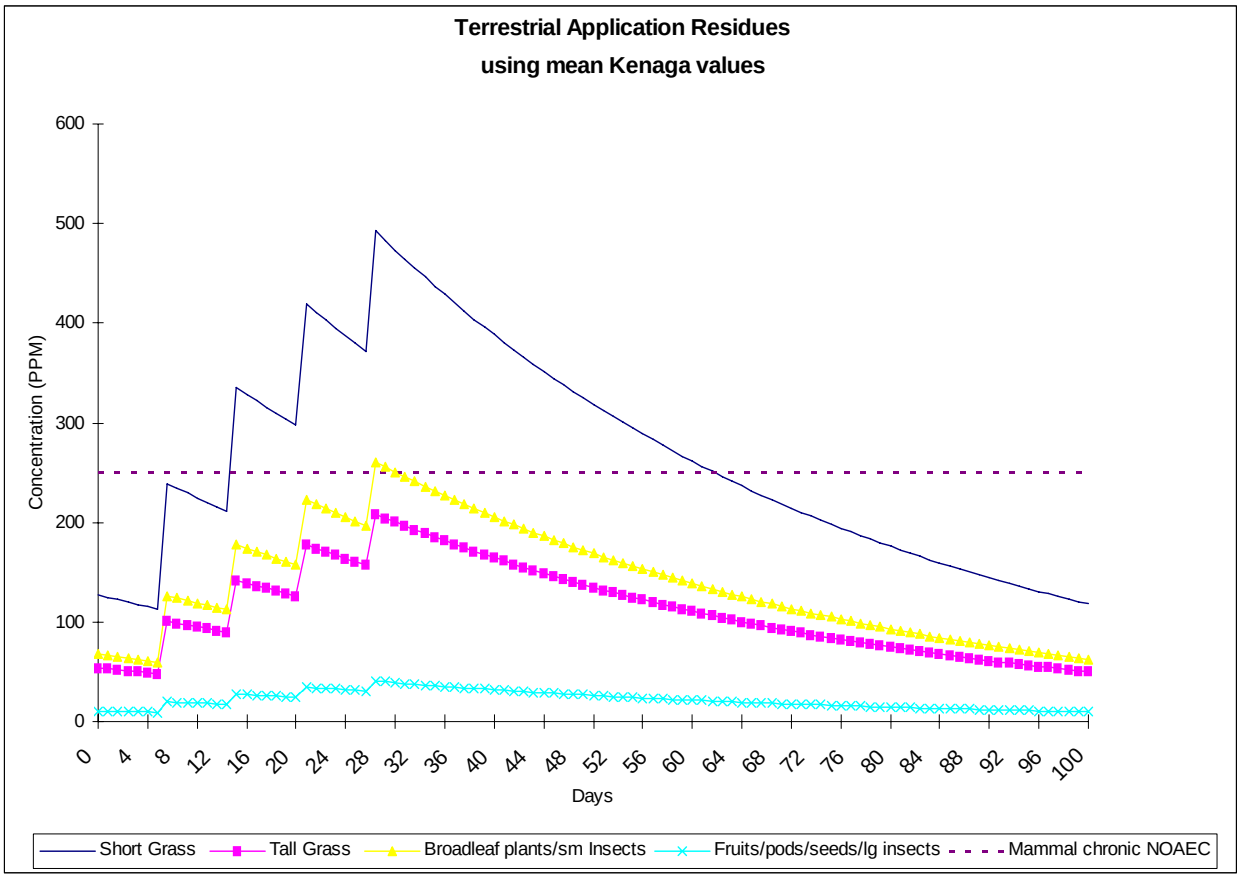
Mammalian Results

Mammalian Class	Body Weight	%body wgt consumed	Adjusted LD50	Adjusted NOAEL
Herbivores/ insectivores	15	95	7473	27
	35	66	6046	22
	1000	15	2615	10
Grainvores	15	21	7473	27
	35	15	6046	22
	1000	3	2615	10

EEC equivalent dose (mg/kg-bw)	Mammalian Classes and Body weight					
	Herbivores/ insectivores			Granivores		
	15 g	35 g	1000 g	15 g	35 g	1000 g
Short Grass	468	325	74			
Tall Grass	198	138	31			
Broadleaf plants/sm Insects	248	172	39			
Fruits/pods/seeds/lg insects	39	27	6	9	6	1

Dose-based RQs (daily dose/LD50 or NOAEL)	15 g mammal		35 g mammal		1000 g mammal	
	Acute	Chronic	Acute	Chronic	Acute	Chronic
Short Grass	0.06	17.03	0.05	14.62	0.03	7.68
Tall Grass	0.03	7.21	0.02	6.19	0.01	3.25
Broadleaf plants/sm insects	0.03	9.02	0.03	7.74	0.01	4.07
Fruits/pods/lg insects	0.01	1.40	0.00	1.20	0.00	0.63
Seeds (granivore)	0.00	0.31	0.00	0.27	0.00	0.13

Dietary-based RQs (EEC/LC50 or NOAEC)	Mammal RQs					
	Acute	Chronic				
Short Grass	#DIV/0!	1.97				
Tall Grass	#DIV/0!	0.83				
Broadleaf plants/sm insects	#DIV/0!	1.04				
Fruits/pods/seeds/lg insects	#DIV/0!	0.16				


Terrestrial Application Residues
using mean Kenaga values
Concentration (PPM)
600
500
400
300
200
100
0
0
4
8
12
16
20
24
28
32
36
40
44
48
52
56
60
64
68
72
76
80
84
88
92
96
100
Days
Short Grass
Tall Grass
Broadleaf plants/sm Insects
Fruits/pods/seeds/lg insects
Mammal chronic NOAEC

For Risk Description Purposes

Mean Kenaga Residues

Chemical Name:	DCNA	
Use	Snap Beans	
Formulation	0	
Application Rate	3.75	lbs a.i./acre
Half-life	35	days
Application Interval		days
Maximum # Apps./Year	1	
Length of Simulation	1	year
Concentration of Concern	250.00	(ppm)
Name of Concentration of Concern	Mammal chronic NOAEC	

Endpoints

Avian	Bobwhite quail LD50 (mg/kg-bw)	900
	Bobwhite quail LC50 (mg/kg-diet)	1219
	Bobwhite quail NOAEL (mg/kg-bw)	0
	Bobwhite quail NOAEC (mg/kg-diet)	387
Mammals	LD50 (mg/kg-bw)	3400
	LC50 (mg/kg-diet)	0
	NOAEL (mg/kg-bw)	12.5
	NOAEC (mg/kg-diet)	250

EECs (ppm)	Kenaga Values
Short Grass	318.75
Tall Grass	135.00
Broadleaf plants/sm Insects	168.75
Fruits/pods/seeds/lg insects	26.25

Avian Results

Avian Class	Body Weight	% body wgt consumed	Adjusted LD50
Small	20	114	637
Mid	100	65	811
Large	1000	29	1146

EEC equivalent dose (mg/kg-bw)	Avian Classes and Body Weights		
	small 20 g	mid 100 g	large 1000 g
Short Grass	363	207	92
Tall Grass	154	88	39
Broadleaf plants/sm Insects	192	110	49
Fruits/pods/lg insects	30	17	8

Dose-based RQs (daily dose/LD50)	Avian Acute RQs		
	20 g	100 g	1000 g
Short Grass	0.57	0.26	0.08
Tall Grass	0.24	0.11	0.03
Broadleaf plants/sm insects	0.30	0.14	0.04
Fruits/pods/lg insects	0.05	0.02	0.01

Dietary-based RQs (EEC/LC50 or NOAEC)	RQs	
	Acute	Chronic
Short Grass	0.26	0.82
Tall Grass	0.11	0.35
Broadleaf plants/sm Insects	0.14	0.44
Fruits/pods/lg insects	0.02	0.07

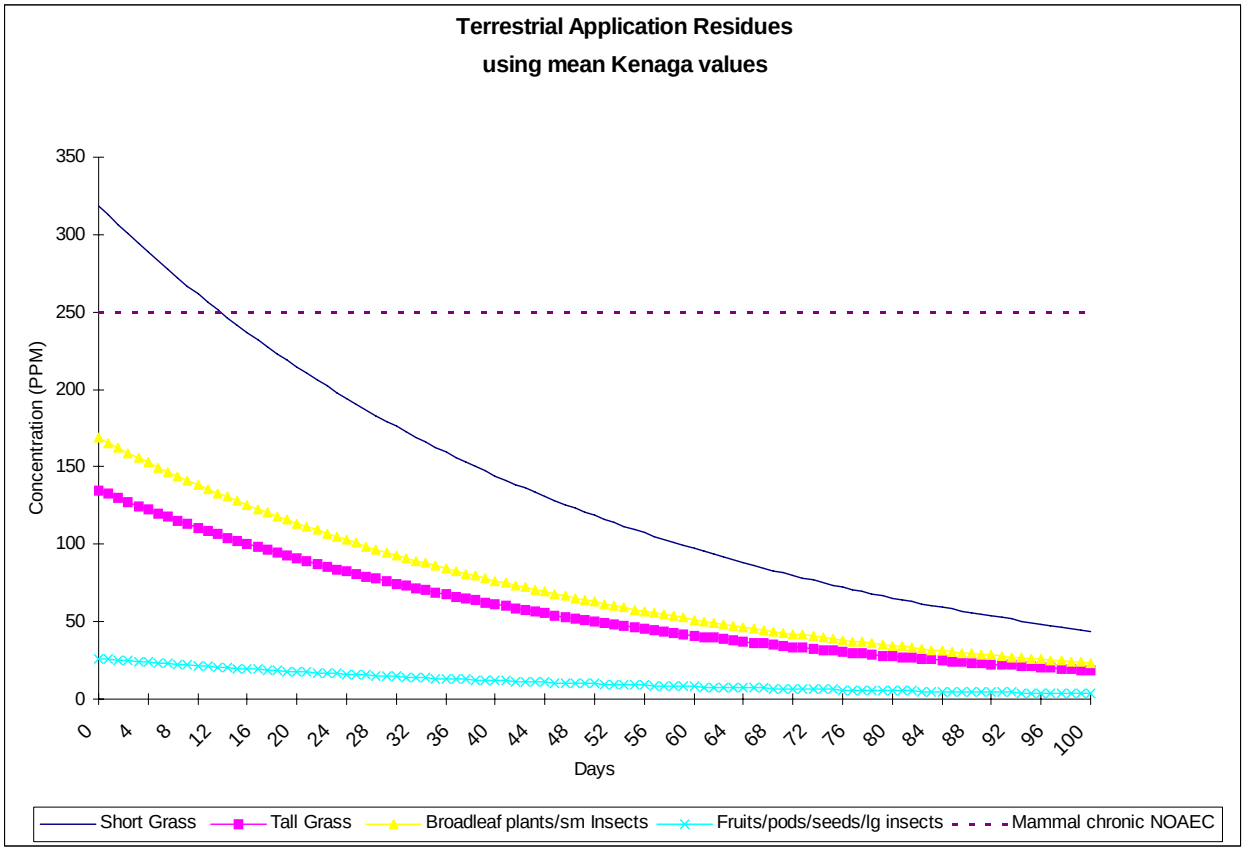
Mammalian Results

Mammalian Class	Body Weight	% body wgt consumed	Adjusted LD50	Adjusted NOAEL
Herbivores/ insectivores	15	95	7473	27
	35	66	6046	22
	1000	15	2615	10
Grainvores	15	21	7473	27
	35	15	6046	22
	1000	3	2615	10

EEC equivalent dose (mg/kg-bw)	Mammalian Classes and Body weight					
	Herbivores/ insectivores			Granivores		
	15 g	35 g	1000 g	15 g	35 g	1000 g
Short Grass	303	210	48			
Tall Grass	128	89	20			
Broadleaf plants/sm Insects	160	111	25			
Fruits/pods/seeds/lg insects	25	17	4	6	4	1

Dose-based RQs (daily dose/LD50 or NOAEL)	15 g mammal		35 g mammal		1000 g mammal	
	Acute	Chronic	Acute	Chronic	Acute	Chronic
Short Grass	0.04	11.02	0.03	9.46	0.02	4.97
Tall Grass	0.02	4.67	0.01	4.01	0.01	2.11
Broadleaf plants/sm insects	0.02	5.84	0.02	5.01	0.01	2.63
Fruits/pods/lg insects	0.00	0.91	0.00	0.78	0.00	0.41
Seeds (granivore)	0.00	0.20	0.00	0.18	0.00	0.08

Dietary-based RQs (EEC/LC50 or NOAEC)	Mammal RQs					
	Acute	Chronic				
Short Grass	#DIV/0!	1.28				
Tall Grass	#DIV/0!	0.54				
Broadleaf plants/sm insects	#DIV/0!	0.68				
Fruits/pods/seeds/lg insects	#DIV/0!	0.11				


Terrestrial Application Residues
using mean Kenaga values
Concentration (PPM)
350
300
250
200
150
100
50
0
0
4
8
12
16
20
24
28
32
36
40
44
48
52
56
60
64
68
72
76
80
84
88
92
96
100
Days
Short Grass
Tall Grass
Broadleaf plants/sm Insects
Fruits/pods/seeds/lg insects
Mammal chronic NOAEC

APPENDIX E
ECOLOGICAL EFFECTS DATA

Toxicity to Terrestrial Animals

Acute and Subacute Toxicity to Birds

Acute symptoms of DCNA toxicity can include regurgitation, ataxia, weakness, wing drop, and falling when walking. These symptoms can persist for up to 5 weeks after treatment. The acute oral toxicity of DCNA to 14 – 26 week-old Bobwhite Quail (*Colinus virginianus*) was assessed over 14 days (MRID 437551-01). The 14 day-acute oral LD_{50} was 900 mg a.i/kg bw (**Table E1**). Clinical signs of toxicity were observed at 250 mg/kg bw and above. Increasing body weight losses were observed at 500 mg/kg bw and above. Reduced food consumption was also noted starting at 500 mg/kg bw (males) and 1000 mg/kg bw (females). Mortalities were observed in the 500, 1000, and 2000 mg/kg bw dose groups. Gross pathological examinations showed incidences of discoloration of the intestine, reduced subcutaneous fat and muscle and enlarged gall bladders at 500 mg/kg and above. According to the US EPA classification, DCNA is classified as slightly toxic to birds on an acute exposure basis. The study is classified as scientifically sound and satisfies the guideline (71-1) for avian oral studies using bobwhite quail.

Table E1. Summary of avian acute toxicity test on bobwhite quail (*Colinus virginianus*) and Mallard duck (*Anas platyrhynchos*) exposed to DCNA.

Species	Study Type	% active ingredient	LD_{50} mg/kg bw	MRID No. Author Year	Toxicity Category	Fulfills Guideline Requirement
Bobwhite quail *Colinus virginianus*	acute oral	98.3	900 (NOEL = 125)	437551-01 Rodgers, 1995	Slightly toxic	acceptable
Mallard duck *Anas platyrhynchos*	acute oral	97.5	>157	405831-03 Roberts, 1989	NA	*Invalid*

Two subacute dietary studies using the technical grade active ingredient (TGAI) are required to establish the toxicity of DCNA to birds. The preferred test species are the bobwhite quail and the mallard duck (**Table E2**). Two studies were submitted for review. For the subacute quail study (MRID 40508812), subdued behavior and ruffled feathers were observed at the 500 – 4000 ppm nominal test concentrations. The mean measured concentrations ranged from 93.9 to 99.9% of nominal (217.4, 460.3, 999, 1940 and 3872 ppm). A total of 22 birds died during the experiment (1 at the 250 ppm nominal dose, 4 at 500ppm, 6 at 1000 ppm, 4 at 2000 ppm, and 7 at 4000 ppm). Gross pathological examination of the birds revealed no abnormalities. The dietary LC_{50} value was reported as 1435 ppm based on nominal concentrations. Using the actual mean measured concentrations the LC_{50} = 1219 ppm. DCNA is classified as slightly toxic to quail. This study fulfills the guideline requirements for an avian dietary study and is of acceptable quality.

For the 9-day mallard study (MRID 40508811), no clinical signs of ill health or toxicity were observed in any of the birds in the experiment; however, five birds died during the test (1 at the 2600 ppm nominal dose and 4 at 5200 ppm). During treatment there was a dose-related reduction in food consumption, which was most marked in the 2600 and 5200 ppm nominal concentrations (*e.g.*, on day 5,

approximately 38 g/bird/day in the control groups vs. 4 g/bird/day in the 5200 ppm group). Gross pathological examination of the five birds that died during testing revealed them to be emaciated. The dietary LC_{50} value was reported as 5940 ppm based on nominal concentrations. Using the actual mean measured concentrations the LC_{50} = 6193 ppm. DCNA is classified as practically non-toxic to Mallards. This study is scientifically sound and fulfills the guideline for the subacute avian dietary testing requirement (Guideline 71-2).

Table E2. Summary of subacute dietary toxicity studies with mallard ducks (*Anas platyrhynchos*) and bobwhite quail (*Colinus virginianus*) for DCNA**.**

Species	Study Type	% active ingredient	LC_{50} mg/L	MRID No. Author Year	Toxicity Category	Fulfills Guideline Requirement
Bobwhite quail *Colinus virginianus*	9-day acute dietary	97.5	1219	40508812, 43115501	Slightly toxic	acceptable
Mallard duck *Anas platyrhynchos*	9-day acute dietary	97.5	6193	40508811, 43115502	Practically nontoxic	acceptable

Chronic Toxicity to Birds

One avian reproduction study was submitted for review (**Table E3**). In this study with bobwhite quail (MRID 46218900), the NOEC was determined to be 387 ppm based upon a significant reduction in egg production, embryo viability, embryo survival, hatchability, offspring survival and 14-day survivor body weight; the LOEC was 967 ppm. This avian reproduction study is scientifically sound and meets the guideline requirements for an avian reproduction study using Bobwhite quail. There were no overt signs of toxicity or treatment-related effects upon adult body weight or treatment-related mortalities; however, there were six adult mortalities observed during the course of this experiment (one in the control, two in the 160 ppm group, one in the 400 ppm group, two in the 1000 ppm group). It is EFED's opinion that these mortalities were the result of male trauma (e.g., head lacerations, bone fractures) and some of the observations in the necropsies (e.g., egg yolk peritonitis) can be attributed to stress or physical restraint of the egg laying hen. This study is classified as acceptable.

Table E3. Summary of avian reproduction study with and bobwhite quail (*Colinus virginianus*) for DCNA.

Species	% active ingredient	NOEC / LOEC mg/kg	most sensitive endpoint	MRID No. Author Year	Fulfills Guideline Requirement
Bobwhite quail *Colinus virginianus*	97.03	387 (35.2 mg/kg-bw/d) / 967	egg production, embryo viability, embryo survival, hatchability, offspring survival and 14-day survivor body weight	462189-00 Frey, L. T. (Wildlife International), 2003	In review

Acute and Chronic Toxicity to Mammals

Wild mammal testing is required on a case-by-case basis, depending on the results of lower tier laboratory mammalian studies, intended use pattern and pertinent environmental fate characteristics. For the acute oral toxicity requirement (**Table E4**), two main studies were considered ; one with a DCNA

formulation (MRID 00064581) and one with DCNA technical (MRID 00086879). In the study using DCNA technical, rats of an unspecified strain were given a single oral dose of DCNA (unspecified purity) in an unspecified vehicle at 1600, 2500, 4000, 6300, and 10,000 mg/kg treatment levels. DCNA produced nasal hemorrhage, paralysis and depression at 2500 mg/kg and excessive yellow urine and feces at 6300 mg/kg. No mortality was noted in the study. The LD_{50} > 10,000 mg/kg-bw; however, this study is classified as unacceptable and does not satisfy the guideline requirements. This study did not provide any experimental data, individual animal data, or whether the rats used in the experiment were male or female.

In the second acute oral study (MRID 00064581), rats were tested at 1600, 2000, 2500, 3200, 4000, 5000 and 6400 mg/kg with a DCNA formulation (48.8% DCNA and 24.4 % thiophanate methyl). The LD_{50} was determined to be 3400 mg/kg-bw. This study was classified as supplemental since it did not use the technical grade of DCNA.

In the two generation reproduction study in rats, dicloran technical (99.2% pure) was fed in diet to Sprague-Dawley (CD) rats (24/sex/dose) at 0, 50, 250 and 1250 ppm for two generations (F_0 & F_1). The parental and reproductive NOEL was determined to be 250 ppm. There was increased incidence in yellow staining of cage traypaper and staining of coat in all sexes and generations at 1250 ppm. There were decreased body weight gains in both generations of both sexes during pre-mating (F_1 and F_2 pup weights) and in females during gestation at 1250 ppm. There were decreased epididymal and ovarian weights and increased testicular weights in both generations at 1250 ppm. There was increased vaginal proesterus morphology at 1250 ppm and decreased metestrus morphology at 1250 ppm. These observations were significant in the F_0 generation, and, although not significant, the trend continued in the F_1 parental generation. F_0 males showed an increase in abnormal sperm morphology (not significant) at 1250 ppm.

Table E4. Acute and chronic toxicity of DCNA to the rat.

Species	% a.i.	Endpoint (mg/kg)	MRID Author, year	Study Classification
Rat				
Acute	48.8	LD_{50} = 3400	00242341	Supplemental
	Technical	LD_{50} >10,000	00086879	Unacceptable
Chronic	99.2	NOEL = 250 (12.5 mg/kg/d)	44233803, 44474101 Wilcox and Barton, 1997	Acceptable

Acute Toxicity to Earthworms

No earthworm toxicity tests were submitted.

Toxicity to Insects

A honey bee acute contact study using the TGAI was required for DCNA because its use may result in honey bee exposure. The contact LD_{50} was >181.29 µg/bee (MRID 00036935, **Table E5**). At the 181.29 µg/bee test concentration there was 5.2% mortality. EFED considers this study acceptable for fulfilling guideline testing requirements.

Table E5. Summary of acute contact and oral 48-hr toxicity tests with the honey bee (*Apis mellifera*) for DCNA.

Species	% active ingredient	LD_{50} µg/bee	MRID No. Author/Year	Toxicity Category	Fulfills Guideline Requirement
Honey Bee	99.5	>181.29 (contact)	00036935 Atkins, 1975	Practically Nontoxic	acceptable

Toxicity to Freshwater Aquatic Animals

Freshwater Fish, Acute

Results of toxicity tests with freshwater fish are tabulated in **Table E6**. Based on the LC_{50} values for the species tested, DCNA is classified as moderately to highly toxic to freshwater fish on an acute exposure basis. In the acute toxicity test with rainbow trout (MRID 00096064), mortality was observed at concentrations as low as 0.24 ppm. At the 0.75 ppm level and above, 100 % mortality was observed. Guidelines 72-1(a) and 72-1(c) are fulfilled.

Table E6. Summary of freshwater fish acute toxicity in mg/L (ppm) for technical grade DCNA.

Species	% ai	96-hour LC_{50} (mg/L)	Toxicity Category	MRID No. Author/Year	Study Classification
Rainbow Trout *(Onchorynchus mykiss)*	95.0	0.90	Highly Toxic	00096064 ABL-EPA McCann, 1974	Acceptable
Bluegill Sunfish *(Lepomis macrochirus)*	95.0	1.08	Moderately Toxic	00096058 ABL-EPA McCann, 1974	Acceptable

Toxicity was determined for one the formulated end-use products, Botran 50W, (MRID 00096062, 00096063); 96-hr LC_{50} values ranged from 4.1 to 7.0 mg/L (ppm), indicating that DCNA formulations can be classified as moderately toxic to freshwater fish (**Table E7**).

Table E7. Summary of freshwater fish acute toxicity in mg/L (ppm) for formulated products of DCNA.

Species	% ai	96-hour LC_{50} (mg a.i./L)	Toxicity Category	MRID No. Author/Year	Study Classification
Rainbow Trout *(Onchorynchus mykiss)*	50	7.0	Moderately toxic	00096063 ABL-EPA McCann, 1974	Acceptable
Bluegill Sunfish *(Lepomis macrochirus)*	50	4.1	Moderately toxic	00096062 ABL-EPA McCann, 1974	Acceptable

Freshwater Fish, Chronic

The 28-day toxicity of DCNA (dicloran) to the juvenile stage of rainbow trout (*Oncorhynchus mykiss*) was studied under flow- through conditions (**Table E8**). Juvenile rainbow trout (10 per group) with an average body weight of 1.1 g were exposed to control, solvent control (100 µl N,N-dimethylformamide), and nominal DCNA test concentrations of 0.005, 0.016, 0.050, 0.16 and 0.50 mg a.i/L. The nominal

0.050 and 0.16 mg a.i./l test concentrations were measured and determined to range from 92 to 104% nominal. Nominal test concentrations were used for all statistical analyses since measured values were not available for all treatment levels. The test system was maintained at 13.5 to 14.6ºC and a pH of 7.6 to 8.0. Mortality was 100 and 70% in the nominal 0.50 and 0.156 mg/L treatment levels, respectively. The 28-day EC_{50} and NOAEC values, based on mortality/sub-lethal effects (growth), were 0.12 and 0.050 mg a.i/L, respectively (**Table E8**). The sublethal effects included visible abnormalities and reduced body weight. The most sensitive end point was the NOAEC for growth of 0.050 mg a.i./l. This toxicity study is scientifically sound but does not fulfill EPA guidelines for a chronic study on freshwater fish since the study design deviated significantly from both fish early life stage and fish life-cycle tests. Primarily, this study was designed to evaluate effects on juvenile fish growth; data on the potential effects to fish development and reproduction are needed. And, in addition, only 2 test concentrations were measured precluding an accurate assessment of actual exposure concentrations. These toxicity results may be useful for risk assessments and therefore this study is classified as SUPPLEMENTAL.

Table E8. Summary of freshwater fish chronic toxicity in mg/L for technical grade DCNA

Species	% active ingredient	NOEC / LOEC mg/L	most sensitive endpoint	MRID No. Author Year	Fulfills Guideline Requirement
Rainbow trout *Oncorhynchus mykiss*	97.17	0.049 / 0.155	growth	466571-02 Peither, A. (RCC Ltd), 2003	No, Supplemental

Freshwater Invertebrates, Acute

A freshwater aquatic invertebrate acute toxicity test (405831-02) was submitted using the preferred test species *Daphnia magna* and is summarized in **Table E9**. The 48-hour EC_{50} was 2.07 mg/l and the NOEC was 1.0. Other than immobilization, no signs of toxicity were observed. No toxicity was observed at concentrations < 1.0 mg/l. DCNA is categorized as moderately toxic to aquatic invertebrates on an acute exposure basis (**Table E9**). Guideline 72-2 is fulfilled.

Table E9. Summary of freshwater invertebrate acute toxicity in mg/L (ppm) for technical grade DCNA.

Species/Static or Flow-through	% ai	48-hour EC_{50} (mg/L)	Toxicity Category	MRID No. Author/Year	Study Classification
Water flea (*Daphnia magna*)	97.0	2.07 NOEC = 1.0	Moderately toxic	405831-02 Hill, 1988	Acceptable

Freshwater Invertebrate, Chronic

The 21-day-chronic toxicity of DCNA to *Daphnia magna* was studied under static renewal conditions (**Table E10**). Daphnids were exposed to control, solvent control, and nominal test chemical concentrations of 0.0032, 0.010, 0.032, 0.10, 0.32, 1.0 mg a.i/L. Only the 0.032 and 0.10 mg a.i./L treatment levels were analytically verified; both "new" and "old" measured values ranged between 101 and 109% nominal. Nominal concentrations were therefore used in statistical tests. The 21-day LC_{50} based on mortality was 0.57 mg a.i/L. The 21-day EC50 based on a reduction in the number of offspring produced per surviving adult was 0.35 mg a.i./L. The 21-day NOAEC based on the number of offspring produced by surviving adults and adult body length was 0.032 mg a.i/L with a corresponding LOAEC of 0.10 mg a.i./L (**Table E10**). The sublethal effects included were the number of offspring produced, the number of offspring produced per surviving adult, and body length of surviving adults. The time to first reproduction could not be evaluated because daphnids were not observed daily. Production of offsprings in the treated groups indicated that DCNA had an effect on the reproduction at concentrations greater than 0.032 mg a.i/L. The most sensitive end points were reproduction and growth. This study is scientifically sound, however, there were several notable deviations. Not all test levels were analytically verified and daphnids were not observed on a daily basis. In addition, dry weight is a required endpoint and was not measured in the current study. This study is classified as Supplemental and does not need to be repeated at this time.

In addition to the guideline daphnid study, the 28-day chronic toxicity of dicloran to the midge, *Chironomus riparius*, was studied under static conditions in water-spiked exposures. The nominal test concentrations were 0 (negative and solvent controls), 150, 300, 600, 1200, and 1200 ppb a.i. Analysis of dicloran concentrations was not conducted for all treatment levels, only the solvent control, 600 ppb a.i. and the 2400 ppb a.i./L. In overlying water at the nominal 600 and 2400 ppb a.i. treatment levels, measured concentrations were 85.78% and 86.06% of nominal levels on Day 0; 29.75% and 32.29% on Day 7; and 12.09% and 11.01% on Day 28, respectively. In pore water at the nominal 600 and 2400 ppb a.i. treatment levels, measured concentrations were 0.04% and <LOQ of nominal overlying water levels on Day 0; 0.22% and 0.36% on Day 7; and 0.00% and 0.00% on Day 28, respectively. In sediment at the nominal 600 and 2400 ppb a.i. treatment levels, measured concentrations were 12.35% and 7.65% of nominal overlying water levels on Day 0; 48.61% and 41.12% on Day 7; and 0.00% and 0.00% on Day 28, respectively. There were no treatment-related effects at any of the nominal overlying water treatment concentrations by 28-days. The overall NOEC and LOEC values were determined to be 2400 and >2400 ppb a.i. in overlying water. However, since this is designed to provide some indication of sediment toxicity, the sediment concentration corresponding to the overlying water was 566.21, 3043.46, and 0.00 µg/kg for days 0, 7, and 28, respectively. The mean of these three values is 1203.36 µg/kg which may or may not adequately represent a composite exposure value. This study was designed to fulfill proposed OECD Draft Guideline 219 (February 2000) and does not fulfill any current U.S. EPA guideline. This study is scientifically sound and is classified as SUPPLEMENTAL.

Table E10. Summary of freshwater invertebrate chronic toxicity in mg/L for technical grade DCNA

Species	% active ingredient	NOEC / LOEC mg/L	most sensitive endpoint	MRID No. Author Year	Fulfills Guideline Requirement
Waterflea *Daphnia magna*	97.17	0.032 / 0.10	Reproduction	466571-03 Peither, A. (RCC Ltd), 2003	Yes Supplemental

Midge *Chironomus riparius*	99.1	2.4 / >2.4 mg/L 1.2 / >1.2 mg/kg (sediment)	None	466571-04 Schmidt, T. (RCC Ltd), 2003	No Supplemental

Toxicity to Estuarine and Marine Animals

Estuarine/Marine Fish, Acute

No acute estuarine/marine fish studies were submitted. Guideline 72-3(a) is not fulfilled.

Estuarine and Marine Fish, Chronic

No chronic estuarine/marine fish studies were submitted. Guideline 72-4(a) for estuarine/marine fish is not fulfilled.

Estuarine and Marine Invertebrates, Acute

As shown in **Table E11**, the 96-hour Oyster EC_{50} for technical DCNA is 2300 µg/L (ppb) (MRID 00087031). Thus, this chemical is categorized as practically non-toxic to estuarine/ marine shellfish on an acute basis. Guideline 72-3 is not fulfilled.

Table E11. Summary of estuarine/marine invertebrate acute toxicity for DCNA.

Species	% ai.	96-hour EC_{50} µg/L	Toxicity Category	MRID No. Author/Year	Study Classification
Eastern Oyster (*Crassostrea virginica*)	98.2	2300	practically non-toxic	00087031 Woodard Research Co., 1982	Supplemental

Estuarine and Marine Invertebrate, Chronic

There are no available chronic toxicity data for estuarine/marine invertebrates. The guideline 72-4(b) for estuarine/marine invertebrates is not fulfilled.

Toxicity to Aquatic Plants

Freshwater, Non-vascular Plants, Acute

In a 72-hour acute toxicity study, the cultures of the green algae, *Scenedesmus subspicatus*, were exposed to 2,6-dichloro-4-nitroaniline at nominal concentrations of 0.15, 0.32, 0.70, 1.5, 3.3, and 7.0 mg/L under static conditions. Test concentrations were measured initially and at 72 hours. The mean-measured test concentrations were "not detected", 0.135, 0.294, 0.673, 1.44, 3.15, and 5.61for the nominal controls,0.15, 0.32, 0.70, 1.5, 3.3, and 7.0 mg/L treatment levels. There were significant effects of dicloran on algal cell density, area under the growth curve (biomass), and growth rates; all treatment levels including the lowest (0.135 mg a.i./L) were significantly different than the solvent control for all endpoints. The NOAEC / EC_{05} and EC_{50}/IC_{50} values based were <0.135/ 0.12 and 1.3 mg a.i/L, respectively. The % growth inhibition in the treated algal culture as compared to the control ranged from 2.3 to 56.6.

At 72 hours (study termination), a sample was taken from the control and the 1.5 mg/L test concentration to determine if there were abnormalities in cell shape or size associated with dicloran exposure; no differences were observed . The study author concluded that there were no effects of dicloran on algal cell shape or size. This toxicity study is classified as scientifically sound or and satisfies the guideline requirement for an acute toxicity study on nonvascular plants.

Table E12. Summary of aquatic plant toxicity for technical DCNA

Species	% ai.	72-hour EC_{50} mg/L	NOAEC / EC_{05}	MRID No. Author/Year	Study Classification
Green algae (*Scenedesmus subspicatus*)	97.17	1.2 mg a.i./L	<0.135 / 0.12 (95% C.I. 0.075-0.18)	466571-05 Seyfried, B. (RCC Ltd, 2003)	Acceptable

APPENDIX F
SUMMARY OF ENDANGERED/THREATENED SPECIES

Unique Taxa Count by State for Selected Crops
Reporting for > 1 Acres

BEANS, SNAP

	Bird	Fish	Mammal	Amphibian	Crustacean	Reptile	Arachnids	Insects	Plant	Snails	Clam
Affected Counties:	414	186	359	36	31	93		72	270	7	103
Affected States:	43	33	42	7	8	15	3	17	38	7	24
Affected Species:	54	54	41	12	15	26	8	31	396	8	60

CELERY

	Bird	Fish	Mammal	Amphibian	Crustacean	Reptile	Arachnids	Insects	Plant	Snails	Clam
Affected Counties:	25	15	22	10	9	12		12	21	1	1
Affected States:	11	5	10	1	1	3	0	3	7	1	1
Affected Species:	34	18	20	6	6	13		13	176	1	1

GRAPES

	Bird	Fish	Mammal	Amphibian	Crustacean	Reptile	Arachnids	Insects	Plant	Snails	Clam
Affected Counties:	434	230	345	52	43	92		71	299	11	102
Affected States:	44	32	41	10	8	14	2	15	41	7	24
Affected Species:	35	75	46	16	15	23	9	37	318	13	60

LETTUCE AND ROMAINE

	Bird	Fish	Mammal	Amphibian	Crustacean	Reptile	Arachnids	Insects	Plant	Snails	Clam
Affected Counties:	121	72	96	27	26	28		30	85	2	9
Affected States:	24	13	26	4	4	5	1	8	22	2	8
Affected Species:	46	30	39	9	10	13	1	25	337	2	4

ONIONS, DRY

	Bird	Fish	Mammal	Amphibian	Crustacean	Reptile	Arachnids	Insects	Plant	Snails	Clam
Affected Counties:	156	78	94	25	20	36		29	94	3	9
Affected States:	31	20	24	5	3	8	0	8	25	3	7
Affected Species:	31	36	36	9	8	18		25	218	5	5

ONIONS, GREEN

	Bird	Fish	Mammal	Amphibian	Crustacean	Reptile	Arachnids	Insects	Plant	Snails	Clam
Affected Counties:	77	31	59	15	15	23		15	43	2	9
Affected States:	27	12	24	4	4	6	1	6	21	2	7
Affected Species:	45	22	35	9	9	12	1	15	263	2	3

POTATOES (EXCLUDING SWEET POTATOES)

	Bird	Fish	Mammal	Amphibian	Crustacean	Reptile	Arachnids	Insects	Plant	Snails	Clam
Affected Counties:	381	166	385	28	16	46		48	247	10	99
Affected States:	45	34	42	7	4	14	1	14	40	5	21
Affected Species:	33	58	40	13	11	20	1	23	222	12	46

SWEET POTATOES

	Bird	Fish	Mammal	Amphibian	Crustacean	Reptile	Arachnids	Insects	Plant	Snails	Clam
Affected Counties:	87	49	43	8	6	30		13	59	3	26
Affected States:	17	13	18	3	3	8	1	7	15	2	9
Affected Species:	29	25	15	4	5	10	1	7	185	2	38

APPENDIX G
DATA REQUIREMENTS

Table G1. Status of environmental fate data adequacy/needs for DCNA.

Guideline #		Data Requirement	Are Data Adequate for Risk Assessment?	MRID #'s	Study Classification
161-1	835.2120	Hydrolysis	yes	Acc. No. 253963	Acceptable
161-2	835.2240	Photodegradation in Water	yes	43891901 40508809	Acceptable Unacceptable
161-3	835.2410	Photodegradation on Soil	yes	43893601 40508810	Acceptable Unacceptable
161-4	835.2370	Photodegradation in Air	–		
162-1	835.4100	Aerobic Soil Metabolism	yes	40894801[1] 00086942	Acceptable Supplemental
162-2	835.4200	Anaerobic Soil Metabolism	yes	40894801[1]	Acceptable
162-3	835.4400	Anaerobic Aquatic Metabolism	yes	43866501[1]	Acceptable
162-4	835.4300	Aerobic Aquatic Metabolism	no	46216001[1]	Unacceptable
163-1	835.1240 835.1230	Leaching-Adsorption/ Desorption	yes	40538202 40538201 43809001 40863001 00065859	Acceptable Acceptable Supplemental Unacceptable Unacceptable
163-2	835.1410	Laboratory Volatility	waived (4/6/90)		
164-1	835.6100	Terrestrial Field Dissipation	Not Required	44414201 40583101 00086953 & 00086955 00082668	Acceptable Unacceptable Unacceptable Unacceptable
164-2	835.6200	Aquatic Field Dissipation	—	—	NA

164-3	835.6300	Forestry Dissipation	—	—	NA
164-4	835.6400	Combination Products and Tank Mixes Dissipation	—	—	NA
165-4	850.1730	Accumulation in Fish	yes	43782001 40508808	Acceptable Supplemental
165-5	850.1950	Accumulation – Aquatic Non-target Organisms	—	—	NA
166-1	835.7100	Groundwater – Small Prospective	In Review	45237401	In Review
201-1	840.1100	Droplet Size Spectrum			
202-1	840.1200	Drift Field Evaluation			

[1]A single document, MRID 40894801, contains both the aerobic and anaerobic soil metabolism studies.

Table G2. Status of ecological effects data adequacy/needs for DCNA.

Guideline #	Data Requirement	MRID #'s	Study Classification	Are the data adequate for risk assessment?
71-1	Avian acute oral LD_{50} Bobwhite quail	437551-01	Acceptable	yes
	Mallard duck	405831-03	Invalid	no
71-2	Avian subacute dietary LC_{50} Bobwhite quail	405088-12 431155-01	Supplemental Acceptable	no yes
	Mallard duck	405088-11 431155-02	Supplemental Acceptable	no yes
71-4	Avian reproduction bobwhite quail	462189-00	In Review	In Review
	mallard duck	NS	--	no
72-1	Freshwater fish acute LC_{50} Rainbow trout	00096064	Acceptable	yes
	Bluegill sunfish	00096058	Acceptable	yes
72-2	Freshwater invertebrate acute LC_{50} (*Daphnia magna*)	405831-02	Acceptable	yes
72-3a	Estuarine/marine fish acute LC_{50} (Sheepshead minnow)	NS	--	no
72-3b	Estuarine/marine acute invertebrate LC_{50} (mysid)	NS	--	no
72-3c	Estuarine/marine acute invertebrate LC_{50} (mollusc)	00087031	Supplemental	yes
72-4a	Freshwater fish early life stage (Rainbow trout)	NS	--	no
72-4b	Freshwater invertebrate life cycle (*Daphnia magna*)	466571-03	Supplemental	yes
72-4d	Estuarine/marine life cycle (mysid)	NS	--	no
72-5	Freshwater fish full life cycle (Fathead minnow)	NS	--	no
141-1	Acute honeybee contact	00036935	Acceptable	yes

Nonguideline	Earthworm Acute	NS	--	Not Required
81-1	rat acute oral toxicity	00086879	Unacceptable	no
		00064581	Supplemental	yes
83-4	rat 2-generation reproduction	444141-01	Acceptable	yes

NS = not submitted

APPENDIX H
ENVIRONMENTAL FATE and ECOLOGICAL EFFECTS GUIDELINE STUDIES BIBLIOGRAPHY

Environmental Fate Studies

161-1 Hydrolysis

MRID	Citation Reference
144957	Jaglon, P.; Arnold, T. (1983) Hydrolysis Study of (Carbon Radiola- belled)-dichloran in Aqueous Buffered Solutions at 25 degrees celsius: Technical Report No. 218-9760-83-002. Unpublished study prepared by Upjohn Co. 15 p.

161-2 Photodegradation-water

MRID	Citation Reference
40508809	Brehm, M. (1987) W40 Dicloran--The Photolysis of Dicloran (...) in Aqueous Solution: Project ID: APC 43/87. Unpublished study pre- pared by Schering AG. 51 p.
43891901	Misra, B. (1995) 2,6-Dichloro-4-Nitroaniline (DCNA): Photodegradation of DCNA in an Aqueous Buffered Solution Under Artificial Sunlight: Final Report: Lab Project Number: ME 9500194. Unpublished study prepared by Pittsburgh Environmental Research Lab, Inc. 84 p.
45397001	Jaglan, P.; Arnold, T. (1985) Dicloran (DCNA): Photolysis of (Carbon-14)-Dicloran from Aqueous Solutions: Preliminary Study. Lab Project Number: 218-9760-85-005. Unpublished study prepared by The Upjohn Company. 31 p.
45525801	Hawk, R.; Winkler, V. (2001) Dicloran (DCNA) Environmental Fate Studies: Lab Project Number: GEC101. Unpublished study prepared by Gowan Company. 288 p.
45575001	Hawk, R.; Winkler, V. (2001) Dicloran (DCNA) Environmental Fate Studies: Lab Project Number: GEC101. Unpublished study prepared by Gowan Company. 446 p.

161-3 Photodegradation-soil

MRID	Citation Reference
114180	Wang, C.; Broadbent, F. (1972) Kinetics of losses of PCNB and DCNA in three California soils. Soil Science Society of America Proceedings 36(5):742-745. (Submitter 3370; also In unpub- lished submission received Sep 7, 1982 under 1258-517; submitted by Olin Corp., Stamford, CT; CDL:248281-N)
40508810	Brehm, M. (1987) W38 Dicloran: The Photodegradation of Dicloran (...) on Soil Surfaces: Project ID: APC 32/87. Unpublished stu- dy prepared by Schering AG. 45 p.

43893601 Misra, B. (1995) 2,6-Dichloro-4-Nitroaniline (DCNA): Photodegradation of DCNA on Soil Under Artificial Sunlight: Final Report: Lab Project Number: ME 9500193. Unpublished study prepared by Pittsburgh Environmental Research Lab, Inc. 85 p.

45525801 Hawk, R.; Winkler, V. (2001) Dicloran (DCNA) Environmental Fate Studies: Lab Project Number: GEC101. Unpublished study prepared by Gowan Company. 288 p.

45575001 Hawk, R.; Winkler, V. (2001) Dicloran (DCNA) Environmental Fate Studies: Lab Project Number: GEC101. Unpublished study prepared by Gowan Company. 446 p.

162-1 Aerobic soil metabolism

MRID	Citation Reference
86924	Groves, K.; Chough, K.S. (1970) Fate of the fungicide, 2,6-di- chloro-4-nitroaniline (DCNA) in Plants and Soils. Journal of Agricultural and Food Chemistry 18(6):1127-1128. (Also~In~ unpublished submission received Nov 17, 1981 under 1023-36; submitted by Upjohn Co., Kalamazoo, Mich.; CDL:070503-U)
86942	Van Alfen, N.K.; Kosuge, T. (1976) Metabolism of the Fungicide 2, 6-dichloro-4-nitroaniline in soil. Journal of Agricultural and Food Chemistry 24:584-588. (Also in unpublished submission received Nov 17, 1981 under 1023-36; submitted by Upjohn Co., Kalamazoo, Mich.; CDL:070503-AW)
114179	Wang, C.; Broadbent, F. (1973) Effect of Soil Treatments on Losses of Two Chloronitrobenzene Fungicides. J. Environ. Quality 2(4): 511-515. (Submitter 3370; also In unpublished submission re- ceived Sep 7, 1982 under 1258-517; submitted by Olin Corp., Stamford, CT; CDL:248281-M)
40894801	Arnold, D.; Allen, R. (1988) W48 Dicloran: The Degradation of ?Car- bon 14|-Dicloran in Sand and Loam Soils under Aerobic and Flood- ed Conditions: Laboratory Project ID: ENVIR/88/36. Unpublished study prepared by Schering Agrochemicals Limited. 58 p.

162-2 Anaerobic soil metabolism

MRID	Citation Reference
40894801	Arnold, D.; Allen, R. (1988) W48 Dicloran: The Degradation of ?Car- bon 14|-Dicloran in Sand and Loam Soils under Aerobic and Flood- ed Conditions: Laboratory Project ID: ENVIR/88/36. Unpublished study prepared by Schering Agrochemicals Limited. 58 p.

162-3 Anaerobic aquatic metabolism

MRID	Citation Reference
43866501	Wisocky, M. (1995) Anaerobic Aquatic Metabolism of (carbon 14)- Dicloran: Lab Project Number: XBL94111: RPT00235. Unpublished study prepared by XenoBiotic Labs, Inc. 153 p.
45333301	Hawk, R. (2001) Anaerobic Aquatic Metabolism of (carbon 14)-Dicloran: Addendum 1: Lab Project Number: XBL94111: RPT00235. Unpublished study prepared by Xenobiotic

Labs., Inc. 23 p.

45525801 Hawk, R.; Winkler, V. (2001) Dicloran (DCNA) Environmental Fate Studies: Lab Project Number: GEC101. Unpublished study prepared by Gowan Company. 288 p.

45575001 Hawk, R.; Winkler, V. (2001) Dicloran (DCNA) Environmental Fate Studies: Lab Project Number: GEC101. Unpublished study prepared by Gowan Company. 446 p.

162-4 Aerobic aquatic metabolism

MRID	Citation Reference
46216001	Volkl, S. (2003) (Carbon 14)-Dicloran: Route and Rate of Degradation in Aerobic Aquatic Systems. Project Number: 843085, 714/001. Unpublished study prepared by RCC Umweltchemie Ag and SCC Scientific Consulting Company. 171 p.

163-1 Leach/adsorp/desorption

MRID	Citation Reference
3151	Mamadou, D. (1976) Evaluation of a Soil-Plate Screening Technique in Developing Fungicidal Control for Southern Stem Rot of Pea- nuts. Master's thesis, North Carolina State Univ., Dept. of Plant Pathology. (Unpublished study including abstract, re- ceived Sep 13, 1976 under 400-129; submitted by Uniroyal Chemi- cal, Bethany, Conn.; CDL:225604-AA)
114180	Wang, C.; Broadbent, F. (1972) Kinetics of losses of PCNB and DCNA in three California soils. Soil Science Society of America Proceedings 36(5):742-745. (Submitter 3370; also In unpub- lished submission received Sep 7, 1982 under 1258-517; submitted by Olin Corp., Stamford, CT; CDL:248281-N)
5001190	Helling, C.S.; Dennison, D.G.; Kaufman, D.D. (1974) Fungicide movement in soils. Phytopathology 64(8):1091-1100.
40538201	Fortsch, A. (1988) W41 Dicloran: Mobility of Dicloran in Four Soils: Project ID: UPSR 8/88. Unpublished study prepared by Schering AG. 32 p.
40538202	Bruhl, R. (1988) W42 Dicloran: Adsorption to and Desorption from Soil: Project ID: UPSR/12/88. Unpublished study prepared by Schering AG. 52 p.
40863001	Arnold, D.; Barrett, K. (1988) W47 Dichloran: The Mobility of ?Carbon 14|-Dicloran 'Aged' in Sand and Sandy Loam Soils: Laboratory Project ID ENVIR/88/27. Unpublished study prepared by Schering Agrochemicals Ltd. 35 p.
43809001	Wisocky, M. (1995) Aged Leaching of (carbon 14) Dicloran in Four Soils: Lab Project Number: XBL94112: RPT00236: F94146-015. Unpublished study prepared by XenoBiotic Labs, Inc. 209 p.
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45575001	Hawk, R.; Winkler, V. (2001) Dicloran (DCNA) Environmental Fate Studies: Lab Project Number: GEC101. Unpublished study prepared by Gowan Company. 446 p.

164-1 Terrestrial field dissipation

MRID	Citation Reference
82668	Upjohn Company (1964) Persistence of 2,6-Dichloro-4-nitroaniline (DCNA) in Soil (Michigan, 1964). (Unpublished study received Mar 29, 1965 under 5F0434; CDL:090471-U)
86955	Upjohn Company (1978) ?DCNA Residues in Soil from Peanut Fields|. (Compilation; unpublished study, including reports nos. 217- 9760-8, 217-9760-9, 217-9760-10, ..., received Nov 17, 1981 under 1023-36; CDL:070499-B)
95999	Upjohn Company (1964) Persistence of 2,6-Dichloro-4-nitroaniline (DCNA) in Soil (Michigan, 1964). (Unpublished study received on unknown date under 5F0434; CDL:098115-N)
128155	Upjohn Co. (1982) ?DCNA Residues in Soil: Botran 75W Fungicide|. (Compilation; unpublished study received Apr 21, 1983 under 1023-36; CDL:071566-E)
40583101	Bardalaye, P.; Kelly, I. (1988) Dissipation of Dicloran in Soil following Maximum Use Rates in the USA: Proj. No. 66006. Unpub- lished study prepared by NOR-AM Chemical Co. 118 p.
44414201	Kliskey, E. (1997) Determination of the Dissipation of Residues of 2,6-Dichloro-4-nitroaniline (Dicloran) and its Metabolites in a California Bare Ground Field Treated with Botran: Lab Project Number: GOWN-9321: F94084-207: GOWN-9321-CA1. Unpublished study prepared by Compliance Services International. 418 p.
45525801	Hawk, R.; Winkler, V. (2001) Dicloran (DCNA) Environmental Fate Studies: Lab Project Number: GEC101. Unpublished study prepared by Gowan Company. 288 p.
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165-4 Bioaccumulation in fish

MRID	Citation Reference
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43782001	Schocken, M. (1995) Bioconcentration/Metabolism Study With (Carbon 14)DCNA in Bluegill Sunfish: Final Report: Lab Project Numbers: 95-6-5940: 12791.0494.6102.140. Unpublished study prepared by Springborn Labs., Inc. 132 p.
45525801	Hawk, R.; Winkler, V. (2001) Dicloran (DCNA) Environmental Fate Studies: Lab Project Number: GEC101. Unpublished study prepared by Gowan Company. 288 p.
45575001	Hawk, R.; Winkler, V. (2001) Dicloran (DCNA) Environmental Fate Studies: Lab Project Number: GEC101. Unpublished study prepared by Gowan Company. 446 p.

166-1 Ground water-small prospective

MRID	Citation Reference
43953401	Coody, P. (1996) Candidate Site Selection Study: Botran: Field Scale Groundwater Monitoring: Lab Project Number: 112217-20-4187: 113260-16-4187: JOB # H5054. Unpublished study prepared by Weber, Hayes, and Associates. 95 p.
44068001	Hayes, J.; Hoban, P.; Bierman, A. (1996) Small Scale Prospective Groundwater Study for BOTRAN 75W (DCNA) Applied to Head Lettuce in Monterey County, California: Phase I: Site Characterization and Conceptual Model: Lab Project Number: 961: H5054: H5054.B. Unpublished study prepared by PTRL East, Inc. and Weber, Hayes and Associates. 196 p.
44215401	Coody, P. (1997) Small Scale Prospective Ground Water Study for Botran 75W (DCNA) Applied to Head Lettuce in Monterey County, California: First Quarterly Report: Lab Project Number: 961: 1939. Unpublished study prepared by PTRL East, Inc. and Weber, Hayes & Assoc. 124 p.
44350101	Coody, P. (1997) Small Scale Prospective Ground Water Study for Botran 75W (DCNA) Applied to Head Lettuce in Monterey County, California: Second Quarterly Report: Lab Project Number: 961: 1939. Unpublished study prepared by PTRL East, Inc. and Weber, Hayes & Associates. 22 p.
44533001	Howard, J. (1998) Small Scale Prospective Ground Water Study for Botran 75W (DCNA) Applied to Head Lettuce in Monterey County, California: Third Quarterly Report: Lab Project Number: 961: 2000. Unpublished study prepared by PTRL East, Inc. and Weber, Hayes & Assoc. 50 p.
44694301	Howard, J. (1998) Small Scale Prospective Ground Water Study for BOTRAN 75 W (DCNA) Applied to Head Lettuce in Monterey County, California: Fourth Quarterly Report: Lab Project Number: 961: 2020. Unpublished study prepared by PTRL East, Inc. and Weber, Hayes, and Associates. 97 p.
44842101	Howard, J. (1999) Small Scale Prospective Ground Water Study for Botran 75W (DCNA) Applied to Head Lettuce in Monterey County, California: Lab Project Number: 961: 2041. Unpublished study prepared by PTRL East, Inc. and Weber, Hayes & Associates. 217 p.
45237401	Howard, J.; White, J. (2000) Small Scale Prospective Ground Water Study for BOTRAN 75W (DCNA) Applied to Head Lettuce in Monterey County, California: Final Report: Lab Project Number: 961: 2103: 2000. Unpublished study prepared by PTRL East, Inc. and Weber, Hayes & Associates. 806 p.

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71-1 Avian Single Dose Oral Toxicity

MRID	Citation Reference
40583103	Roberts, N.; Phillips, C.; Hakin, B.; et al. (1988) W44 Technical Dicloran: Acute Oral Toxicity to the Mallard Duck: HRC Rept. No. SMS 48/88147. Unpublished study prepared by Huntingdon Research Centre. 26 p.
43755101	Rodgers, M. (1995) Dicloran Technical: Acute Oral Toxicity (LD50) to the Bobwhite Quail: Lab Project Number: GWN 2: GWN 2/951332. Unpublished study prepared by Huntingdon Research Centre Ltd. 27 p.

71-2 Avian Dietary Toxicity

MRID	Citation Reference
86931	Knott, W.; Scott, W.J. (1968) Comparison of enide (N,N-dimethyl- 2,2-diphenylacetamide) and botran (2,6-dichloro-4-nitroaniline) with DDT with respect to toxicity to fish and wildlife. Tox- icology and Applied Pharmacology 12:286. (Also~In~unpublished submission received Nov 17, 1981 under 1023-36; submitted by Upjohn Co., Kalamazoo, Mich.; CDL:070503-AB)
87020	Beliles, R.P.; Scott, W.; Knott, W.; et al. (1965) Subacute Toxic- ity in Bobwhite Quail. (Unpublished study received Nov 17, 1981 under 1023-36; prepared by Woodard Research Corp., submitted by Upjohn Co., Kalamazoo, Mich.; CDL:070502-Q)
87027	Beliles, R.P.; Scott, W.; Knott, W.; et al. (1965) Botran: Subacute Toxicity in Mallard Ducks. (Unpublished study received Nov 17, 1981 under 1023-36; prepared by Woodard Research Corp., sub- mitted by Upjohn Co., Kalamazoo, Mich.; CDL:070502-AD)
87032	Beliles, R.P.; Scott, W.; Knott, W.; et al. (1965) Botran: Summary of Safety Evaluation on Fish and Wildlife. Summary of studies 070502-Q and 070502-AD through 070502-AH. (Unpublished study, including submitter summary, received Nov 17, 1981 under 1023- 36; prepared by Woodard Research Corp., submitted by Upjohn Co., Kalamazoo, Mich.; CDL:070502-AI)
96061	Beliles, R.P.; Scott, W.; Knott, W.; et al. (1965) Botran Safety Evaluation on Fish and Wildlife: (Bobwhite Quail, Mallard Ducks, Rainbow Trout, Goldfish, Sunfish, Oysters). (Unpublished study received Aug 5, 1965 under 1023-18; prepared by Woodard Research Corp., submitted by Upjohn Co., Kalamazoo, Mich.; CDL:131798-A)
40508811	Roberts, N. (1987) W39 Technical Dicloran: Subacute Dietary Toxici- ty to the Mallard Duck: Project ID: TOX 87/199-86. Unpublished study prepared by Huntingdon Research Centre. 41 p.
40508812	Roberts, N.; Phillips, C.; Hakin, B. (1987) W36 Technical Dicloran: Subacute Dietary Toxicity to the Bobwhite Quail: Project ID: Tox 87/199-87. Unpublished study prepared by Huntingdon Research Centre. 40 p.
43115501	Bright, J. (1987) W36A Dicloran: Determination of Dicloran Dietary Concentrations for an LC50 Dietary Study in the Bobwhite Quail: Lab Project Number: RESID/87/87.

Unpublished study prepared by Schering Agrochemicals Limited. 14 p.

43115502 Bright, J. (1987) W37A Dicloran: Determination of Dicloran Dietary Concentrations for an LC50 Dietary Study in the Mallard Duck: Lab Project Number: RESID/87/86. Unpublished study prepared by Schering Agrochemicals Limited. 14 p.

71-4 Avian Reproduction

MRID	Citation Reference
46218901	Frey, L.; Martin, K.; Beavers, J.; et. al. (2003) Dicloran: A Reproduction Study with the Northern Bobwhite: Final Report. Project Number: 813/001, 90000308, 555/104. Unpublished study prepared by Wildlife International, Ltd. 190 p.

72-1 Acute Toxicity to Freshwater Fish

MRID	Citation Reference
86931	Knott, W.; Scott, W.J. (1968) Comparison of enide (N,N-dimethyl- 2,2-diphenylacetamide) and botran (2,6-dichloro-4-nitroaniline) with DDT with respect to toxicity to fish and wildlife. Tox- icology and Applied Pharmacology 12:286. (Also~In~unpublished submission received Nov 17, 1981 under 1023-36; submitted by Upjohn Co., Kalamazoo, Mich.; CDL:070503-AB)
87028	Beliles, R.P.; Scott, W.; Knott, W.; et al. (1965) Botran: Acute Toxicity in Rainbow Trout. (Unpublished study received Nov 17, 1981 under 1023-36; prepared by Woodard Research Corp., sub- mitted by Upjohn Co., Kalamazoo, Mich.; CDL:070502-AE)
87029	Beliles, R.P.; Scott, W.; Knott, W.; et al. (1965) Botran: Acute Toxicity in Goldfish. (Unpublished study received Nov 17, 1981 under 1023-36; prepared by Woodard Research Corp., submitted by Upjohn Co., Kalamazoo, Mich.; CDL:070502-AF)
87030	Beliles, R.P.; Scott, W.; Knott, W.; et al. (1965) Botran: Acute Toxicity in Sunfish. (Unpublished study received Nov 17, 1981 under 1023-36; prepared by Woodard Research Corp., submitted by Upjohn Co., Kalamazoo, Mich.; CDL:070502-AG)
87032	Beliles, R.P.; Scott, W.; Knott, W.; et al. (1965) Botran: Summary of Safety Evaluation on Fish and Wildlife. Summary of studies 070502-Q and 070502-AD through 070502-AH. (Unpublished study, including submitter summary, received Nov 17, 1981 under 1023- 36; prepared by Woodard Research Corp., submitted by Upjohn Co., Kalamazoo, Mich.; CDL:070502-AI)
96058	Pitcher, F.A.; McCann, J.A. (1974) ?Botran Technical: Bluegill (?~L~?.?~macrochirus~?)|: Test No. 742. (U.S. Agricultual Re- search Service, Chemical & Biological Investigations Branch, Technical Services Div., Animal Biology Laboratory; unpublished study; CDL:127912-A)
96061	Beliles, R.P.; Scott, W.; Knott, W.; et al. (1965) Botran Safety Evaluation on Fish and Wildlife: (Bobwhite Quail, Mallard Ducks, Rainbow Trout, Goldfish, Sunfish, Oysters). (Unpublished study received Aug 5, 1965 under 1023-18; prepared by Woodard Research Corp., submitted by Upjohn Co., Kalamazoo, Mich.; CDL:131798-

A)

96062 McCann, J.A. (1971) ?Botran 50W: Bluegill (?~Lepomis macro~?- ?~chirus~?)|: Test No. 330. (U.S. Agricultural Research Serv- ice, Pesticides Regulation Div., Animal Biology Laboratory; un- published study; CDL:130652-A)

96063 McCann, J.A. (1971) Botran 50W: Rainbow Trout (?~Salmo gaird~?- ?~nairi~?): Test No. 338. (U.S. Agricultural Research Service, Pesticides Regulation Div., Animal Biology Laboratory; unpub- lished study; CDL:130652-B)

96064 Pitcher, F.G.; McCann, J.A. (1974) ?Botran Technical: Rainbow Trout|. (U.S. Environmental Protection Agency, Chemical & Bio- logical Investigations Branch, Technical Services Div., Animal Biology Laboratory; unpublished study; CDL:165061-A)

72-2 Acute Toxicity to Freshwater Invertebrates

MRID	Citation Reference

40583102 Hill, R.; Moffat, A.; Comber, M. (1988) W43 Dicloran Technical: De- termination of Acute Toxicity to Daphnia magna: Rept. No. BL/B/ 3242. Unpublished study prepared by Imperial Chemical Industri- es, Ltd., Brixham Laboratory. 25 p.

72-3 Acute Toxicity to Estuarine/Marine Organisms

MRID	Citation Reference

87031 Beliles, R.P.; Scott, W.; Knott, W.; et al. (1965) Botran: Effect on Shell Growth of Oysters. (Unpublished study received Nov 17, 1981 under 1023-36; prepared by Woodard Research Corp., sub- mitted by Upjohn Co., Kalamazoo, Mich.; CDL:070502-AH)

87032 Beliles, R.P.; Scott, W.; Knott, W.; et al. (1965) Botran: Summary of Safety Evaluation on Fish and Wildlife. Summary of studies 070502-Q and 070502-AD through 070502-AH. (Unpublished study, including submitter summary, received Nov 17, 1981 under 1023- 36; prepared by Woodard Research Corp., submitted by Upjohn Co., Kalamazoo, Mich.; CDL:070502-AI)

96061 Beliles, R.P.; Scott, W.; Knott, W.; et al. (1965) Botran Safety Evaluation on Fish and Wildlife: (Bobwhite Quail, Mallard Ducks, Rainbow Trout, Goldfish, Sunfish, Oysters). (Unpublished study received Aug 5, 1965 under 1023-18; prepared by Woodard Research Corp., submitted by Upjohn Co., Kalamazoo, Mich.; CDL:131798-A)

81-1 Acute oral toxicity in rats

83-4 2-generation repro.-rat

44414101 Wilcox, S.; Barton, S. (1997) Dicloran: Two Generation Reproduction Study in Rats: Lab Project Number: 491514: 14271. Unpublished study prepared by Inveresk Research. 363 p.

APPENDIX I
ECOTOXICITY BIBLIOGRAPHY

Acceptable for ECOTOX and OPP

1. Beute, M. K., Porter, D. M., and Hadley, B. A. (1975). **Sclerotinia Blight of Peanut in North Carolina and Virginia and Its Chemical Control.** *Plant Dis.Rep.* 59: 697-701.

   EcoReference No.: 72286
   User Define 2: REPS,WASH,CORE SENT
   Chemical of Concern: PNB,DCNA,Cu,CTN; Habitat: T; Effect Codes: PHY,POP; Rejection Code: LITE EVAL CODED(DCNA).

2. Brenneman, T. B., Phipps, P. M., and Stipes, R. J. (1987). **Control of Sclerotinia Blight of Peanut: Sensitivity and Resistance of Sclerotinia minor to Vinclozolin, Iprodione, Dicloran, and PCNB.** *Plant Dis.* 71: 87-90.

   EcoReference No.: 70774
   User Define 2: REPS,WASH,CORE SENT
   Chemical of Concern: PNB,IPD,DCNA; Habitat: T; Effect Codes: GRO; Rejection Code: LITE EVAL CODED(DCNA).

3. Burton, D. T. and Fisher, D. J. (1990). **Acute Toxicity of Cadmium, Copper, Zinc, Ammonia, 3,3'-Dichlorobenzidine, 2,6-Dichloro-4-nitroaniline, Methylene Chloride, and 2,4,6-Trichlorophenol to Juvenile Grass Shrimp and Killifish.** *Bull.Environ.Contam.Toxicol.* 44: 776-783.

   EcoReference No.: 3163
   Chemical of Concern: DCNA,Cd,Cu,CuS,Zn,NH4,CP; Habitat: A; Effect Codes: MOR; Rejection Code: LITE EVAL CODED(DCNA,CuS,OW-TRV-Cu),OK(ALL CHEMS).

4. Gallo, M. A., Bachmann, E., and Golberg, L. (1976). **Mitochondrial Effects of 2,6-Dichloro-4-Nitroaniline and Its Metabolites.** *Toxicol.Appl.Pharmacol.* 35: 51-61.

   EcoReference No.: 35174
   User Define 2: CORE
   Chemical of Concern: DCNA; Habitat: T; Effect Codes: CEL,BCM,GRO,PHY; Rejection Code: LITE EVAL CODED(DCNA).

5. Hutton, K. E. and Kable, P. F. (1970). **Evaluation of Fungicides for Control of Peach Brown Rot in New South Wales.** *Plant Dis.Rep.* 54: 776-780.

   EcoReference No.: 72299
   User Define 2: REPS,WASH,CORE SENT
   Chemical of Concern: PNB,Captan,DCNA; Habitat: T; Effect Codes: PHY; Rejection Code: LITE EVAL CODED(DCNA).

6. Kim, D. G. and Riggs, R. D. (1998). **Effects of Some Pesticides on the Growth of ARF18 and Its Pathogenicity to Heterodera glycines.** *J.Nematol.* 30: 201-205.

EcoReference No.: 70527
User Define 2: REPS,WASH,CALF,CORE,SENT
Chemical of Concern:
PNB,CBL,DCNA,SXD,FPP,MLN,KFAT,CHX,DZ,DCF,TPM,GYPI,MYC,PAQT,MZB,DMM,TFN,FML,ADC,DLN,CTN; Habitat: T; Effect Codes: POP,GRO; Rejection Code: LITE EVAL CODED(DCNA,SXD),OK(ALL CHEMS).

Acceptable for ECOTOX but not OPP

1. Ashour, W. A., Morsy, A. A., Ali, M. D. H., and Diab, M. M. M. (1971). **Effect of Some Cultural Practices and Fungicides on Basal Bulb Rot of Onion.** *Agric.Res.Rev.* 51: 153-162.

   EcoReference No.: 71526
   User Define 2: REPS,WASH,CORE SENT
   Chemical of Concern: PNB,DCNA,Captan,Nabam,DCNA,THM; Habitat: T; Effect Codes: POP,GRO,PHY; Rejection Code : OK(Nabam,THM,Captan),NO ENDPOINT(DCNA,PNB).

2. Beckman, K. M. and Parsons, J. E. (1965). **Fungicidal Control of Sclerotinia Wilt in Green Beans.** *Plant Dis.Rep.* 49: 357-358.

   EcoReference No.: 72316
   User Define 2: CORE,SENT
   Chemical of Concern: DCNA; Habitat: T; Effect Codes: PHY; Rejection Code: NO ENDPOINT(DCNA).

3. Earl, F. L., Curtis, J. M., Bernstein, H. N., and Smalley, H. E. Jr. (1971). **Ocular Effects in Dogs and Pigs Treated with Dichloran (2,6-Dichloro-4-Nitroaniline).** *Food Cosmet.Toxicol.* 9: 819-828.

   EcoReference No.: 36502
   User Define 2: CORE
   Chemical of Concern: DCNA; Habitat: T; Effect Codes: CEL,BCM,PHY; Rejection Code: NO ENDPOINT(DCNA).

4. Fischer, J. W. and Landis, T. D. (1990). **Dicloran Fungicide Causes Stem Injury to Container Spruce Seedlings.** *Tree Planters' Notes - U.S.Dep.of Agric., For.Serv.* 41: 39-42.

   EcoReference No.: 49190
   Chemical of Concern: DCNA,Captan; Habitat: T; Effect Codes: PHY; Rejection Code: NO ENDPOINT(ALL CHEMS).

5. Hoshiya, T., Hasegawa, R., Hakoi, K., Lin, C., Ogiso, T., Cabral, R., and Ito, N. (1993). **Enhancement by Non-mutagenic Pesticides of GST-P Positive Hepatic Foci Development Initiated with Diethylnitrosamine in the Rat.** *Cancer Lett.* 72: 59-64.

   EcoReference No.: 75341
   Chemical of Concern: DCNA,NSA,DLN,VCZ,MLN; Habitat: T; Effect Codes: PHY,BCM; Rejection Code: NO ENDPOINT(ALL CHEMS).

6. Jaglan, P. S. and Arnold, T. S. (1982). **Metabolism of [14C]Dichloran (2,6-Dichloro-4-Nitroaniline) in the Lactating Goat.** *J.Agric.Food Chem.* 30: 1051-1056.

   EcoReference No.: 37283
   User Define 2: PULL,CORE
   Chemical of Concern: DCNA; Habitat: T; Effect Codes: PHY; Rejection Code: NO ENDPOINT,CONTROL(DCNA).

7. Jones, K. H., Sanderson, D. M., and Noakes, D. N. (1968). **Acute Toxicity Data for Pesticides (1968).** *World Rev.Pest Control* 7: 135-143.

   EcoReference No.: 70074
   Chemical of Concern: 24DXY,ABT,ACL,ADC,AMTL,AMTR,AND,ASM,ATN,ATZ,AZ,BFL,BMC,BMN,BS,BTY,Captan,CBL,CCA,CHD,CMPH,CPP,CPY,CQTC,CTHM,Cu,CuFRA,DBN,DCB,DCNA,DDD,DDT,DDVP,DEM,DINO,DLD,DMB,DMT,DOD,DPP,DQTBr,DS,DU,DZ,DZM,EDT,EN,EP,EPTC,ES,ETN,FLAC,FMU,FNF,FNT,FNTH,Folpet,HCCH,HPT,LNR,Maneb,MCB,MCPA,MCPB,MDT,MLH,MLN,MLT,MRX,MTM,MVP,MXC,Naled,NPM,PB,PCH,PCL,PCP,PEB,PHMD,PHSL,PMT,PPHD,PPN,PPX,PPZ,PQT,PRN,PRO,PRT,PYN,PYZ,RTN,SFT,SID,SZ,TCF,TFN,THM,TRB,TRL,TXP,VNT,Zineb; Habitat : T; Effect Codes: MOR; Rejection Code: PUBL AS(24DXY,ABT,ACL,AMTL,AMTR,ASM,ATN,AZ,BFL,BMC,BMN,BS,BTY,CCA,CMPH,CPP,CPY,CQTC,CTHM,DBN,DCB,DCNA,DDT,DINO,DOD,DPP,DQTBr,DU,DZM,EP,EPTC,ES,FMU,FNF,FNT,Folpet,HCCH,HPT,LNR,MCB,MCPP,MLT,MP,MRX,MTM,MXC,Naled,NPM,Pb,PCH,PCL,PEB,PHSL,PPN,PPZ,PQT,PRO,PYN,PYZ,RTN,RYA,SFT,SID,TFN,THM,TRL,VNT),NO CONTROL,DURATION(ALL CHEMS).

8. Lemin, A. J. (1965). **Translocation and Metabolism of 2,6-Dichloro-4-Nitroaniline by Lettuce and Tomato.** *J.Agric.Food Chem.* 13: 557-564.

   EcoReference No.: 51448
   User Define 2: CORE
   Chemical of Concern: DCNA; Habitat: T; Effect Codes: PHY,ACC; Rejection Code: NO ENDPOINT(DCNA).

9. Lewis, J., Weber, D. J., and Venketeswaran, S. (1969). **Mode of Action of 2,6-Dichloro-4-Nitroaniline in Plant Tissue Culture.** *Phytopathology* 59: 93-97.

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   User Define 2: CORE
   Chemical of Concern: DCNA; Habitat: T; Effect Codes: CEL,BCM,GRO; Rejection Code: NO ENDPOINT(DCNA).

10. Locke, S. B. (1968). **Experimental Control of Onion White Rot by Means of Soil Chemicals.** *Plant Dis.Rep.* 52: 272-276.

    EcoReference No.: 72279
    User Define 2: REPS,WASH,CORE SENT
    Chemical of Concern: PNB,DCNA,Hg; Habitat: T; Effect Codes: POP; Rejection Code: NO ENDPOINT(DCNA).

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User Define 2: WASH,CORE,SENT
Chemical of Concern: DCNA,CTN,BMY,TBA,THM,CBX,OXC; Habitat: T; Effect Codes: POP; Rejection Code: NO ENDPOINT(ALL CHEMS).

12. Office of Pesticide Programs (2000). **Pesticide Ecotoxicity Database (Formerly: Environmental Effects Database (EEDB)).** *Environmental Fate and Effects Division, U.S.EPA, Washington, D.C.*

EcoReference No.: 344
Chemical of Concern:
24DXY,ACL,ACP,ACR,AQS,ATZ,AZ,BDF,BMC,BML,BMN,BRSM,BS,BT,Captan,CBF,CBL,CFE,CFE,CLNB,CMPH,CPC,CPY,CTN,CTZ,Cu,CuO,CuS,CYD,CYF,CYP,CYT,DBN,DCNA,DFT,DFZ,DM,DMB,DMM,DMP,DMT,DOD,DPC,DPDP,DS,DSP,DU,DZ,DZM,EFL,EFS,EFV,EP,FHX,FMP,FO,Folpet,FPP,FVL,GYP,HCCH,HXZ,IPD,IZP,LNR,MAL,MB,MBZ,MDT,MFX,MFZ,MGK,MLN,MLT,MOM,MP,MTC,MTL,MTM,NAA,Naled,NFZ,NPP,NTP,OXF,OXT,OYZ,PCZ,PDM,PEB,PHMD,PMR,PMT,PNB,PPB,PPG,PPMH,PQT,PRB,PRT,PSM,PYN,PYZ,RSM,RTN,SMM,SMT,SS,SXD,SZ,TBC,TDC,TDZ,TET,TFN,TFR,TMT,TPR,TRB,WFN,ZnP; Habitat: AT; Effect Codes: MOR,POP,PHY,GRO,REP; Rejection Code: NO EFED (344).

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EcoReference No.: 19294
Chemical of Concern: SZ,AZD,CBF,ES,MLN,PYT,RTN,ADC,CBF,DCNA,DMT; Habitat: A; Effect Codes: MOR; Rejection Code: NO TOXICANT(SZ,DCNA),PUBLAS(AZD,CBF,ES,MLN,PYT,RTN).

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Chem Codes: Chemical of Concern: DCNA; Rejection Code: CHEM METHODS.

2. 1985). **HYDROLYSIS STUDY OF 14C-DICHLORAN IN AQUEOUS BUFFERED SOLUTIONS AT 25C.** *EPA/OTS; Doc #878216225*.

Chem Codes: Chemical of Concern: DCNA; Rejection Code: CHEM METHODS.

3. 1983). **LIST OF ANILINE SUBSTITUTED PRODUCTS MADE BY MONTEDISON-ACNA ORGANIC CHEMICAL DIVISION.** *EPA/OTS; Doc #40-8376127*.

Chem Codes: Chemical of Concern: DCNA; Rejection Code: NO TOX DATA.

4. 2000). **METHEMOGLOBIN INDUCING POTENTIAL OF VARIOUS SUBSTITUTED ANILINES WITH COVER LETTER DATED 121984.** *EPA/OTS; Doc #40-8476328*.

   Chem Codes: Chemical of Concern: DCNA; Rejection Code: NO TOX DATA.

5. 1985). **PHOTOLYSIS OF 14C DICHLORAN (U-2069,DCNA, 2,6-DICHLORO-4-NIT ROANILINE) FROM AQUEOUS SOLUTIONS-WITH COVER LETTER 112585.** *EPA/OTS; Doc #878216217*.

   Chem Codes: Chemical of Concern: DCNA; Rejection Code: FATE .

6. 1990). **PRELIMINARY ASSESSMENT FOR AN EPIDEMIOLOGIC STUDY ON EMPLOYEES AT THE NORTH HAVEN FINE CHEMICALS PLANT (FINAL REPORT) WITH COVER LETTER DATED 060790.** *EPA/OTS; Doc #89-900000285*.

   Chem Codes: Chemical of Concern: DCNA; Rejection Code: HUMAN HEALTH.

7. 1989). **SOLUBILITY OF 2,6-DICHLORO-4-NITRO-BENZENAMINE IN WATER WITH COVER LETTER FROM SOCMA DATED 082889.** *EPA/OTS; Doc #40-8976497*.

   Chem Codes: Chemical of Concern: DCNA; Rejection Code: CHEM METHODS.

8. 1985). **SOLUBILITY OF DICHLORAN IN DISTILLED WATER.** *EPA/OTS; Doc #878216226*.

   Chem Codes: Chemical of Concern: DCNA; Rejection Code: CHEM METHODS.

9. 1985). **STABILITY OF DCNA RESIDUES IN HAY AT ROOM TEMPERATURE.** *EPA/OTS; Doc #878216222*.

   Chem Codes: Chemical of Concern: DCNA; Rejection Code: NO SPECIES.

10. 2000). **TELEPHONE COMMUNICATION: FROM USEPA TO UPJOHN CO.** *EPA/OTS; Doc #40-8376165*.

    Chem Codes: Chemical of Concern: DCNA; Rejection Code: NO TOX DATA.

11. ABDUL-RAOUF UM, HWANG CA, and BEUCHAT LR (1994). **Comparison of combinations of diluents and media for enumerating Zygosaccharomyces rouxii in intermediate water activity foods.** *LETTERS IN APPLIED MICROBIOLOGY;* 19: 28-31.

    Chem Codes: Chemical of Concern: DCNA; Rejection Code: NO TOX DATA.
    BIOSIS COPYRIGHT: BIOL ABS. Combinations of five diluents (0.1% peptone, 40 and 50% glucose, and 18 and 26% glycerol) and three enumeration media (tryptone glucose yeast extract, dichloran 18% glycerol and malt extract yeast extract 50% glucose (MY50G) agars) were evaluated for recovering a xerotolerant yeast, Zygosaccharomyces rouxii, from foods with

intermediate water activity (alphaw). Combinations of 40% (alphaw 0.936) or 50% (alphaw 0.898) glucose diluent and MY50G agar (alphaw 0.890) were superior in recovering highe populations. The type of solute in the diluent, as well as a reduced alphaw, influences efficiency of recovering viable cells. Plants/Cytology/ Body Water/ Biochemistry/Methods/ Biochemistry/ Amino Acids/ Peptides/ Proteins/ Carbohydrates/ Nutrition/ Nutritional Status/ Food Technology/ Food Analysis/ Food Technology/ Food-Processing Industry/ Food Technology/ Mycoses/ Environmental Monitoring/ Public Health/ Communicable Diseases/Microbiology/ Beverages/ Food Microbiology/ Food Contamination/ Industrial Microbiology/ Biophysics/ Plants/Metabolism/ Plants/Physiology/ Water/Metabolism/ Biophysics/ Nutrition/ Plants/Physiology/ Plants/Metabolism/ Biophysics/ Plants/Physiology/ Plants/Metabolism/ Plants/Growth & Development/ Biophysics/ Plants/Physiology/ Plants/Metabolism/ Ascomycota

12. ABILDGREN MP , LUND, F., THRANE, U., and ELMHOLT, S. (1987). **CZAPEK-DOX AGAR CONTAINING IPRODIONE AND DICLORAN AS A SELECTIVE MEDIUM FOR THE ISOLATION OF FUSARIUM SPECIES.** *LETT APPL MICROBIOL;* 5: 83-86.

    Chem Codes: Chemical of Concern: DCNA; Rejection Code: NO TOX DATA.
    BIOSIS COPYRIGHT: BIOL ABS. RRM FUNGICIDES Biochemistry/ Carbohydrates/ Microbiological Techniques/ Biophysics/ Plants/Physiology/ Plants/Metabolism/ Plants/Growth & Development/ Biophysics/ Plant Growth Regulators/Pharmacology/ Plants/Physiology/ Plants/Metabolism/ Plants/Growth & Development/ Plants/Drug Effects/ Biophysics/ Plants/Physiology/ Plants/*Metabolism/ Biophysics/ Plants/Physiology/ Herbicides/ Pest Control/ Pesticides/ Mitosporic Fungi

13. ADASKAVEG JE , CONN KE, and OGAWA JM (1993). **EFFICACY OF IPRODIONE COMPARED TO DICHLORAN FOR POSTHARVEST CONTROL OF RHIZOPUS ROT OF SWEET POTATOES.** *JOINT MEETING OF THE AMERICAN PHYTOPATHOLOGICAL SOCIETY AND THE SOCIETY OF NEMATOLOGISTS ON PLANT PATHOLOGY BEYOND* 2000, NASHVILLE, TENNESSEE, USA, NOVEMBER 6-10, 1993. PHYTOPATHOLOGY; 83: 1354.

    Chem Codes: Chemical of Concern: DCNA; Rejection Code: ABSTRACT.
    BIOSIS COPYRIGHT: BIOL ABS. RRM MEETING ABSTRACT RHIZOPUS-STOLONIFER PLANT FUNGUS FUNGICIDE CROP INDUSTRY AGRICULTURE Congresses/ Biology/ Biochemistry/ Food Technology/ Fruit/ Nuts/ Vegetables/ Beverages/ Food Microbiology/ Food Contamination/ Industrial Microbiology/ Vegetables/ Fungi/ Plant Diseases/ Plant Diseases/ Preventive Medicine/ Herbicides/ Pest Control/ Pesticides/ Phycomycetes/ Plants

14. Albrecht, A, Redmann, T, Nuchter, H, Bonner, B M, Kaleta, E, and Kampfer, P (2003). **Airborne microorganisms in a rearing henhouse for layers during vaccination.** *DTW. Deutsche Tierarztliche Wochenschrift* 110: 487-493.

    Chem Codes: Chemical of Concern: DCNA; Rejection Code: BACTERIA.
    Airborne microorganisms are proved regularly in livestock houses as a part of stable dust and its amount depends on housing conditions, the flow of air and the movement of material. Health of animals and farmers can be influenced in a negative way by these bioaerosols. In a rearing house for layers concentrations of various groups of airborne microorganisms were measured during vaccination by a veterinary and his three assistants. During the vaccination activities the concentrations of some airborne microorganisms increased by a factor of ten to the following

medians of colony forming units (cfu) on used selective agars (cfu/m3): 10(3) on MacConkey (36 degrees C), 10(3) on Dichloran-Glycerol (25 degrees C), 10(7) on Tryptone Soy (CaSo, 36 degrees C), 10(3) on Salmonella-Shigella (36 degrees C), 10(2) yeasts on Sabouraud (36 degrees C), and 10(2) on Campylobacter (36 degrees C). Thermophilic fungi were only grown on some of the used Maltextract agar dishes (45 degrees C) in concentrations near of the limit of detection. Some aerial samples were analysed for Chlamydia. Chlamydophila psittaci was not detected. Concentrations of airborne microorganisms in livestock houses depends not only on housing conditions but also on specific work procedures of farmers or on the activity of the animals. [Journal Article; In German; Germany]

15. Ali, H., Summerell, B., and Bergess, L. W. (1991). **An evaluation of three media for the isolation of Fusarium, Alternaria and other fungi from sorghum grain.** *Australas Plant Pathol* 20 : 134-138.

Chem Codes: Chemical of Concern: PNB,DCNA; Rejection Code: NO TOXICANT.
ABSTRACT: BIOSIS COPYRIGHT: BIOL ABS. The effectiveness of three media, peptone-PCNB agar (PPA), dichloran-chloramphenicol agar (DCPA) and modified potato-dextrose agar (MPDA) for the recovery of Fusarium, Alternaria and other fungi from sorghum grain was evaluated using three grain samples. One sample appeared free of mould damage on visual inspection whereas the other two samples had obvious mould damage and were discoloured. PPA was the most effective medium for the recovery of Fusarium spp. while DCPA was most effective in recovering Alternaria spp. MPDA proved useful for the recovery of Phoma sorghina and a number of dematiaceous fungal species. A. alternata was frequently recovered from the clean sorghum sample but rarely recovered from the two mouldy samples. F. moniliforme, F. equiseti, F. chlamydosporum and F. semitectum were all isolated at relatively high frequencies from the two mouldy sorghum samples but only F. moniliforme was recovered from the clean sample. P. sorghina was recovered at high
KEYWORDS: Biochemical Studies-General
KEYWORDS: Biochemical Studies-Carbohydrates
KEYWORDS: Nutrition-General Studies
KEYWORDS: Nutrition-Carbohydrates (1972-)
KEYWORDS: Food Technology-Cereal Chemistry
KEYWORDS: Microbiological Apparatus
KEYWORDS: Food and Industrial Microbiology-Food and Beverage Spoilage and Contamination
KEYWORDS: Morphology
KEYWORDS: Plant Physiology
KEYWORDS: Plant Physiology
KEYWORDS: Agronomy-Grain Crops
KEYWORDS: Phytopathology-Diseases Caused by Fungi
KEYWORDS: Pest Control
KEYWORDS: Fungi Imperfecti or Deuteromycetes
KEYWORDS: Gramineae

16. Andersen, Birgitte and Frisvad, Jens C (2002). **Characterization of Alternaria and Penicillium species from similar substrata based on growth at different temperature, pH and water activity.** *Systematic And Applied Microbiology* 25: 162-172.

Chem Codes: Chemical of Concern: DCNA; Rejection Code: HUMAN HEALTH.
Fifty-eight Alternaria isolates representing 10 species or species-groups and 66 Penicillium

isolates representing 18 species were examined for their growth response to the combined effects of water activity, temperature and pH in an extended Central Composite Design. Growth responses were recorded as colony diameter after one and two weeks of growth and analysed using different multivariate statistical analyses. The isolates, when analysed by Principal Component Analysis, clustered according to their genus and to some degree to species or species groups and not according to substratum as excepted. Soft Independent Modelling of Class Analogy and Response Surface Analysis showed that growth responses or growth profiles may be used as classification tool. Partial Least Squares Regression showed that a combination of two different media based on Dichloran Rose bengal Yeast Extract Sucrose agar incubated at two different temperatures were enough to get genus segregation and to some extent species segregation. The results also showed that water activity, temperature and pH interact strongly in their effect on growth rates and that the squared products (optima) of water activity, temperature and pH for each isolate were important for modelling the data sufficiently. [Journal Article; In English; Germany]

17. Andersen, Birgitte and Nissen, Anita Thrane (2000). **Evaluation of media for detection of Stachybotrys and Chaetomium species associated with water-damaged buildings.** *International Biodeterioration & Biodegradation* 46: 111-116.

Chem Codes: Chemical of Concern: DCNA; Rejection Code: SURVEY.
Stachybotrys chartarum and Chaetomium globosum are two important species colonising wet building materials containing cellulose. Both species produce toxic metabolites in pure cultures as well as on artificially inoculated building materials, so detection is important. However, the media recommended for detection of fungi in buildings, DG18 (dichloran 18% glycerol agar), MEA (malt extract agar) and Water agar, are ineffective. Furthermore, contact plates should be used instead of air sampling, because the spores of S. chartarum and C. globosum do not readily become air-borne. Therefore, 22 mycological media were tested and evaluated according to colony size, colony density and sporulation density of 14 test isolates. Amongst the 14 isolates (nine Stachybotrys, four Chaetomium and one Memnoniella) used in this study, eight came from Danish water-damaged buildings. The results showed that none of the 14 isolates sporulated on DG18 and that growth was very restricted. On MEA the fungi were inhibited in their growth and only one-third of the isolates sporulated. Only media containing some kind of plant-based ingredient resulted in good growth and sporulation. At present V8, with antibiotics in the form of contact plates, seems to be the best choice of medium out of the 22 tested for detection of S. chartarum and C. globosum species found in water-damaged buildings.

18. ANDREWS, S. (1992). **COMPARATIVE STUDY OF WL NUTRIENT AGAR WITH DRBC AND OGY FOR YEAST ENUMERATION IN FOODS.** *SAMSON, R. A., ET AL. (ED.). DEVELOPMENTS IN FOOD SCIENCE, VOL.31. MODERN METHODS IN FOOD MYCOLOGY; SECOND INTERNATIONAL WORKSHOP ON STANDARDIZATION OF METHODS FOR MYCOLOGICAL EXAMINATION OF FOODS, BAARN, NETHERLANDS, AUGUST 20-24, 1990. XVI+388P. ELSEVIER SCIENCE PUBLISHERS B.V.: AMSTERDAM, NETHERLANDS; NEW YORK, NEW YORK, USA. ISBN 0-444-88939-6.; 0* 61-65.

Chem Codes: Chemical of Concern: DCNA; Rejection Code: YEAST.
BIOSIS COPYRIGHT: BIOL ABS. RRM FUNGI FOOD CONTAMINATION BEER WINE FRUIT JUICE OXYTETRACYCLINE YEAST EXTRACT GLUCOSE AGAR DICHLORAN ROSE BENGAL CHLORAMPHENICOL AGAR Congresses/ Biology/ Biochemistry/ Bile Pigments/ Porphyrins/ Food Technology/ Food Technology/ Fruit/ Nuts/ Vegetables/ Fermentation/ Food Technology/ Food Analysis/ Food Technology/ Food-Processing Industry/

Food Technology/ Pharmacology/ Microbiological Techniques/ Microbiological Techniques/ Bacteria/ Environmental Monitoring/ Public Health/ Communicable Diseases/Microbiology/ Antibiotics/Administration & Dosage/ Antibiotics/Analysis/ Antibiotics/Chemical Synthesis/ Antibiotics/Metabolism/ Beverages/ Food Microbiology/ Food Contamination/ Industrial Microbiology/ Biophysics/ Plants/Physiology/ Plants/Metabolism/ Biophysics/ Plants/Physiology/ Fungi

19. ANDREWS, S., DE GRAAF H, and STAMATION, H. (1997). **Optimisation of methodology for enumeration of xerophilic yeasts from foods.** *INTERNATIONAL JOURNAL OF FOOD MICROBIOLOGY;* 35: 109-116.

    Chem Codes: Chemical of Concern: DCNA; Rejection Code: YEAST.
    BIOSIS COPYRIGHT: BIOL ABS. Xerophilic yeasts grow in intermediate moisture foods (aw, 0.65-0.85) such as sugar syrups, fruit concentrates, jams and brines. Non-osmophilic yeasts are enumerated by diluting in 0.1% peptone and then plated onto media such as malt extract or glucose yeast extract agar. In the presence of moulds the yeasts are enumerated in dichloran rose bengal chloramphenicol agar (DRBC). These procedures were demonstrated to be unsatisfactory for the enumeration of xerophilic yeasts in low a, foods. Investigations using pure cultures of xerophilic yeasts as well as naturally contaminated apple juice concentrates and glace cherries have shown that a reduced a, diluent, in particular 30% w/w glycerol in combination with tryptone 10% glucose yeast extract agar (TGY) optimises the recovery of the yeasts, especially sublethally injured cells. The inclusion of sodium chloride in either the diluents or the culture media was not necessary to optimise the recovery of D. hansenii growing in Biochemistry/ Food Technology/ Poisoning/ Animals, Laboratory/ Fermentation/ Industrial Microbiology/ Food Microbiology/ Ascomycota

20. Azechi, Y, Ishikawa, K, Mizuno, N, and Takahashi, K (2000). **Sustained release of diclofenac from polymer-containing suppository and the mechanism involved.** *Drug Development And Industrial Pharmacy* 26: 1177-1183.

    Chem Codes: Chemical of Concern: DCNA; Rejection Code: NO TOX DATA.
    Sustained release of diclofenac sodium (DcNa) from suppositories composed of triglycerides and polymer was investigated by dissolution testing through an artificial membrane. DcNa was slowly released from a suppository containing carboxyvinyl polymer (CVP), and the extent of the release decreased with the amount of CVP added. Little effect was noted with the addition of other water-soluble polymers, such as hydroxyethylcellulose (HEC), xanthan gum, and polyvinylalcohol (PVA). When sodium benzoate was used instead of DcNa, a similar result was obtained with the addition of CVP. The result of release rate analysis together with the viscosity and pH in these cases showed that the reduction of solubility and diffusion due to sodium exchange between DcNa and CVP played an important role in the sustained release from the suppository. Also, in comparison with the results when CVP was not used, the plasma concentration profile of diclofenac after the administration of CVP suppository displayed a twofold longer half-life time. [Journal Article; In English; United States]

21. Beuchat, L. R., Frandberg, E., Deak, T., Alzamora, S. M., Chen, J., Guerrero, S., Lopez-Malo, A., Ohlsson, I., Olsen, M., and Peinado, J. M. (2001). **Performance of mycological media in enumerating desiccated food spoilage yeasts: an interlaboratory study.** *International Journal of Food Microbiology* 70: 89-96.

Chem Codes: Chemical of Concern: DCNA; Rejection Code: YEAST.
Dichloran 18% glycerol agar (DG18) was originally formulated to enumerate nonfastidious xerophilic moulds in foods containing rapidly growing Eurotium species. Some laboratories are now using DG18 as a general purpose medium for enumerating yeasts and moulds, although its performance in recovering yeasts from dry foods has not been evaluated. An interlaboratory study compared DG18 with dichloran rose bengal chloramphenicol agar (DRBC), plate count agar supplemented with chloramphenicol (PCAC), tryptone glucose yeast extract chloramphenicol agar (TGYC), acidified potato dextrose agar (APDA), and orange serum agar (OSA) for their suitability to enumerate 14 species of lyophilized yeasts. The coefficient of variation for among-laboratories repeatability within yeast was 1.39% and reproducibility of counts among laboratories was 7.1%. The order of performance of media for recovering yeasts was TGYC>PCAC=OSA>APDA>DRBC>DG18. A second study was done to determine the combined effects of storage time and temperature on viability of yeasts and suitability of media for recovery. Higher viability was retained at -18[deg]C than at 5[deg]C or 25[deg]C for up to 42 weeks, although the difference in mean counts of yeasts stored at -18[deg]C and 25[deg]C was only 0.78 log10 cfu/ml of rehydrated suspension. TGYC was equal to PCAC and superior to the other four media in recovering yeasts stored at -18[deg]C, 5[deg]C, or 25[deg]C for up to 42 weeks. Results from both the interlaboratory study and the storage study support the use of TGYC for enumerating desiccated yeasts. DG18 is not recommended as a general purpose medium for recovering yeasts from a desiccated condition.

22. Beuchat, L R , Scouten, A J, and Jablonska, J (2002). **Influence of composition of diluent on populations of yeasts and moulds recovered from raw fruits.** *Letters In Applied Microbiology* 35: 399-402.

Chem Codes: Chemical of Concern: DCNA; Rejection Code: YEAST,NO TOX DATA.
AIMS: The aims of this study were (i) to determine the retention of viability of mycoflora removed from raw fruits, and how this affected diluents used to prepare samples for enumeration of propagules, and (ii) to evaluate the performance of recovery media for supporting colony development. METHODS AND RESULTS: Yeasts and moulds removed from seven types of raw fruit were held in seven diluents for 1 h before plating on dichloran rose bengal chloramphenicol (DRBC) agar and plate count agar supplemented with chloramphenicol (100 micro g ml-1) (PCAC). Significant reductions (P=0.05) in populations of yeasts, moulds, and yeasts plus moulds occurred within the 1 h holding period, regardless of diluent composition. Overall, retention of viability was not influenced by diluent composition, and neither DRBC agar nor PCAC were superior in supporting colony development. CONCLUSIONS: The composition of diluents used to prepare food samples for mycological analysis has little affect on the number of yeasts and moulds recovered from seven types of naturally contaminated raw fruit. Both DRBC agar and PCAC are suitable as enumeration media. SIGNIFICANCE AND IMPACT OF THE STUDY: Diluents and media most often recommended for enumerating yeasts and moulds in foods are appropriate for raw fruits. [Journal Article; In English; England]

23. BEUCHAT LR (1992). **Enumeration of fungi in grain flours and meals as influenced by settling time in diluent and by the recovery medium.** *J FOOD PROT;* 55: 899-901.

Chem Codes: Chemical of Concern: DCNA; Rejection Code: SURVEY.
BIOSIS COPYRIGHT: BIOL ABS. A study was undertaken to determine if the time elapsed, i.e., settling time, after homogenizing grain flours and meals in a primary diluent and withdrawing

samples for serially diluting and plating has an effect on populations of yeasts and molds detected. Sixty samples of flour and meal were analyzed. Samples were withdrawn from the top, middle, and bottom areas of graduated cylinders containing homogenates after settling times of 0, 2, 6, and 10 min and plated on dichloran 18% glycerol agar and dichloran rose bengal chloramphenical agar. As the settling time between homogenizing plain and self-rising wheat flours and rye flour increased, the population of fungi detected in the top area of primary homogenates decreased significantly ($P < 0.05$), whereas the population detected in the bottom area increased significantly Dichloran 18% glycerol agar was clearly superior to dichloran rose bengal chloramphenical aggar for recovering fungi from wheat and rye flours, regard Mathematics/ Statistics/ Biology/ Biochemistry/ Carbohydrates/ Cereals/ Food Technology/ Food Analysis/ Food Technology/ Food-Processing Industry/ Food Technology/ Food, Formulated/ Food, Fortified/ Food Technology/ Microbiological Techniques/ Mycoses/ Environmental Monitoring/ Public Health/ Disease Reservoirs/ Communicable Diseases/Microbiology/ Beverages/ Food Microbiology/ Food Contamination/ Industrial Microbiology/ Biophysics/ Plants/Physiology/ Fungi

24. BOSCA, F., MIRANDA MA, SERRANO, G., and VARGAS, F. (1998). **Photochemistry and photobiological properties of dicloran, a postharvest fungicide with photosensitizing side effects.** *PHOTOCHEMISTRY AND PHOTOBIOLOGY;* 67: 532-537.

    Chem Codes: Chemical of Concern: DCNA; Rejection Code: FATE .
    BIOSIS COPYRIGHT: BIOL ABS. Photochemical and laser flash photolysis studies on dicloran have shown that this fungicide undergoes photoreactions such as photoreduction of the nitro group and homolytic rupture of the C-NH2 bond. Dramatic changes in the dicloran photoreactivity by the influence of the solvents have been observed. More efficient photodegradation of this fungicide was observed in diethyl ether and chloroform than in methanol or acetonitrile. Photoreduction of the nitro group from the dicloran triplet state seems to he the most important photodegradation pathway in solvents of low polarity. Hydrogen abstraction by the triplet state or the intermediate radicals appears to be in the origin of linoleic acid peroxidations photosensitized by dicloran. The photohemolysis assay has been used, as an in vitro phototoxicity test, to demonstrate the involvement of radical-mediated cellular membrane damage in dicloran photosensitization. Radiation/ Biochemistry/ Poisoning/ Animals, Laboratory

25. Bovill, R, Bew, J, and Robinson, S (2001). **Comparison of selective media for the recovery and enumeration of probiotic yeasts from animal feed.** *International Journal Of Food Microbiology* 67: 55-61.

    Chem Codes: Chemical of Concern: DCNA; Rejection Code: YEAST.
    Six selective media (acidified malt extract agar, CHROMagar Candida, dichloran rose bengal chloramphenicol, molybdate, oxytetracycline glucose yeast extract and Petrifilm Yeast and Mould agar) were examined for the recovery of three yeasts commonly used in animal feeds as probiotic additives (Candida pintolopesii, C. saitoana and Saccharomyces cerevisiae). The highest recovery was obtained on oxytetracycline glucose yeast extract agar, although this was susceptible to overgrowth by moulds. CHROMagar Candida also gave good recovery and species were easily discriminated by the differential colour formation of colonies. [Journal Article; In English; Netherlands]

26. BRAEDLIN, N. (1996). **Enumeration of xerophilic yeasts in the presence of xerophilic moulds: A collaborative study.** *INTERNATIONAL JOURNAL OF FOOD MICROBIOLOGY;* 29: 185-192.

Chem Codes: Chemical of Concern: DCNA; Rejection Code: YEAST.
BIOSIS COPYRIGHT: BIOL ABS. A collaborative study was undertaken to compare the performance of Dichloran 18% Glycerol agar (DG18) with three other media widely used in food mycology, for the enumeration of xerophilic yeasts in the presence of xerophilic moulds. Oxytetracycline Glucose Yeast extract agar, (OGY), Dichloran Rose Bengal Chloramphenicol agar (DRBC) and Malt extract Yeast extract 50% Glucose agar (MY50G) were evaluated. Three reference samples (A, B, C) were prepared using skimmed milk powder inoculated with mixed lyophilized cultures of selected xerophilic yeasts and moulds, at levels around 104 to 105 CFU/g. Yeast species used were Candida glucosophila, C. versatilis, Zygosaccharomyces bailii and Z. rouxii, together with Eurotium spp. and some other moulds. Collaborators were asked to examine each sample twice, by dilution plating on the four media. Colonies were counted after 3, 5 and 7 days incubation at 25êC. Fourteen participants from seven laboratories in six countries collabora Biochemistry/ Carbohydrates/ Dairy Products/ Food Technology/ Food Analysis/ Food Technology/ Food-Processing Industry/ Food Technology/ Food Additives/Poisoning/ Food Additives/Toxicity/ Food Contamination/ Food Poisoning/ Food Preservatives/Poisoning/ Food Preservatives/Toxicity/ Microbiological Techniques/ Beverages/ Food Microbiology/ Food Contamination/ Industrial Microbiology/ Ascomycota/ Mitosporic Fungi

27. Bragulat, M R, Martinez, E, Castella, G, and Cabanes, F J (2004). **Selective efficacy of culture media recommended for isolation and enumeration of Fusarium spp.** *Journal Of Food Protection* 67: 207-211.

Chem Codes: Chemical of Concern: DCNA; Rejection Code: HUMAN HEALTH.
Selective culture media, such as Nash and Snyder medium (NS), dichloran-chloramphenicol peptone agar (DCPA), modified Czapek-Dox agar (MCz), Czapek Dox iprodione dichloran agar (CZID), potato dextrose iprodione dichloran agar (PDID), or malachite green agar (MGA 2.5), have been developed for isolating and enumerating Fusarium spp. from natural samples. However, some of these culture media are not very selective because they allow the growth of many other fungal species. In this study, a comparison of the selective efficacy of these culture media, using different strains of Fusarium spp. (F. anthophilum, F. culmorum, F. dlamini, F. graminearum, F. napiforme, F. nygamai, F. oxysporum, F. proliferatum, F. semitectum, F. solani, F. subglutinans, and F. verticillioides) and natural samples has been carried out. Among the six recommended selective culture media assayed, no statistical differences were detected in colony counts of the Fusarium spp. strains tested, although the colony diameters in MGA 2.5 were significantly lower than in NS, MCz, DCPA, CZID, and PDID media. With natural samples, MGA 2.5 performs as a potent selective medium for Fusarium spp., whereas the other recommended selective media allow the growth of many other different fungal species including Zygomycetes and yeasts. [Journal Article; In English; United States]

28. BROWN, T. (1992). **METHODS TO EVALUATE ADVERSE CONSEQUENCES OF GENETIC CHANGES CAUSED BY PESTICIDES.** *TARDIFF, R. G. (ED.). SCOPE (SCIENTIFIC COMMITTEE ON PROBLEMS OF THE ENVIRONMENT), NO. 49. METHODS TO ASSESS ADVERSE EFFECTS OF PESTICIDES ON NON-TARGET ORGANISMS; WORKSHOP, CESKE BUDEJOVICE, CZECHOSLOVAKIA, OCTOBER 3-7, 1988. XXVII+270P.*

JOHN WILEY AND SONS LTD.: CHICHESTER, ENGLAND, UK; NEW YORK, NEW YORK, USA. ILLUS. ISBN 0-471-93156-X 221-242.

Chem Codes: Chemical of Concern: DCNA,24DXY; Rejection Code: METHODS.
AB - BIOSIS COPYRIGHT: BIOL ABS. RRM INSECT RESISTANCE INSECTICIDE SUSCEPTIBILITY MUTAGEN EVOLUTIONCongresses/ Biology/ Evolution/ Animals/Genetics/ Biochemistry/ Poisoning/ Animals, Laboratory/ Herbicides/ Pest Control/ Pesticides/ Animal/ Disease/ Insects/Parasitology/ Insects

29. Carroll Products Inc. (2000). **Letter to U.S.EPA.** *EPA/OTS Doc.#40-8376124*.

Chem Codes: Chemical of Concern: DCNA; Rejection Code: NO TOX DATA.

30. CHAMEL, A. (1986). **FOLIAR ABSORPTION OF HERBICIDES STUDY OF THE CUTICULAR PENETRATION USING ISOLATED CUTICLES.** *PHYSIOL VEG;* 24: 491-508.

Chem Codes: Chemical of Concern: DCNA; Rejection Code: IN VITRO.
BIOSIS COPYRIGHT: BIOL ABS. RRM REVIEW Biochemistry/ Metabolism/ Biophysics/ Plants/Metabolism/ Biophysics/ Plants/Physiology/ Plants/*Metabolism/ Herbicides/ Pest Control/ Pesticides

31. CHANDRANI AN and KAUL JL (1997). **EFFECT OF HYDROCOOLING WITH OR WITHOUT FUNGICIDES ON WHISKER'S ROT OF JULY ELBERTA PEACHES.** *JOURNAL OF MYCOLOGY AND PLANT PATHOLOGY;* 27: 76-78.

Chem Codes: Chemical of Concern: DCNA; Rejection Code: HUMAN HEALTH.
BIOSIS COPYRIGHT: BIOL ABS. RRM NOTE RESEARCH ARTICLE PEACH CULTIVAR-JULY ELBERTA HOST FRUIT CROP HYDROCOOLING BOTRAN FUNGICIDE BAVISTIN WHISKER'S ROT POSTHARVEST ROT FOODS FUNGAL DISEASE Cold/ Food Technology/ Fruit/ Nuts/ Vegetables/ Food-Processing Industry/ Food Technology/ Thermography/Methods/ Beverages/ Food Microbiology/ Food Contamination/ Industrial Microbiology/ Plant Diseases/ Preventive Medicine/ Herbicides/ Pest Control/ Pesticides/ Plants, Medicinal

32. de Vos, R. H., Bosma, M. P. M. M., and Brouwer, A. E. (1974). **Rapid analysis of dichloran, lindane, PCNB and TCNB residues in lettuce by automated gas-liquid chromatography.** *Journal of Chromatography A* 93: 91-98.

Chem Codes: Chemical of Concern: PNB,DCNA; Rejection Code: CHEM METHOD.
Residues of the pesticides dichloran (2,6-dichloro-4-nitroaniline), lindane, PCNB (quintozene) and TCNB (tecnazene) are extracted from lettuce samples with ethyl acetate. An internal standard is added. The extracts obtained are diluted with n-hexane and analyzed by automated gas-liquid chromatography, with electron capture detection. Chromatographic data are processed on a programmable desk-top calculator. A program has been developed for this purpose that can also be applied to other multi-component residue analyses. The system is suitable for screening large series of samples. The accuracy of the analysis is at least as good as can be obtained with manual analysis. http://www.sciencedirect.com/science/article/B6TG8-44B86H2-VS/2/11b12039ec2840d079e5d1acb2854d90

33. DEAK, T. and BEUCHAT LR (1993). **Comparison of conductimetric and traditional plating techniques for detecting yeasts in fruit juices.** *JOURNAL OF APPLIED BACTERIOLOGY;* 75: 546-550.

Chem Codes: Chemical of Concern: DCNA; Rejection Code: CHEM METHODS.
BIOSIS COPYRIGHT: BIOL ABS. Frozen fruit juice concentrates containing an average microbial population of log10 1.54 cfu ml-1 were examined by traditional plating techniques and direct and indirect conductimetry. The initial populations in diluted (1:4) concentrates increased to an average of log10 3.82 cfu ml-1 during incubation at 25ê C for 24 h. Incubation before plating and subjecting to conductimetric tests also facilitated the resuscitation of cells that may have been freeze-injured. Yeasts were recovered in equal numbers on acidified (pH 3.5) potato dextrose agar and dichloran rose bengal chloramphenicol agar (pH 5.6). Yeasts and bacteria were recovered on orange serum agar. Detection times determined by indirect conductimetry correlated fairly well (r = -0.73) with populations (cfu ml-1) detected on traditional plating media. Populations in diluted concentrates which were not incubated before examination were detected conductimetrically in an average of 48.9 h, whereas detection times for Biology/Methods/ Mathematics/ Statistics/ Biology/ Biochemistry/ Carbohydrates/ Biophysics/ Biophysics/Methods/ Temperature/ Food Technology/ Fruit/ Nuts/ Vegetables/ Food Analysis/ Food Technology/ Food-Processing Industry/ Food Technology/ Microbiological Techniques/ Microbiological Techniques/ Mycoses/ Environmental Monitoring/ Public Health/ Communicable Diseases/Microbiology/ Beverages/ Food Microbiology/ Food Contamination/ Industrial Microbiology/ Biophysics/ Plants/Physiology/ Plants/Metabolism/ Biophysics/ Plants/Physiology/ Fungi

34. DEAK, T., BEUCHAT LR, GUERZONI ME, LILLIE, A., PETER, G., ROHM, H., SCHNURER, F., TABAJDI PV, and WESTPHAL, S. (1998). **A collaborative study of media for the enumeration of yeasts in foods.** *INTERNATIONAL JOURNAL OF FOOD MICROBIOLOGY;* 43: 91-95.

Chem Codes: Chemical of Concern: DCNA; Rejection Code: YEAST.
BIOSIS COPYRIGHT: BIOL ABS. A collaborative study was made to evaluate the effectivity of a general purpose medium, tryptone glucose yeast extract (TGY) agar on the detection and enumeration of yeasts from food. Nine laboratories participated in the study and compared five media (four kinds of TGY with different concentrations of glucose, one of them without tryptone, and, for comparison, dichloran rose bengal chloramphenicol (DRBC) agar). Six food samples were investigated by each laboratory and 23 additional food samples were investigated individually by different laboratories. No difference was found in the performance of media with either the samples common to all laboratories or the various samples tested in different ones. A medium consisting of tryptone, glucose and yeast extract, at any concentration of glucose tested, appeared reliable for the detection and enumeration of yeasts from foods, and its performance did not differ from that of DRBC. Omission of tryptone as recommended by ISO pr Biochemistry/ Food Technology/ Fermentation/ Industrial Microbiology/ Food Microbiology/ Fungi

35. Deak, T, Chen, J, Golden, D A, Tapia, Tornai-Lehoczki, J, Viljoen, B C, Wyder, M T, and Beuchat, L R (2001). **Comparison of dichloran 18% glycerol (DG18) agar with general purpose mycological media for enumerating food spoilage yeasts.** *International Journal Of Food Microbiology* 67: 49-53.

Chem Codes: Chemical of Concern: DCNA; Rejection Code: YEAST.
Dichloran 18% glycerol (DG18) agar was originally developed to enumerate xerophilic foodborne

moulds. However, some laboratories are using DG18 agar as a general medium to enumerate foodborne moulds and yeasts. A collaborative study, with the participation of seven laboratories, was undertaken to compare DG18 agar with dichloran rose bengal chloramphenicol (DRBC) agar, tryptone glucose yeast extract chloramphenicol (TGYC) agar, and plate count agar supplemented with chloramphenicol (PCAC) for enumerating 14 species of common food spoilage yeasts. Comparison of the mean values of populations of all yeasts recovered on each medium revealed no significant differences among DRBC agar, PCAC, and TGYC agar, while each of these media supported the development of significantly ($P < or = 0.05$) higher numbers of colonies than DG18 agar. However, differences were only 0.08 to 0.10 log10 cfu/ml, making the practical significance questionable. The overall coefficient of variation (CV) for within laboratory repeatability was 1.71%, while the CV for reproducibility of counts obtained among laboratories was 6.96%. Compared to DRBC agar, TGYC agar, and PCAC, yeast colonies were smaller on DG18 agar. Growth of Brettanomyces anomalus, Cryptococcus albidus, and Rhodotorula mucilaginosa was particularly retarded or inhibited on DG18 agar. Based on the performance of media in supporting colony development and ease of counting colonies, the use of DG18 agar as a general enumeration medium for foodborne yeasts cannot be recommended. [Journal Article; In English; Netherlands]

36. DI MUCCIO A, DOMMARCO, R., ATTARD BARBINI D, SANTILIO, A., GIROLIMETTI, S., AUSILI, A., VENTRIGLIA, M., GENERALI, T., and VERGORI, L. (1993). **Application of solid-phase partition cartridges in the determination of fungicide residues in vegetable samples.** *J CHROMATOGR;* 643: 363-368.

    Chem Codes: Chemical of Concern: DCNA; Rejection Code: CHEM METHODS.
    BIOSIS COPYRIGHT: BIOL ABS. Disposable, ready-to-use cartridges filled with a macroporous diatomaceous material are used to extract in a single step fungicide residues with dichloromethane from aqueous acetone extracts of vegetables. This procedure takes the place of some functions (such as separating funnel partition, drying over anhydrous sodium sulphate and clean-up) usually performed by separate steps in classical schemes. Fourteen fungicides (dichloran, vinclozolin, chlorthalonil, triadimefon, dichlofluanide, procymidone, hexaconazole, captan, folpet, ditalimfos, iprodione, captafol, pyrazophos and fenarimol) were determined using the described procedure with recoveries between 83 and 107% at spiking levels ranging for the different compounds from 0.04 to 0.40 mg/kg. Crops subjected to the described procedure included lettuce, strawberry, apple, yellow pepper and peach, and gave extracts containing a mass of co-extractives between 5 and 30 mg. compared with classical schemes, the described pr Biochemistry/Methods/ Biochemistry/ Food Technology/ Food Technology/ Fruit/ Nuts/ Vegetables/ Food Analysis/ Food Technology/ Biophysics/ Plants/Physiology/ Plants/*Metabolism/ Fruit/ Vegetables/ Herbicides/ Pest Control/ Pesticides/ Plants/ Plants, Medicinal/ Plants

37. DULUBOVA, I. , KIYATKIN, N., CHEKHOVSKAYA, I., and GRISHIN, E. (1992). **CLONING AND SEQUENCING CDNA ENCODING NEW LOW MOLECULAR WEIGHT PROTEIN CO-PURIFIED WITH ALPHA ATROTOXIN.** *TENTH WORLD CONGRESS ON ANIMAL, PLANT AND MICROBIAL TOXINS, SINGAPORE, SINGAPORE, NOVEMBER* 3-8, 1991. TOXICON; 30: 504.

    Chem Codes: Chemical of Concern: DCNA; Rejection Code: ABSTRACT.
    BIOSIS COPYRIGHT: BIOL ABS. RRM ABSTRACT BLACK WIDOW SPIDER VENOM COMPLEMENTARY DNA Congresses/ Biology/ Animals/Genetics/ Nucleic Acids/ Purines/ Pyrimidines/ Amino Acids/ Peptides/ Proteins/ Biophysics/ Macromolecular Systems/ Molecular

Biology/ Dental Equipment/ Dental Instruments/ Dentistry/Methods/ Poisoning/ Animals, Laboratory/ Anatomy, Comparative/ Animal/ Arthropods/Physiology/ Physiology, Comparative/ Pathology/ Arachnida

38. Duso, C. and Pavan, F. (1986). **Control of Grape Moths (Lobesia botrana Den. and Schiff.; Eupoecilia ambiguella Hb.). 2. Consideration on the Side Effects of Various Insecticides (Il Controllo delle Tignole della vite (Lobesia botrana Den. e Schiff.; Eupoecilia ambiguella Hb.). 2. Considerazioni sugli Effetti Collaterali di Insetticidi Diversi).** *Riv.Vitic.Enol.* 39: 304-312 (ITA) (ENG ABS).

    Chem Codes: EcoReference No.: 73431
    User Define 2: WASHT,CALFT
    Chemical of Concern: CBL,ACP,CPY,DCNA; Rejection Code: NON-ENGLISH.

39. EPA/OTS (1984). **Comments on Section 4(A) Consideration of Anilines.** *EPA/OTS Doc.#40+8476188*.

    Chem Codes: Chemical of Concern: DCNA; Rejection Code: NO TOX DATA.

40. EPA/OTS (1991). **Letter from Eastman Kodak Company to U.S.EPA Submitting Enclosed Follow-Up Information Concerning 2,6-Dichloro-4-Nitroaniline with Attachments.** *EPA/OTS Doc.#89-910000159* 11 p.

    Chem Codes: EcoReference No.: 75708
    Chemical of Concern: DCNA; Rejection Code: REFS CHECKED/REVIEW.

41. EPA/OTS (1991). **Letter from Eastman Kodak Company to U.S.EPA Submitting Initial Submission Concerning 2,6-Dichloro-4-Nitroaniline.** *EPA/OTS Doc.#88-910000131* 2 p.

    Chem Codes: Chemical of Concern: DCNA; Rejection Code: NO SPECIES/NO TOX DATA.

42. EPA/OTS (2000). **U.S.EPA Submission Summary Report: 2,6-Dichloro-4-Nitroaniline with Cover Letter Dated 050191.** *EPA/OTS Doc.#8EHQ-0491-1215* 5 p.

    Chem Codes: Chemical of Concern: DCNA; Rejection Code: NO SPECIES/NO TOX DATA.

43. GINTING, C., ZEHR EI, and MILLER RW (1992). **SENSITIVITY OF GILBERTELLA-PERSICARIA TO FUNGICIDES.** *ANNUAL MEETING OF THE AMERICAN PHYTOPATHOLOGICAL SOCIETY, PORTLAND, OREGON, USA, AUGUST* 8-12, 1992. PHYTOPATHOLOGY; 82: 1146.

    Chem Codes: Chemical of Concern: DCNA; Rejection Code: ASBTRACT.
    BIOSIS COPYRIGHT: BIOL ABS. RRM ABSTRACT FUNGUS FOSETYL-AL TRIFORINE IPRODIONE DICHLORAN CAPTAN VINCLOZOLIN GROWTH INHIBITION Congresses/ Biology/ Biochemistry/ Biophysics/ Plants/Physiology/ Plants/Metabolism/ Plants/Growth & Development/ Fungi/ Plant Diseases/ Plant Diseases/ Preventive Medicine/ Herbicides/ Pest Control/ Pesticides/ Phycomycetes

44. Gonzalez, F. J. Egea, Granero, A. Mena, Glass, C. R., Frenich, A. Garrido, and Vidal, J. L. Martinez (2004). **Screening method for pesticides in air by gas chromatography/tandem mass spectrometry.** *Rapid Communications in Mass Spectrometry* 18: 537-543.

Chem Codes: Chemical of Concern: TCZ,DCNA; Rejection Code: CHEM METHODS.
A multiresidue method for detg. more than 70 pesticides in air has been validated using a single injection with gas chromatog./tandem mass spectrometry (GC/MS/MS). The method validation considered both stages of sampling and anal. The sampling method, based on active sampling using sorption in sorbent cartridges, was validated by generating std. atmospheres. Performance parameters of the method were evaluated, with a redn. in the limits of quantification by injecting a higher vol. of sample ext., and increase of selectivity by the use of MS/MS detection mode. The method was based on solid-phase extn., which permits a degree of automation. The best adsorbents were Chromosorb 106 and Tenax TA. The retention capacity of these sampling sorbents allows up to 1440 L of air to be sampled without any breakthrough for most of the compds. Data were generated for assessing the potential exposure of bystanders. The application of the method to the anal. of the air in urban locations near agricultural areas showed that pesticides were present in most of the samples. [on SciFinder (R)] pesticide/ residue/ air/ gas/ chromatog/ mass/ spectrometry Copyright: Copyright 2004 ACS on SciFinder (R))
Database: CAPLUS
Accession Number: AN 2004:184532
Chemical Abstracts Number: CAN 140:194845
Section Code: 5-1
Section Title: Agrochemical Bioregulators
CA Section Cross-References: 59, 80
Document Type: Journal
Language: written in English.
Index Terms: Mass spectrometry (gas chromatog. combined with; screening pesticides in air by gas chromatog./tandem mass spectrometry); Gas chromatography (mass spectrometry combined with; screening pesticides in air by gas chromatog./tandem mass spectrometry); Air analysis; Pesticides (screening pesticides in air by gas chromatog./tandem mass spectrometry)
CAS Registry Numbers: 55-38-9 (Fenthion); 56-38-2 (Parathion); 58-89-9 (Lindane); 60-51-5 (Dimethoate); 62-73-7 (Dichlorvos); 99-30-9 (Dichloran); 115-32-2 (Dicofol); 116-29-0 (Tetradifon); 121-75-5 (Malathion); 122-14-5 (Fenitrothion); 298-00-0 (Parathion-methyl); 563-12-2 (Ethion); 786-19-6 (Carbofenothion); 959-98-8 (Endosulfan I); 1031-07-8 (Endosulfan sulfate); 1085-98-9 (Dichlofluanid); 1897-45-6 (Chlorothalonil); 2310-17-0; 2312-35-8 (Propargite); 2921-88-2 (Chlorpyriphos); 5598-13-0; 7287-19-6 (Prometryn); 10265-92-6 (Methamidophos); 13194-48-4 (Ethoprophos); 13457-18-6 (Pyrazophos); 13593-03-8 (Quinalphos); 18181-80-1 (Bromopropylate); 22224-92-6 (Fenamiphos); 22248-79-9 (Tetrachlorvinphos); 23103-98-2 (Pirimicarb); 23560-59-0 (Heptenophos); 29232-93-7 (Pirimiphos-methyl); 30560-19-1 (Acephate); 32809-16-8 (Procymidone); 33089-61-1 (Amitraz); 33213-65-9 (Endosulfan II); 36734-19-7 (Iprodione); 38260-54-7 (Etrimfos); 39515-41-8 (Fenpropathrin); 40487-42-1 (Pendimethalin); 41483-43-6 (Bupirimate); 43121-43-3 (Triadimefon); 50471-44-8 (Vinclozolin); 51630-58-1 (Fenvalerate); 52315-07-8 (Cypermethrin); 52645-53-1 (Permethrin); 52918-63-5 (Deltamethrin); 53112-28-0 (Pyrimethanil); 57837-19-1 (Metalaxyl); 60168-88-9 (Fenarimol); 60207-90-1 (Propiconazole); 63284-71-9 (Nuarimol); 66246-88-6 (Penconazole); 68085-85-8 (Cyhalothrin); 68359-37-5 (Cyfluthrin); 69327-76-0 (Buprofezin); 70124-77-5 (Flucythrinate); 71626-11-4 (Benalaxyl); 77732-09-3 (Oxadixyl); 79983-71-4 (Hexaconazole); 82657-04-3 (Bifenthrin); 84332-86-5 (Chlozolinate); 88283-41-4

(Pyrifenox); 96489-71-3 (Pyridaben); 101007-06-1 (Acrinathrin); 107534-96-3 (Tebuconazole); 112281-77-3 (Tetraconazole); 119446-68-3 (Difenoconazole); 131341-86-1 (Fludioxonil); 131860-33-8 (Azoxystrobin) Role: ANT (Analyte), ANST (Analytical study) (screening pesticides in air by gas chromatog./tandem mass spectrometry)

45. Gui, L. and Bouwer, E. J. (1996). **TRANSFORMATION OF NITROAROMATIC PESTICIDES UNDER CONDITIONS SRC.** *211th American Chemical Society National Meeting, New Orleans, Usa, March 24-28, 1996. Abstracts of Papers American Chemical* Agro 17.

Chem Codes: Chemical of Concern: PNB,DCNA; Rejection Code: BACTERIA.
ABSTRACT: BIOSIS COPYRIGHT: BIOL ABS. RRM MEETING ABSTRACT BACTERIA BIODEGRADATION HYDROGEN SULFIDE TRIFURALIN ABIOTIC TRANSFORMATION NITROAROMATIC PESTICIDE PESTICIDES DICLORAN DINOSEB PENTACHLORONITROBENZENE TRACE METALS ELECTRON PRODUCTS-AGROCHEMICALS METABOLISM PRIMARY GASES ORGANICS
KEYWORDS: General Biology-Symposia
KEYWORDS: Biophysics-Molecular Properties and Macromolecules
KEYWORDS: Metabolism-General Metabolism
KEYWORDS: Toxicology-General
KEYWORDS: Physiology and Biochemistry of Bacteria
KEYWORDS: Public Health: Environmental Health-Air
KEYWORDS: Soil Microbiology
KEYWORDS: Pest Control
KEYWORDS: Bacteria-General Unspecified (1992-)

46. GUI, L. and BOUWER EJ (1996). **TRANSFORMATION OF NITROAROMATIC PESTICIDES UNDER SULFATE-REDUCING CONDITIONS SRC.** *211TH AMERICAN CHEMICAL SOCIETY NATIONAL MEETING, NEW ORLEANS, LOUISIANA, USA, MARCH* 24-28, 1996. ABSTRACTS OF PAPERS AMERICAN CHEMICAL SOCIETY; 211: AGRO 17.

Chem Codes: Chemical of Concern: DCNA; Rejection Code: BACTERIA.
BIOSIS COPYRIGHT: BIOL ABS. RRM MEETING ABSTRACT BACTERIA PESTICIDE BIODEGRADATION HYDROGEN SULFIDE TRIFURALIN ABIOTIC TRANSFORMATION BIOTIC TRANSFORMATION NITROAROMATIC PESTICIDE PESTICIDES DICLORAN FUNGICIDE DINOSEB PENTACHLORONITROBENZENE TRACE METALS ELECTRON MEDIATORS CHEMICAL PRODUCTS-AGROCHEMICALS METABOLISM PRIMARY GASES ORGANICS METALS Congresses/ Biology/ Biophysics/ Macromolecular Systems/ Molecular Biology/ Metabolism/ Poisoning/ Animals, Laboratory/ Bacteria/Physiology/ Bacteria/Metabolism/ Air Pollution/ Soil Pollutants/ Water Pollution/ Soil Microbiology/ Herbicides/ Pest Control/ Pesticides/ Bacteria

47. Hamsa, T. Ap and Ayres, J. C. (**A Differential Medium For The Isolation Of Aspergillus Flavus From Cottonseed.**

Chem Codes: Chemical of Concern: Cu,DCNA; Rejection Code: NO TOX DATA.
heep copyright: biol abs. an amended aspergillus differential (bsad) agar prepared by a modification of bothast and fennell's formula (mycologia (1974) 66: 3651) using botran (2,6-

dichloro-4-nitroaniline) facilitated the isolation and enumeration of a. flavus from cottonseeds based on the characteristic orange yellow under-colony pigmentation after the cultures were incubated for 5 days at 28~ c. pigment production by a. flavus cultures on bsad agar was detected by the 3rd day of incubation. an incubation period of 5 days at 28~ c is recommended for routine screening of cottonseed samples for contamination by a. flavus. at the concentrations used, botran (10 mg/l) and streptomycin sulfate (50 mg/l) did not interfere with the pigment production by a. flavus but decreased the numbers and colony size of other fungi and bacteria. decrease in ph of the medium from 6.5 to 5.5, 4.5 and 3.5 resulted in decrease of the intensity of pigmentation while the sporulation of a. flavus colonies increased. when ferric citrate was omitted from adm (aspergillus differential medium) containing botran or was replaced with manganous sulfate, zinc sulfate or copper sulfate, orange yellow pigmentation was not produced. kojic acid produced by strains of aspergillus reacts with ferric citrate in the medium to produce orange-yellow pigmentation. when esculin hydrate (6,7-dihydrocoumarin-6-glucoside) was added to bsad agar at a 1% level, deep reddish brown pigment was produced by all isolates of a. flavus and a. parasiticus tested. similarities between pigment production and nitrification by the a. flavus group of fungi was observed. few isolates of a. oryzae produced pigmentation similar to that produced by a. flavus. (screening of crops for toxic and carcinogenic mycotoxins, particularly aflatoxins, is discussed.)

48. Hashimoto, Kiichiro, Mori, Naohide, Tamesa, Takao, Okada, Toshimasa, Kawauchi, Shigeto, Oga, Atsunori, Furuya, Tomoko, Tangoku, Akira, Oka, Masaaki, and Sasaki et, al. (2004). **Analysis of DNA copy number aberrations in hepatitis C virus-associated hepatocellular carcinomas by conventional CGH and array CGH.** *Modern Pathology: An Official Journal Of The United States And Canadian Academy Of Pathology, Inc* 17: 617-622.

    Chem Codes: Chemical of Concern: DCNA; Rejection Code: HUMAN HEALTH.
    To clarify the genetic aberrations involved in the development and progression of hepatitis C virus-associated hepatocellular carcinoma (HCV-HCC), we investigated DNA copy number aberrations (DCNAs) in 19 surgically resected HCCs by conventional CGH and array CGH. Conventional CGH revealed that increases of DNA copy number were frequent at 1q (79% of the cases), 8q (37%), 6p (32%), and 10p (32%) and that decreases were frequent at 17p (79%), 16q (58%), 4q (53%), 13q (42%), 10q (37%), 1p (32%), and 8p (32%). In general, genes that showed DCNAs by array CGH were usually located in chromosomal regions with DCNAs detected by conventional CGH analysis. Increases in copy numbers of the LAMC2, TGFB2, and AKT3 genes (located on 1q) and decreases in copy numbers of FGR/SRC2 and CYLD (located on 1p and 16q, respectively) were observed in more than 30% of tumors, including small, well-differentiated carcinomas. These findings suggest that these genes are associated with the development of HCV-HCC. Increases of MOS, MYC, EXT1, and PTK2 (located on 8q) were detected exclusively in moderately and poorly differentiated tumors, suggesting that these alterations contribute to tumor progression. In conclusion, chromosomal and array CGH technologies allow identification of genes involved in the development and progression of HCV-HCC.Modern Pathology (2004) 17, 617-622, advance online publication, 30 April 2004; doi:10.1038/modpathol.3800107 [Journal Article; In English; United States]

49. HERNANDEZ, P. and BEUCHAT LR (1995). **Evaluation of diluents and media for enumerating Zygosaccharomyces rouxii in blueberry syrup.** *INTERNATIONAL JOURNAL OF FOOD MICROBIOLOGY;* 25: 11-18.

Chem Codes: Chemical of Concern: DCNA; Rejection Code: NO TOX DATA.
BIOSIS COPYRIGHT: BIOL ABS. Combinations of diluents and enumeration media were evaluated for their efficacy in enumerating Zygosaccharomyces rouxii in blueberry syrup (alphaw 0.818, 0.870 and 0.921). Diluents consisted of deionized water containing 0.1% peptone, 20%, 30%, 40% or 50% glucose, 50% glucose plus 0.05% Tween 80, and 12%, 18%, 26% or 35% glycerol, all calculated on a w/w basis. Enumeration media were dichloran rose bengal chloramphenicol (DRBC) agar, tryptone glucose yeast extract (TGY) agar, dichloran 18% glycerol (DG18) agar, plate count agar containing 52% sucrose (PCA52S) and malt extract yeast extract 50% glucose (MY50G) agar. Two test strains of Z. rouxii grown in blueberry syrup for 7 or 14 days responded similarly to diluent/enumeration medium combinations. The use of 0.1% peptone diluent or DRBC agar in combination with other enumeration media or diluents was inferior for recovering Z. rouxii. As the alphaw of the blueberry syrup decreased, the sensitivity of Z. rouxii to dilue Plants/Cytology/ Biochemistry/ Comparative Study/ Body Water/ Biochemistry/Methods/ Biochemistry/ Amino Acids/ Peptides/ Proteins/ Carbohydrates/ Nutrition/ Nutritional Status/ Food Technology/ Food Technology/ Fruit/ Nuts/ Vegetables/ Carbohydrates/ Food Technology/ Food Analysis/ Food Technology/ Food-Processing Industry/ Food Technology/ Microbiological Techniques/ Microbiological Techniques/ Mycoses/ Environmental Monitoring/ Public Health/ Communicable Diseases/Microbiology/ Beverages/ Food Microbiology/ Food Contamination/ Industrial Microbiology/ Biophysics/ Plants/Metabolism/ Plants/Physiology/ Water/Metabolism/ Biophysics/ Nutrition/ Plants/Physiology/ Plants/Metabolism/ Biophysics/ Plants/Physiology/ Plants/Metabolism/ Plants/Growth & Development/ Biophysics/ Plants/Physiology/ Plants/Metabolism/ Ascomycota

50. Hunter, J. E., Buddenhagen, I. W., and Kojima, E. S. (1969). **Efficacy of Fungicides, Hot Water and gamma-Irradiation for Control of Post-Harvest Fruit Rot of Papaya.** *Plant Dis.Rep.* 53: 279-284.

Chem Codes: User Define 2: CORE,NA
Chemical of Concern: DCNA; Rejection Code: NO TOX DATA.

51. Ismail, S. A. S., Deak, T., Abd El-Rahman, H. A., Yassien, M. A. M., and Beuchat, L. R. (2000). **Presence and changes in populations of yeasts on raw and processed poultry products stored at refrigeration temperature.** *International Journal of Food Microbiology* 62: 113-121.

Chem Codes: Chemical of Concern: DCNA; Rejection Code: HUMAN HEALTH.
A study was undertaken to determine populations and profiles of yeast species on fresh and processed poultry products upon purchase from retail supermarkets and after storage at 5[deg]C until shelf life expiration, and to assess the potential role of these yeasts in product spoilage. Fifty samples representing 15 commercial raw, marinated, smoked, or roasted chicken and turkey products were analyzed. Yeast populations were determined by plating on dichloran rose bengal chloramphenicol (DRBC) agar and tryptone glucose yeast extract (TGY) agar. Proteolytic activity was determined using caseinate and gelatin agars and lipolytic activity was determined on plate count agar supplemented with tributyrin. Populations of aerobic microorganisms were also determined. Initial populations of yeasts (log10 cfu/g) ranged from less than 1 (detection limit) to 2.89, and increased by the expiration date to 0.37-5.06, indicating the presence of psychrotrophic species. Highest initial populations were detected in raw chicken breast, wings, and ground chicken, as well as in turkey necks and legs, whereas roasted chicken and turkey products contained less than 1 log10 cfu/g. During storage, yeast populations increased significantly

(PYarrowia lipolytica and Candida zeylanoides were predominant, making up 39 and 26% of the isolates, respectively. Six different species of basidiomycetous yeasts representing 24% of the isolates were identified. Most Y. lipolytica strains showed strong proteolytic and lipolytic activities, whereas C. zeylanoides was weakly lipolytic. Results suggest that yeasts, particularly Y. lipolytica, may play a more prominent role than previously recognized in the spoilage of fresh and processed poultry stored at 5[deg]C.

52. JAGLAN PS and ARNOLD TS (1985). **BIOAVAILABILITY OF CARBON-14 DICHLORAN 2 6 DICHLORO-4-NITROANILINE DERIVED RESIDUES FROM GOAT LIVER ON INGESTION BY RATS .** *190TH AMERICAN CHEMICAL SOCIETY NATIONAL MEETING, CHICAGO, ILL., USA, SEPT. 8-13, 1985. ABSTR PAP AM CHEM SOC; 190 (0). 1985 (RECD. 1986). NO PAGINATION.* 190.

Chem Codes: Chemical of Concern: DCNA; Rejection Code: ABSTRACT.
BIOSIS COPYRIGHT: BIOL ABS. RRM ABSTRACT FUNGICIDE METABOLIC FATE TISSUE RESIDUE FOOD RESIDUE Congresses/ Biology/ Biochemistry/ Metabolism/ Food Technology/ Meat/ Meat Products/ Food Analysis/ Food Technology/ Food Additives/Poisoning/ Food Additives/Toxicity/ Food Contamination/ Food Poisoning/ Food Preservatives/Poisoning/ Food Preservatives/Toxicity/ Plant Diseases/ Preventive Medicine/ Herbicides/ Pest Control/ Pesticides/ Artiodactyla

53. Johnson, N. C. and Pfleger, F. L. (1992). **Vesicular-Arbuscular Mycorrhizae and Cultural Stresses.** *In: G.J.Bethlenfalvay and R.G.Linderman (Eds.), ASA (Am.Soc.of Agron.), Spec.Publ.No.54, Oct.31, 1991, Denver, CO, Am.Soc.of Agron.Inc., Crop Sci.Soc.of Am.Inc., Soil Sci.Soc.of Am.Inc., Madison, WI* 71-99.

Chem Codes: EcoReference No.: 70839
User Define 2: REPS,WASH,CALF,CORE,NA
Chemical of Concern: SZ,PNB,CBL,DZ,PRN,CBF,ADC,DCNA,PHMD; Rejection Code: REFS CHECKED/REVIEW.

54. Jones, D. P. (**Taint Hazards In Pesticides.**

Chem Codes: Chemical of Concern: DCNA; Rejection Code: NO TOX DATA.
hapab despite the wide assortment and large quantities of pesticides in use, the varying conditions of usage, and the numerous crops involved, instances of flavor impairment are rare, but do occur. the mixed isomers of bhc are known for the characteristic taint produced in several crops, notably potatoes, carrots and black currants. its persistance in soil can result in tainting many years after application. bhc should not be used on arabica coffee because of production of so-called bricky flavor. in amercian tests of 23 crops, bhc, lindane, toxaphene, endrin and malathion were individually associated with a depreciation of flavor. chlordane has been implicated in flavor loss in potatoes, and aldrin and dieldrin, in carrots; a fusty flavor in strawberries is attributed to demeton-s- methyl. acaricides have been reported very infrequently in flavor impairment, although genite 923 is likely to cause changes in peaches and chlorfenson in pears, while dmc, chlorobenzilate and possibly diazinon may be responsible for flavor changes developing during storage. among the fungicides, an outstanding problem is the production of off-flavors by certain sulphur compounds in canned produce; lime-sulphur and the thiocarbamates are suspect here: examples are captan in canned and fresh strawberries, ferbam in black currants, thiram in canned and quick frozen black currants and canned and fren strawberries, nabam in canned black

currants, dicloran in canned carrots and strawberries, dinocap in hops, and pcnb in potatoes. herbicides are not associated with as much flavor impairment as insecticides. residues and their monitoring 67/06/00, 15 1967 ai: yes db: tox sf: hapab

55. KATTA SK, ESKRIDGE KM, and BULLERMAN LB (1995). **Mold content of commercial popcorn.**

Chem Codes: Chemical of Concern: DCNA; Rejection Code: HUMAN HEALTH. BIOSIS COPYRIGHT: BIOL ABS. Internal mold infection levels for microwave yellow popcorn, nonmicrowave white popcorn, nonmicrowave yellow popcorn and specialty popcorn were determined by direct plating of kernels on Dichloran-rose bengal-chloramphenicol agar (DRBC), Dichloran-18% glycerol agar (DG-18), Aspergillus flavus/parasiticus agar (AFPA) and Czapek's iprodione agar (CZID). The total percentage of mold-infected kernels was low in microwave yellow popcorn (5.9%) and nonmicrowave yellow popcorn (7.3%), but somewhat higher in specialty popcorn (13.6%) and nonmicrowave white popcorn (15.1%). Of the molds found, Fusarium species predominated in the microwave yellow popcorn (54.2%) and nonmicrowave white popcorn (66.2%), whereas Aspergillus species predominated in the nonmicrowave yellow popcorn (43.8%) and specialty popcorn (52.9%). Of the Fusarium species isolated, F. moniliforme was the predominant species in all types of popcorn including microwave yellow (70.4%), nonmicrowave white (70.4%), n Isotopes/ Radiation/ Biochemistry/ Electricity/ Gravitation/ Magnetics/ Heat/ Heating/ Food Technology/ Cereals/ Food Technology/ Food Analysis/ Food Technology/ Food-Processing Industry/ Food Technology/ Food Additives/Poisoning/ Food Additives/Toxicity/ Food Contamination/ Food Poisoning/ Food Preservatives/Poisoning/ Food Preservatives/Toxicity/ Microbiological Techniques/ Mycoses/ Environmental Monitoring/ Public Health/ Communicable Diseases/Microbiology/ Beverages/ Food Microbiology/ Food Contamination/ Industrial Microbiology/ Biophysics/ Plants/Physiology/ Plants/Metabolism/ Plants/Growth & Development/ Biophysics/ Plants/Chemistry/ Biophysics/ Plants/Physiology/ Plants/Metabolism/ Fungi

56. KISKO, G., STEGEMAN, H., and FARKAS, J. (1998). **Detection of moulds in paprika powder by enzyme-linked immunosorbent assay.** *ACTA ALIMENTARIA;* 27: 97-103.

Chem Codes: Chemical of Concern: DCNA; Rejection Code: HUMAN HEALTH. BIOSIS COPYRIGHT: BIOL ABS. A commercial ELISA kit was used for detection of Penicillium and Aspergillus species in paprika samples. The cells of a plate are coated with antibodies raised against the heat stable, water soluble polysaccharide antigens specific to these fungi. Viable mould count was determined using three different media (oxytetracycline glucose yeast extract agar, rose-bengal chloramphenicol and dichloran rose-bengal chloramphenicol agar), which showed almost the same results. The kit is suitable for detection of both viable and non-viable moulds. There was a good correlation between mould colony count and titer of ELISA reaction for untreated samples. In (supposedly) decontaminated samples there was no correlation between mould colony count and ELISA titer. The results revealed that viable mould counts does not reflect the actual microbiological quality of the products. Results indicated that ELISA-mould tests could be used as a rapid, reliable method for screening paprika powders Biochemistry/Methods/ Food Technology/ Fermentation/ Industrial Microbiology/ Food Microbiology/ Mitosporic Fungi

57. Kurle, J. E. and Pfleger, F. L. (1994). **The Effects of Cultural Practices and Pesticides on Vam Fungi.** *In: F.L.Pfleger and R.G.Linderman (Eds.), Mycorrhizae and Plant Health, Am.Phytopathol.Soc.(APS) Press, St.Paul, MN* 101-131.

Chem Codes: Chemical of Concern: SZ,PNB,CBF,ADC,DCNA,CLNB; Rejection Code: REFS CHECKED/REV
EcoReference No.: 70318
User Define 2: REPS,WASH,CALF,CORE,NA

58. Lehotay, Steven J., Harman-Fetcho, Jennifer A., and McConnell, Laura L. (1998). **Agricultural Pesticide Residues in Oysters and Water from Two Chesapeake Bay Tributaries.** *Marine Pollution Bulletin* 37: 32-44.

Chem Codes: Chemical of Concern: SZ,MTL,ADC,CBF,PPB,DMT,DCNA ; Rejection Code: SURVEY.
http://www.sciencedirect.com/science/article/B6V6N-3VXR3T5-7/2/494bf760429d1276c10cf6174eb4256c

59. Leitich, Johannes, Ritter-Thomas, Ursula, Heise, Ingeborg, Tsay, Yi-Hung, and Rust, Jurgen (2002). **Photochemistry of 1,1-dicyano-1-alkenes: General aspects.** *Journal of Photochemistry and Photobiology A: Chemistry* 147: 157-175.

Chem Codes: Chemical of Concern: DCNA; Rejection Code: FATE .
The chemical behaviour of 32 selected 1,1-dicyano-1-alkenes (DCNA) that are devoid of additional unsaturation and of additional hetero-atoms, upon direct excitation by continuous irradiation with light of 253.7 nm wavelength into the long-wavelength flank of their longest wavelength UV absorption band has been studied in solvents ranging from cyclohexane to methanol. The predominant reaction products in the majority of cases were 1,1-dicyano-cyclopropanes formed via 1,2-migration of either hydrogen or methyl/alkyl from C-3 to C-2 (olefin to cyclopropane photorearrangement, OCPR). Photoreactions competing with OCPR were hydrogen atom abstraction from solvent by the C-2 of the DCNA and, in characteristically favourable cases only, 3,4-C---C bond cleavage. In cases of low OCPR quantum yields, hydrogen abstraction from solvent was dominant in cyclohexane or methanol but it could be suppressed by the choice of a solvent (methylene chloride, acetonitrile, tert-butanol) that more strongly resisted hydrogen abstraction. Further minor by-products were isomeric DCNA and 1,1-dicyano-3-alkenes. No carbene-derived products were observed. Supplementary experiments included quenching experiments and an investigation of the DCNA triplet state. The DCNA triplet state was formed at only ca. 1% on direct irradiation but it could be efficiently produced by sensitisation with benzophenone; in the absence of olefins as inter- or intramolecular substrates, it was fairly unreactive. All observed reactions occur from the lowest excited DCNA singlet state. According to the quenching experiments, this state is short-lived as compared to diffusional movements. Other than OCPR which appears to be due to cationic reactivity at C-2 exhibited by the perpendicular geometry of the excited double bond, hydrogen abstraction and 3,4-C---C bond cleavage appear to be due to radical reactivity at C-2 exhibited by geometries of the excited double bond that are intermediate between planar and perpendicular and are due to vibration about the perpendicular conformation.

60. Li, Gwo-Chen , Wong, Sue-San, and Tsai, Mei-Chen (2002). **Safety evaluation and regulatory control of pesticide residues in Taiwan.** *Yaowu Shipin Fenxi* 10: 269-277.

Chem Codes: Chemical of Concern: TCZ,DCNA; Rejection Code: HUMAN HEALTH.

Because agricultural prodn. in Taiwan depends heavily on the use of pesticides, much attention has been focused on pesticide contamination of food and on the effects of pesticide residues on human health. The Taiwan Agricultural Chems. and Toxic Substances Research Institute (TACTRI) conducts tests to evaluate the safe usage of pesticides in Taiwan. In accordance with the Pesticide Control Act, min. harvest intervals and tolerance levels for pesticides used on different crop groups are established before pesticides are approved for use in the field. The \"tolerance\" level of pesticides for different crop groups is detd. on the basis of: (i) the acceptable daily intake value of the pesticide; (ii) the av. daily consumption of each crop group by the Taiwanese people; and (iii) the level of pesticide residues on different crops, estd. from supervised trials. Tolerance levels must be established before registrations can be approved. Pesticide residues on vegetables and fruits are under heavy public scrutiny. Fifteen workstations for pesticide residue control have been set up by the TACTRI in different localities in Taiwan, and multi-residue methods are used for the anal. of these products. Pesticide residues commonly found on vegetables have now been identified. Educational programs for farmers have been devised, based on the anal. results obtained from these workstations. Risk assessments of dietary intakes of pesticides are carried out on a continuing basis. Results have shown that the dietary intake of pesticide residues by consumers is within safe limits. [on SciFinder (R)] food/ risk/ contamination/ pesticide/ vegetable

Database: CAPLUS
Accession Number: AN 2003:188976
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Section Code: 17-5
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Index Terms: Food contamination; Fruit; Human; Pesticides; Risk assessment; Vegetable (safety evaluation and regulatory control of pesticide residues in Taiwan)
CAS Registry Numbers: 52-68-6 (Trichlorfon); 55-38-9 (Fenthion); 56-38-2 (Parathion); 60-51-5 (Dimethoate); 62-73-7 (Dichlorvos); 63-25-2 (Carbaryl); 86-50-0 (Azinphos-methyl); 90-15-3 (1-Naphthol); 99-30-9 (Dicloran); 114-26-1 (Propoxur); 115-29-7 (Endosulfan); 115-32-2 (Dicofol); 115-90-2 (Fensulfothion); 116-06-3 (Aldicarb); 116-29-0 (Tetradifon); 119-12-0 (Pyridaphenthion); 121-75-5 (Malathion); 122-14-5 (Fenitrothion); 133-06-2 (Captan); 141-66-2 (Dicrotophos); 148-79-8 (Thiabendazole); 298-00-0 (Parathion-methyl); 298-02-2 (Phorate); 299-84-3 (Fenchlorphos); 300-76-5 (Naled); 330-55-2 (Linuron); 333-41-5 (Diazinon); 470-90-6 (Chlorfenvinphos); 563-12-2 (Ethion); 584-79-2 (Allethrin); 732-11-6 (Phosmet); 786-19-6 (Carbophenothion); 919-86-8 (Demeton-s-methyl); 944-21-8 (Dyfoxon); 944-22-9 (Fonofos); 950-10-7 (Mephosfolan); 950-37-8 (Methidathion); 1085-98-9 (Dichlofluanid); 1113-02-6 (Omethoate); 1129-41-5 (Metolcarb); 1563-66-2 (Carbofuran); 1582-09-8 (Trifluralin); 1646-87-3 (Aldicarb-sulfoxide); 1646-88-4 (Aldicarb-sulfone); 1897-45-6 (Chlorothalonil); 2032-65-7 (Methiocarb); 2104-64-5 (EPN); 2104-96-3 (Bromophos); 2275-23-2 (Vamidothion); 2310-17-0 (Phosalone); 2425-06-1 (Captafol); 2439-01-2 (Chinomethionat); 2540-82-1 (Formothion); 2597-03-7 (Phenthoate); 2631-37-0 (Promecarb); 2631-40-5 (Isoprocarb); 2655-14-3 (XMC); 2921-88-2 (Chlorpyriphos); 3766-81-2 (Fenobucarb); 4658-28-0 (Aziprotryne); 4824-78-6 (Bromophos-ethyl); 5598-13-0 (Chlorpyrifos-methyl); 6923-22-4 (Monocrotophos); 7292-16-2 (Propaphos); 7696-12-0 (Tetramethrin); 7786-34-7 (Mevinphos); 10265-92-6 (Methamidophos); 10311-84-9 (Dialiphos); 10605-21-7 (Carbendazim); 13067-93-1 (Cyanofenphos); 13071-79-9 (Terbufos); 13171-21-6 (Phosphamidon); 13194-48-4 (Ethoprophos); 13457-18-6 (Pyrazophos); 13593-03-8 (Quinalphos); 14816-18-3 (Phoxim); 15972-60-8 (Alachlor); 16655-82-6 (3-Hydroxycarbofuran); 16709-30-1 (3-Ketocarbofuran); 16752-77-5 (Methomyl); 17109-49-8 (Edifenphos); 18181-80-1

(Bromopropylate); 18854-01-8 (Isoxathion); 19666-30-9 (Oxadiazon); 21609-90-5 (Leptophos); 22224-92-6 (Fenamiphos); 22781-23-3 (Bendiocarb); 23184-66-9 (Butachlor); 24017-47-8 (Triazophos); 25311-71-1 (Isofenphos); 26087-47-8 (Iprobenfos); 27355-22-2 (Fthalide); 29232-93-7 (Pirimiphos-methyl); 30560-19-1 (Acephate); 31972-44-8 (Fenamiphos-sulfone); 32809-16-8 (Procymidone); 34643-46-4 (Prothiofos); 34681-10-2 (Butocarboxim); 36519-00-3 (Phosdiphen); 36734-19-7 (Iprodione); 38260-54-7 (Etrimfos); 39300-45-3 (Dinocap); 39515-41-8 (Fenpropathrin); 40487-42-1 (Pendimethalin); 41198-08-7 (Profenophos); 41483-43-6 (Bupirimate); 42509-80-8 (Isazofos); 42576-02-3 (Bifenox); 43121-43-3 (Triadimefon); 50471-44-8 (Vinclozolin); 50512-35-1 (Isoprothiolane); 51218-45-2 (Metolachlor); 51630-58-1 (Fenvalerate); 52315-07-8 (Cypermethrin); 52645-53-1 (Permethrin); 52918-63-5 (Deltamethrin); 55219-65-3 (Triadimenol); 57511-62-3 (Propaphos-sulfoxide); 57511-63-4 (Propaphos-sulfone); 57837-19-1 (Metalaxyl); 59669-26-0 (Thiodicarb); 60168-88-9 (Fenarimol); 60207-90-1 (Propiconazole); 60238-56-4 (Chlorthiophos); 63284-71-9 (Nuarimol); 66230-04-4 (Esfenvalerate); 66246-88-6 (Penconazole); 66841-25-6 (Tralomethrin); 67375-30-8; 68049-83-2 (Azafenidin); 68085-85-8 (Cyhalothrin); 68359-37-5 (Beta-cyfluthrin); 69327-76-0 (Buprofezin); 69377-81-7 (Fluroxypyr); 69409-94-5 (Fluvalinate); 69806-40-2 (Haloxyfop-methyl); 70124-77-5 (Flucythrinate); 76738-62-0; 79983-71-4 (Hexaconazole); 82657-04-3 (Bifenthrin); 83121-18-0 (Teflubenzuron); 85509-19-9 (Flusilazole); 86479-06-3 (Hexaflumuron); 86598-92-7 (Imibenconazole); 88283-41-4 (Pyrifenox); 88671-89-0 (Myclobutanil); 89784-60-1 (Pyraclofos); 94361-06-5 (Cyproconazole); 95465-99-9 (Cadusafos); 96489-71-3 (Pyridaben); 98886-44-3 (Fosthiazate); 101463-69-8 (Flufenoxuron); 104030-54-8 (Carpropamid); 107534-96-3 (Tebuconazole); 112281-77-3 (Tetraconazole); 114369-43-6 (Fenbuconazole); 116255-48-2 (Bromuconazole); 119446-68-3 (Difenoconazole); 133855-98-8 (Epoxiconazole); 143390-89-0 (Kresoxim-methyl); 146887-37-8 (RH9130); 146887-38-9 (RH9129); 172838-11-8 (Tokuoxon)
Role: ADV (Adverse effect, including toxicity), BIOL (Biological study) (safety evaluation and regulatory control of pesticide residues in Taiwan)

61. Lopez-Avila, V., Benedicto, J., and Bauer, K. M. (1998). **Stability of organochlorine and organophosphorus pesticides when extracted from solid matrixes with microwave energy.** *Journal of Aoac International* 81 : 1224-1232.

Chem Codes: Chemical of Concern: SZ,PNB,CLNB,DCNA,DMT; Rejection Code: CHEM METHODS.
ABSTRACT: BIOSIS COPYRIGHT: BIOL ABS. A stability study of 44 organochlorine pesticides (OCPs) and 47 organophosphorus pesticides (OPPs) was conducted. Compounds were spiked into solvent only (hexane-acetone, 1 + 1; methylene chloride-acetone, 1 + 1; methyl tert-butyl ether (MTBE); and toluene-methanol, 10 + 1), solvent/dry soil suspensions, and solvent/wet soil suspensions (20% water, w/w). Spiked matrixes were heated in closed vessels with microwave energy at 2 temperatures (50ê and 145êC) for 5 or 20 min. For comparison and for determination of nitrogen blowdown losses, spiked matrixes that had not been exposed to microwave energy were concentrated by using the blowdown technique and analyzed for each of the spiked compounds. For OCPs, temperature had the most significant effect on compound recovery, followed by matrix. All 3 pairwise comparisons of the 3 matrix types were statistically significant. The solvent factor was also significant, with average recoveries of 97.8% with methylene chloride acetone,
KEYWORDS: Biochemical Methods-General
KEYWORDS: Biochemical Studies-General
KEYWORDS: Pest Control

62. LUND, F. (1996). **Direct identification of the common cheese contaminant Penicillium commune in factory air samples as an aid to factory hygiene.** *LETTERS IN APPLIED MICROBIOLOGY;* 22: 339-341.

Chem Codes: Chemical of Concern: DCNA; Rejection Code: HUMAN HEALTH.
BIOSIS COPYRIGHT: BIOL ABS. Creatine sucrose dichloran agar (CREAD) was used as a selective medium for Penicillium commune and related species found in air samples in a cheese factory. Using growth and simple colony characters on CREAD together with detection of indole metabolites with a filter paper method, it was possible to identify all 22 P. commune isolates from a total of 43 Penicillium isolates. Penicillium commune numbers on CREAD were compared with those found on a general isolation medium, dichloran 18% glycerol agar. Amino Acids/ Peptides/ Proteins/ Carbohydrates/ Diagnosis/ Pathology/ Dairy Products/ Food Technology/ Culture Media/ Tissue Culture/ Microbiological Techniques/ Mycoses/ Disinfection/ Pest Control/ Disease Vectors/ Pesticides/ Air Pollution/ Soil Pollutants/ Water Pollution/ Communicable Diseases/Microbiology/ Beverages/ Food Microbiology/ Food Contamination/ Industrial Microbiology/ Biophysics/ Plants/Physiology/ Plants/Metabolism/ Mitosporic Fungi

63. LURIE, S., DROBY, S., CHALUPOWICZ, L., and CHALUTZ, E. (1995). **Efficacy of Candida oleophila strain 182 in preventing Penicillium expansum infection of nectarine fruits.** *PHYTOPARASITICA;* 23: 231-234.

Chem Codes: Chemical of Concern: DCNA; Rejection Code: NO TOX DATA.
BIOSIS COPYRIGHT: BIOL ABS. The potential of the yeast Candida oleophila for postharvest control of Penicillium expansum infection on nectarines was assessed on wound-inoculated fruits held at 20ê C, or at 0ê C in either air or controlled atmosphere storage. In addition, the efficacy of a prestorage dip with a yeast suspension, the fungicide dicloran, or a combination of the two, for controlling natural infections following storage was examined. C. oleophila reduced the level of infection caused by P. expansum in harvested nectarines. The yeast's effectiveness was not reduced by controlled atmosphere storage or by application together with the commercial fungicide dicloran. Food Technology/ Fruit/ Nuts/ Vegetables/ Antibiotics/ Biological Products/Biosynthesis/ Industrial Microbiology/ Fungi/ Plant Diseases/ Plant Diseases/ Preventive Medicine/ Herbicides/ Pest Control/ Pesticides/ Mitosporic Fungi/ Plants, Medicinal

64. Magnoli, C, Astoreca, A, Ponsone, L, Combina, M, Palacio, G, Rosa, C A R, and Dalcero, A M (2004). **Survey of mycoflora and ochratoxin A in dried vine fruits from Argentina markets.** *Letters In Applied Microbiology* 39: 326-331.

Chem Codes: Chemical of Concern: DCNA; Rejection Code: NO TOX DATA.
Abstract c. magnoli, a. astoreca, l. ponsone, m. combina, g. palacio, c.a.r. rosa and a.m. dalcero. 2004.Aims: The aims of this work were to identify the mycoflora and to evaluate the natural occurrence of OA in dried vine fruits. Likewise, the capacity to produce OA by Aspergillus section Nigri was studied. Materials and Methods: Fifty samples of dried vine fruits were obtained from Mendoza and San Juan provinces. The surface disinfection method was used for mycoflora determination using the medium dichloran 18% glycerol agar (DG18) and dichloran Rose Bengal chloramphenicol agar (DRBC). Results: Statistical analysis demonstrated that the species A. niger var. niger and Aspergillus niger var. awamori were isolated in higher frequency from black dried vine fruits from DRBC and DG18 media ($P < 0.01$). OA was found in 74% of the dried vine fruits samples. Sixty-two strains (28%) of Aspergillus section Nigri, were OA producers. In the species A. carbonarius the highest percentages of ochratoxigenic strains were detected (82.6%).

Conclusions: The presence of ochratoxigenic strains of Nigri section in dried vine fruits suggests that they may be an important source of OA in this substrate. Dried vine fruits can also be an important source of OA people who consume large amounts. Significance and Impact of the Study: The dried vine fruits contamination with Aspergillus section Nigri and OA was significant. [Journal Article; In English; England]

65. Magnoli, C, Violante, M, Combina, M, Palacio, G, and Dalcero, A (2003). **Mycoflora and ochratoxin-producing strains of Aspergillus section Nigri in wine grapes in Argentina.** *Letters In Applied Microbiology* 37: 179-184.

Chem Codes: Chemical of Concern: DCNA; Rejection Code: NO TOX DATA.
AIMS: The aims of this work were to evaluate the mycoflora and to identify the species of Aspergillus with the potential to produce ochratoxin A (OA) from different wine grape varieties from Mendoza, Argentina. Likewise, the capacity to produce OA by Aspergillus section Nigri was studied. METHODS AND RESULTS: Fifty samples of wine grapes were obtained from a winery of Mendoza province, Argentina. The surface-disinfection method was used for mycoflora determination using the medium dichloran 18% glycerol agar (DG18). Alternaria, Aspergillus and Penicillium were identified at species level. OA production was tested in 63 strains belonging to section Nigri. Alternaria genus was the most frequent (80% of the samples) followed by Aspergillus (70%). Alternaria alternata was the only specie identified from the Alternaria genus, followed by A. niger var. niger, A. flavus among others. From Penicillium genus, P. crysogenum was the most frequent specie. From 63 strains of Aspergillus section Nigri, 41.3% were OA producers. The levels of produced toxin ranged from 2 to 24.5 ng ml-1 of culture medium. CONCLUSIONS: The presence of ochratoxigenic strains of Nigri section in this substrate suggests that they may be an important source of OA in grapes from tropical and subtropical zones. Therefore, the industry should work further to diminish the growth of these fungi and mycotoxins formation in grapes, with the aim to reduce OA content in wine products. SIGNIFICANCE AND IMPACT OF THE STUDY: The wine grape contamination with A. alternata and Aspergillus section Nigri was significant. [Journal Article; In English; England]

66. Mansilla, J. P., Agui(acute)n, O., and Sainz, M. J. (2002). **A fast method for production of Armillaria inoculum.** *Mycologia, 93 (3) pp. 612-615.*

Chem Codes: Chemical of Concern: DCNA; Rejection Code: NO TOX DATA.
A new method is described for the production of inoculum of Armillaria species. An Armillaria mellea isolate was obtained from an infected grapevine plant. Inocula were then obtained by the new method (in which the host-wood rods are incubated in benomyl-dichloran-streptomycin medium) and by three existing methods. Also, the efficacy of the inoculum produced by the new method was assessed by an experimental infection assay using healthy plants of six grapevine rootstocks (196-17 Castel, 110 Richter, 161-49 Couderc, 3309 Couderc, 1103 Paulsen, and 102). The new method produced inoculum within a very short period (15 d, versus 3 mo with the best of the existing methods). All rootstocks were infected by the A. mellea isolate, the most resistant being 161-49 Couderc. This method thus offers a significant reduction in the time necessary for pathogenicity testing or any research requiring Armillaria inoculum. Classification: 92.11.1.2 PLANT PATHOLOGY AND SYMBIOSES: Plant Pathology: Fungi - general; 92.16 TECHNIQUES Armillaria mellea/ Pathogenicity testing/ Vine rootstock/ Vitis vinifera/ White root rot/ Armillaria/ Armillaria mellea

67. MARROQUIN, E., MATTA FB, GRAVES CH, and SMITH BJ (1989). **FUNGICIDAL SCREENING AND HISTOLOGICAL STUDIES FOR DOUBLE BLOSSOM CONTROL OF BLACKBERRIES.** *49TH ANNUAL MEETING OF THE AMERICAN SOCIETY FOR HORTICULTURAL SCIENCE (SOUTHERN REGION), NASHVILLE, TENNESSEE, USA, FEBRUARY* 5-7, 1989. HORTSCIENCE; 24: 763.

Chem Codes: Chemical of Concern: DCNA; Rejection Code: ABSTRACT.
BIOSIS COPYRIGHT: BIOL ABS. RRM ABSTRACT CERCOSPORELLA-RUBI BAYCOR BENLATE ORBIT TOPSIN M CAPTAN BOTRAN BORDEAUX PESTS AGRICULTURE Congresses/ Biology/ Histocytochemistry/ Biology/ Biochemistry/ Fruit/ Fungi/ Plant Diseases/ Plant Diseases/ Preventive Medicine/ Herbicides/ Pest Control/ Pesticides/ Mitosporic Fungi/ Plants

68. MASON JM, VALENCIA, R., and ZIMMERING, S. (1992). **Chemical mutagenesis testing in Drosophila: VIII. Reexamination of equivocal results.** *ENVIRON MOL MUTAGEN;* 19: 227-234.

Chem Codes: Chemical of Concern: DCNA; Rejection Code: REVIEW.
BIOSIS COPYRIGHT: BIOL ABS. Twelve percent of the chemicals tested for mutagenicity by the National Toxicology Program (NTP) using the Drosophila sex-linked recessive lethal assay have been classified as producing equivocal results. We have reexamined the published data and the criteria used to determine mutagenicity in light of the historical distribution of the concurrent negative controls of this project. Many of the chemicals that originally produced equivocal results have been retested under code. As a result of changes to incorporate a comparison with the historical control in the algorithm used to determine mutagenicity and as a result of new data accumulated, 4 of the 25 chemicals that gave equivocal results are judged to be mutagenic, and 11 others are judged to be nonmutagenic under our test conditions. Animals/Genetics/ Biochemistry/ Poisoning/ Animals, Laboratory/ Animal/ Insects/Physiology/ Physiology, Comparative/ Pathology/ Diptera

69. MATTA FB, MARROQUIN, E., GRAVES CH, and SMITH BJ (1989). **IN-VITRO EFFICACY OF FUNGICIDES AND HISTOLOGICAL STUDIES FOR CONTROL OF ROSETTE OF BLACKBERRIES.** *86TH ANNUAL MEETING OF THE AMERICAN SOCIETY FOR HORTICULTURAL SCIENCE, TULSA, OKLAHOMA, USA, JULY* 29-AUGUST 3, 1989. HORTSCIENCE; 0: 81.

Chem Codes: Chemical of Concern: DCNA; Rejection Code: ABSTRACT.
BIOSIS COPYRIGHT: BIOL ABS. RRM ABSTRACT CERCOSPORELLA-RUBI BAYCOR BENLATE ORBIT CAPTAN BOTRAN FRUITS CROP INDUSTRY AGRICULTURE Congresses/ Biology/ Biochemistry/ Fruit/ Fungi/ Plant Diseases/ Plant Diseases/ Preventive Medicine/ Herbicides/ Pest Control/ Pesticides/ Mitosporic Fungi/ Plants, Medicinal

70. MCEUEN SF, NASIRI, M., ECK DL, KURTH MJ, and MILLER MG (1991). **IMMUNOCHEMICAL DETECTION OF FREE AND BOUND RESIDUES OF NITROAROMATIC COMPOUNDS IN BIOLOGICAL SAMPLES.** *201ST ACS NATIONAL MEETING OF THE AMERICAN CHEMICAL SOCIETY, ATLANTA, GEORGIA, USA, APRIL* 14-19, 1991. ABSTR PAP AM CHEM SOC; 201: AGRO 42.

Chem Codes: Chemical of Concern: DCNA; Rejection Code: NO TOX DATA.

BIOSIS COPYRIGHT: BIOL ABS. RRM ABSTRACT BLOOD DINITROBENZENES ELISA DINOSEB DICHLORAN TRIFLURALIN HERBICIDES Congresses/ Biology/ Biochemistry/ Body Fluids/Chemistry/ Hematopoietic System/ Poisoning/ Animals, Laboratory/ Immunity/ Immunochemistry/Instrumentation/ Immunochemistry/Methods/ Herbicides/ Pest Control/ Pesticides

71. Mcleod Harry A., Smith Dorothy C., and Bluman Nathan (**Pesticide residues in the total diet in canada. V: 1976 to 1978.** *Journal of Food Safety (1980), 2(3), 141-64 Coden: Jfsadp; Issn: 0149-6085*.

Chem Codes: Chemical of Concern: PNB,DCNA; Rejection Code: HUMAN HEALTH. Foods, representative of Canadian eating habits as detd. by a national nutritional survey, were prepd. for eating, categorized, and blended into 11 groups or composites representing the dietary intake for each of 5 geog. regions. Portions were analyzed for pesticides, their derivs. and some industrial contaminants. Twenty-four different residues representing organochlorine, organophosphorus, S, nitroaniline, phthalonitrile and carbamate compds. were detected. Compds. reported for the first time are chlordane [12789-03-6], methidathion [950-37-8], phosalone [2310-17-0], toxaphene [8001-35-2], chlorthalonil [1897-45-6], dichloran [99-30-9], quintozene [***82-68-8***], S, chlorpropham [101-21-3] and PCB. Data are presented to show residue levels in different food composites, on a regional and seasonal basis. The av. daily dietary intake is compared to previous survey data and indicates a general redn. in levels of organochlorine pesticides. All residues detected were within the FAO/WHO proposed acceptable daily intakes.

72. MICHAILLIDES TJ, MORGAN DP, and SUBBARAO KV (1996). **AN OLD DISEASE STILL A DILEMMA FOR CALIFORNIA GROWERS.** *PLANT DISEASE;* 80: 828-841.

Chem Codes: Chemical of Concern: DCNA; Rejection Code: NO TOX DATA. BIOSIS COPYRIGHT: BIOL ABS. RRM JOURNAL ARTICLE FICUS-CARICA BLASTOPHAGA-PSENES FUSARIUM-MONILIFORME COMMON EDIBLE FIG CROP PLANT VECTOR INSECT POLLINATOR PATHOGEN FUNGUS BIOBUSINESS CROP INDUSTRY HORTICULTURAL HISTORY POLLINATION CAPRIFICATION CAPRIFIG CALIMYRNA FIG ENDOSEPSIS SOFT ROT PINK ROT BROWN ROT EYE-END ROT FUNGAL TAXONOMY FUNGAL LIFE CYCLE EPIDEMIOLOGY FUNGAL ECOLOGY PLANT REPRODUCTION DISEASE CONTROL CONTAMINATION DETERMINATION FUNGICIDE INDUSTRY PROSPECTS HORTICULTURE PEST MANAGEMENT ECONOMIC ENTOMOLOGY VECTOR BIOLOGY FUNGAL DISEASE MISCELLANEOUS METHOD CALIFORNIA USA Ecology/ Plants/ Fungi/ Biophysics/ Plants/Physiology/ Plants/Metabolism/ Plants/Anatomy & Histology/ Reproduction/ Fruit/ Nuts/ Tropical Climate/ Fungi/ Plant Diseases/ Plant Diseases/ Preventive Medicine/ Arachnida/ Entomology/Economics/ Fruit/ Nuts/ Mitosporic Fungi/ Plants/ Hymenoptera

73. Minyard, J. P Jr and Roberts, W. E. (1991). **State findings on pesticide residues in foods: 1988 and 1989.** *J Assoc Off Anal Chem* 74 : 438-452.

Chem Codes: Chemical of Concern: SZ,RSM,PNB,MOM,CBF,ADC,DCNA,CLNB,DMT,24DXY; Rejection Code: HUMAN HEALTH. ABSTRACT: BIOSIS COPYRIGHT: BIOL ABS. Findings of pesticide and related chemical residues are presented for 27,065 samples of foods collected and analyzed in 10 state food laboratories over 1988 and 1989 (fiscal years (FY) 88 and 89). These laboratories conduct food

regulatory programs compatible with national programs of the U.S. Food and Drug Administration. Of the findings, 6325 samples contained detectable levels of 1 or more pesticide analytes and 418 (or 1.5%) of the total number of samples were deemed to be of regulatory significance.
KEYWORDS: General Biology-Institutions
KEYWORDS: Mathematical Biology and Statistical Methods
KEYWORDS: Comparative Biochemistry
KEYWORDS: Biochemical Methods-General
KEYWORDS: Biochemical Studies-General
KEYWORDS: Food Technology-General
KEYWORDS: Food Technology-Evaluations of Physical and Chemical Properties (1970-)
KEYWORDS: Food Technology-Preparation
KEYWORDS: Toxicology-Foods
KEYWORDS: Public Health-Public Health Laboratory Methods
KEYWORDS: Pest Control

74. Mondy, N., Caissa, C., Pitoizet, N., Delbecque, J. P., and Corio-Costet, M. F. (1997). **Effects of the ingestion of Serratula tinctoria extracts, a plant containing phytoecdysteroids, on the development of the vineyard pest Lobesia botrana (Lepidoptera: Tortricidae).**

Chem Codes: Chemical of Concern: DCNA; Rejection Code: BIOLOGICAL TOXICANT. Archives of Insect Biochemistry and Physiology [ARCH. INSECT BIOCHEM. PHYSIOL.], vol. 35, no. 1-2, pp. 227-235, 1997. We describe here the effects of extracts from Serratula tinctoria, a plant producing phytoecdysteroids, on the growth and development of Lobesia botrana, an economically important pest in vineyards. Leaves, hairy roots, or semi-purified (by Sep-Pak procedure) methanolic extracts from this plant were incorporated into an artificial diet given to insects. Larval growth, mortality, weight, and sex-ratio were investigated, as well as sterol and ecdysteroid contents. Experimental diets induced an important mortality in the first, second, and third larval instars, but also in pupae. As males appeared more sensitive to extracts, sex ratio was significantly modified on experimental diets (particularly with Sep-Pak fractions SP60, SP80, and SP100). Pathophysiological effects were also observed: Larval development was significantly faster on experimental diets and a weight loss, 14% for males and from 12% to 22% for females, was noted (particularly when reared on hairy roots and SP20, SP60, and SP80 extracts). Moreover, sterol and ecdysteroid contents were disturbed after rearing on experimental diets

75. MOORMAN GW and LEASE RJ (1990). **RESIDUAL ACTIVITY OF FUNGICIDES APPLIED TO GERANIUMS IN THE GREENHOUSE.** *1990 ANNUAL MEETING OF THE AMERICAN PHYTOPATHOLOGICAL SOCIETY AND THE CANADIAN PHYTOPATHOLOGICAL SOCIETY, GRAND RAPIDS, MICHIGAN, USA, AUGUST* 4-8, 1990. PHYTOPATHOLOGY; 80: 979.

Chem Codes: Chemical of Concern: DCNA; Rejection Code: ABSTRACT.
BIOSIS COPYRIGHT: BIOL ABS. RRM ABSTRACT PELARGONIUM-HORTORUM CULTIVAR RED ELITE BOTRYTIS-CINEREA ZINEB DICHLORAN CUPRIC HYDROXIDE VINCLOZOLIN CHLOROTHALONIL MANCOZEB PLANT FUNGUS FUNGICIDE AGRICULTURE Congresses/ Biology/ Biochemistry/ Plants/Growth & Development/ Fungi/ Plant Diseases/ Plant Diseases/ Preventive Medicine/ Herbicides/ Pest Control/ Pesticides/ Mitosporic Fungi/ Plants

76. MULLIN-SCHADING BA, SCHADING RL, FRAZEE JE, and PAGE-LESTER SA (1996). **FUNGICIDE TOLERANCE FREQUENCY IN TWENTY-TWO BOTRYTIS ISOLATES TO FIVE DIFFERENT FUNGICIDES.** *ANNUAL MEETING OF THE AMERICAN PHYTOPATHOLOGICAL SOCIETY, NORTH CENTRAL DIVISION, INDIANAPOLIS, INDIANA, USA, JULY* 27-31, 1996. PHYTOPATHOLOGY; 86: S3.

Chem Codes: Chemical of Concern: DCNA; Rejection Code: ABSTRACT.
BIOSIS COPYRIGHT: BIOL ABS. RRM MEETING ABSTRACT BOTRYTIS-CINEREA CONIFERS FUNGUS PATHOGEN HOST FORESTRY PEST MANAGEMENT DICHLORAN FUNGICIDE IPRODIONE THIOPHANATE METHYL VINCLOZOLIN CHLOROTHALONIL PLANT PACIFIC NORTHWEST USA Congresses/ Biology/ Trees/ Fungi/ Plant Diseases/ Plant Diseases/ Preventive Medicine/ Herbicides/ Pest Control/ Pesticides/ Mitosporic Fungi/ Plants

77. Myers, L. A. , Witmer, C. M., and Gallo, M. A. (1988). **Characterization and identification of an indirect cytochrome P-450-initiated denitrosation of 2,6-dichloro-4-nitroaniline in rat hepatic microsomes.** *Toxicology and Applied Pharmacology [TOXICOL. APPL. PHARMACOL.]* 95: 139-152.

Chem Codes: Chemical of Concern: DCNA; Rejection Code: IN VITRO.
The metabolism of 2,6-dichloro-4-nitroaniline (DCNA) to a unique dinitrosated product, 3,5-dichloro-p-aminophenol (DCAP), was investigated in rat hepatic microsomes using an HPLC system containing a reverse-phase column and an electrochemical detector. The parent compound appears to induce its own metabolism. The characterization of this induction was studied by polyacrylamide gel electrophoresis, catalytic enzymatic activity, and immunochemistry. The in vitro miscrosomal aerobic production of DCAP was increased 4- to 6.5-fold after animals were treated with DCNA. The microsomal production of DCAP can be inhibited by the addition of specific antibodies to cytochrome P-450d, indicating that the removal of the nitro group and subsequent replacement with a hydroxyl group was initiated by cytochrome P-450d in the mixed-function oxidase system. It was demonstrated by the addition of H sub(2) super(18)O that this hydroxyl group came from H sub(2)O and not molecular oxygen. Classification: X 24133 Metabolism cytochrome P450/ dinitrosation/ 2,6-dichloro-4-nitroaniline/ microsomes/ liver/ rats/ fungicides

78. NERIN, C., TORNES AR, DOMENO, C., and CACHO, J. (1996). **Absorption of pesticides on plastic films used as agricultural soil covers.** *JOURNAL OF AGRICULTURAL AND FOOD CHEMISTRY;* 44: 4009-4014.

Chem Codes: Chemical of Concern: DCNA; Rejection Code: NO TOX DATA.
BIOSIS COPYRIGHT: BIOL ABS. The absorption of some organochlorine and organophosphorus pesticides on low-density polyethylene (LDPE) films used as agricultural soil covers is studied. Four different types of LDPE films (black, normal, thermic, and extra low density) and a copolymer of ethylene and vinyl acetate (EVA) were selected to do the kinetic study. Temperature ranged from 24 to 50 êC, and contact time between plastic films and a standard solution of pesticides in aqueous phase varied between 3 and 20 days. As pesticides the following were studied: dicloran, malathion, procymidone, folpet, alpha- and beta-endosulfan, chlorothalonil, chlorpyriphos, and methylchlorpyriphos. Kinetic equations of first order were obtained in all cases having kinetic constants from 6.5the pesticides studied were completely absorbed on the plastic films after 15 days of contact time. No degradation of pesticides was

observed once they were absorbed on the plastic. Both the absorption process and the capacity of a Biochemistry/ Biophysics/ Macromolecular Systems/ Molecular Biology/ Biomedical Engineering/ Biophysics/ Engineering/ Plants/Growth & Development/ Soil/ Soil/ Fertilizers/ Soil/ Herbicides/ Pest Control/ Pesticides

79. Okumura, D., Melnicoe, R., Jackson, T., Drefs, C., Maddy, K., and Wells, J. (1991). **PESTICIDE RESIDUES IN FOOD CROPS ANALYZED BY THE CALIFORNIA USA DEPARTMENT OF FOOD AND AGRICULTURE IN 1989.** *Ware, G. W. (Ed.). Reviews of Environmental Contamination and Toxicology, Vol. 118. Ix+158p. Springer-Verlag New York Inc.: New York, New York, Usa* Berlin, Germany. Illus. Isbn 0-387-97447-4; Isbn 3-540-97447-4.; 0 : 87-152.

Chem Codes: Chemical of Concern: MOM,ADC,CBF,DCNA,CLNB,DMT; Rejection Code: HUMAN HEALTH.
ABSTRACT: BIOSIS COPYRIGHT: BIOL ABS. RRM REVIEW ENVIRONMENTAL CONTAMINATION TOXICOLOGY
KEYWORDS: General Biology-Institutions
KEYWORDS: Biochemical Studies-General
KEYWORDS: Toxicology-Foods
KEYWORDS: Public Health: Environmental Health-Air
KEYWORDS: Agronomy-General
KEYWORDS: Pest Control
KEYWORDS: Economic Entomology-Chemical and Physical Control
KEYWORDS: Angiospermae

80. Panter, C and Frances, S P (2003). **A more selective medium for Culicinomyces clavisporus.** *Journal Of Invertebrate Pathology* 82: 198-200.

Chem Codes: Chemical of Concern: DCNA; Rejection Code: NO TOX DATA.
[Journal Article; In English; United States]

81. PAPADOPOULOU-MOURKIDOU, E. (1991). **Postharvest-applied agrochemicals and their residues in fresh fruits and vegetables.** *J ASSOC OFF ANAL CHEM;* 74: 745-765.

Chem Codes: Chemical of Concern: DMT,DCNA; Rejection Code: NO SPECIES.
BIOSIS COPYRIGHT: BIOL ABS. Many agrochemicals are applied postharvest on fruits and vegetables to extend their lives and preserve quality during storage, transport, and marketing. Persistence and distribution of residues on the edible portions of produce have been reported for citrus fruits, pome fruits, stone fruits, mangos, strawberries, bananas, kiwi fruits, avocados, some minor fruit commodities, and bell peppers and tomatoes. Data on the persistence and residues of the fungicides benomyl, biphenyl, sec-butylamine, captan, carbendazim, dicloran, fosetyl-aluminum, guazatine, imazalil, iprodione, metalaxyl, o-phenyphenol, prochloraz, thiabendazole, thiophanate-methyl, triadimefon, and vinclozolin, the fumigants ethylene dibromide, methyl bromide, and sulfur dioxide, the insecticides dimethoate and fenthion, the antiscald compounds diphenylamine and ethoxyquin, and the growth regulators 2,4-D and daminozide are presented and discussed. Biochemistry/ Food Technology/ Fruit/ Nuts/ Vegetables/ Food Analysis/ Food Technology/ Food-Processing Industry/ Food Technology/ Food Additives/Poisoning/ Food Additives/Toxicity/ Food Contamination/ Food Poisoning/ Food Preservatives/Poisoning/ Food Preservatives/Toxicity/ Disinfectants/ Disinfection/ Sterilization/ Fungi/ Plant Diseases/

Herbicides/ Pest Control/ Pesticides/ Arachnida/ Entomology/Economics/ Insecticides/ Pest Control/ Pesticides

82. Pieckova, E. and Kunova, Z. (2002). **Indoor fungi and their ciliostatic metabolites.** *Ann.Agric.Environ.Med.* 9: 59-63.

Chem Codes: Chemical of Concern: DCNA; Rejection Code: BIOLOGICAL TOXICANT. 1232-1966

83. Pieckova, E. and Wilkins, K. (**Airway toxicity of house dust and its fungal composition.** *Annals of Agricultural and Environmental Medicine [Ann. Agric. Environ. Med.]. Vol. 11, no. 1, pp. 67-73. 2004.*

Chem Codes: Chemical of Concern: DCNA; Rejection Code: HUMAN HEALTH.
House dust is an important source of different toxic metabolites as well as allergens, including those of fungal origin, in the indoor environment. A bio-assay employing 1-day-old chick tracheas was used to characterize airway effects of 2-butanone and dimethylsulphoxide (Me sub(2)SO) extracts of 23 dust samples collected from water damaged (13) and control (10) Danish schools. Direct microscopical analysis of samples, followed by cultivation on dichloran 18% glycerol agar at 25 degree C for 10 days to establish their mycoflora, was performed. The in vitro ciliostatic potential of the chloroform-extractable endo- and exometabolites of 41 representative fungal isolates was determined. Nine dust extracts in 2-butanone (2 from damp rooms) or 10 (6) in Me sub(2)SO showed some ciliostatic activity in the 3-days' experiment. Fungal composition of dust from buildings with leakage was almost identical with that from undamaged houses, as well as the fungal colony counts from the damp schools and the control samples. Aspergillus spp. were prevalent in the samples - 31 or 40% of all fungi, followed by Penicillium spp. and Cladosporium cladosporioides. Alternaria spp., Chaetomium spp., Mucor spp., Mycelia sterilia, Paecilomyces variotii, Rhizopus sp., Ulocladium sp. and yeasts were each isolated in less than 8% of the fungal content. No Aspergillus flavus isolate (8 in total) was aflatoxigenic in vitro. Alternaria spp., Aspergillus spp., Botrytis cinerea, Penicillium spp., C. cladosporioides, Chaetomium spp. and Ulocladium sp.; in total, 88% of all fungi tested, produced ciliostatically active metabolites. These toxigenic strains were also present in 4 dust samples from controls and 5 dust samples from water damaged buildings. Extracts of these dust samples were also toxic in bioassay. There were bio-detectable concentrations (10-20 mu g of extracts/ml of the organ culture medium) of toxic compounds in house dust. Contribution of fungal metabolites to its toxic effect should be studied further. Classification: X 24171 Microbial; A 01111 Personal; P 6000 TOXICOLOGY AND HEALTH; H 14000 Toxicology Fungi/ Airborne microorganisms/ Mycotoxins/ Dust/ Respiratory tract/ Houses/ Toxicity/ Chemical composition/ Residential areas/ Air quality/ Denmark

84. Pieckova, Elena and Kunova, Zuzana (2002). **Indoor fungi and their ciliostatic metabolites.** *Annals Of Agricultural And Environmental Medicine: AAEM* 9: 59-63.

Chem Codes: Chemical of Concern: DCNA; Rejection Code: IN VITRO.
According to epidemiological studies, it is possible that some secondary metabolites of indoor airborne fungi could be responsible for health troubles which occupants suffer from. In our previous experiments, a model with tracheal rings of 1-day-old chicks in vitro was shown to be a very suitable method to study the ciliostatic chloroform-extractable endo- and/or exometabolites of filamentous fungi. In this study we isolated the filamentous fungi from walls of "mouldy" dwellings and schools (cultivation on dichloran 18% glycerol agar at 25 and 37 degrees C for 10

d) in Slovakia. We studied the ciliostatic effect of the chloroform-extractable endo- and exometabolites of 96 representative isolates (stationary cultivation on the liquid medium with 2% of yeast extract and 10% of sucrose at 25 degrees C for 10 days) on the cilia movement in tracheal organ cultures of 1-day-old chickens in vitro after 24, 48 and 72 hrs (incubation in the minimal essential medium according to Eagle with Earl s salts and 20 microg of extract of metabolites dissolved in dimethylsulfoxide per 1 mL). Strains of Penicillium Link: Fr. sp., Aspergillus versicolor (Vuill.) Tiraboschi, A. flavus Link, Cladosporium sphaerospermum Penzig and C. cladosporioides (Fres.) de Vries were isolated most frequently. Two A. flavus isolates were able to produce aflatoxins B1, B2, G1, G2 in vitro after cultivation on the liquid medium with 20% sucrose and 2% yeast extract. This is the first isolation of aflatoxigenic A. flavus strains from dwellings in Slovakia. All frequently isolated strains produced secondary metabolites with the strongest ciliostatic activity -- their exo- and endometabolites stopped tracheal ciliary movement in chicks till 24 h. There are some toxic fungal metabolites in the indoor air not only with the ability to destroy ciliary movement in the upper airways in vitro but, probably, during long-lasting exposure to cause general intoxication of macroorganism via lung tissue. [Journal Article; In English; Poland]

85. PITT JI, HOCKING AD, BHUDHASAMAI, K., MISCAMBLE BF, WHEELER KA, and TANBOON-EK, P. (1993). **The normal mycoflora of commodities from Thailand: 1. Nuts and oilseeds.** *INTERNATIONAL JOURNAL OF FOOD MICROBIOLOGY;* 20: 211-226.

Chem Codes: Chemical of Concern: DCNA; Rejection Code: SURVEY.
BIOSIS COPYRIGHT: BIOL ABS. A comprehensive study was carried out of the fungi occurring in commodities normally traded in Thailand. Samples of major commodities were obtained from farmers' stocks and middlemen in major producing areas throughout the country. Retail samples were obtained from outlets in and around Bangkok. Samples were divided into two portions, one being examined in Bangkok, and the second in Sydney. After surface disinfection, fungi were enumerated by direct plating on dichloran rose bengal chloramphenicol agar, dichloran 18% glycerol agar, Aspergillus flavus and parasiticus agar and dichloran chloramphenicol peptone agar. Figures for percentage infection were calculated, and fungi were isolated and identified to species level. In all 602 samples were examined, and at North Ryde about 18000 fungal isolates identified. Data obtained from 329 samples are reported here, comprising maize (154), peanuts (109), cashews (45) and copra (21). Major fungi in maize included Fusarium monil Biology/Methods/ Biochemistry/ Comparative Study/ Biochemistry/Methods/ Biochemistry/ Metabolism/ Food Technology/ Food Technology/ Fruit/ Nuts/ Vegetables/ Fats/ Food Technology/ Oils/ Food Analysis/ Food Technology/ Food-Processing Industry/ Food Technology/ Food Additives/Poisoning/ Food Additives/Toxicity/ Food Contamination/ Food Poisoning/ Food Preservatives/Poisoning/ Food Preservatives/Toxicity/ Mycoses/ Environmental Monitoring/ Public Health/ Communicable Diseases/Microbiology/ Beverages/ Food Microbiology/ Food Contamination/ Industrial Microbiology/ Biophysics/ Plants/Physiology/ Plants/Metabolism/ Plants/Growth & Development/ Biophysics/ Plants/Metabolism/ Biophysics/ Plants/Chemistry/ Biophysics/ Plants/Physiology/ Plants/Metabolism/ Biophysics/ Plants/Physiology/ Fungi/ Plant Diseases/ Fungi

86. PLUMBLEY RA, COX, J., KILMINSTER, K., THOMPSON AK, and DONEGAN, L. (1985). **The effect of imazalil in the control of decay in yellow yam (Dioscorea cayenensis) caused by Penicillium sclerotigenum.** *ANN APPL BIOL; 106 (2). 1985 (RECD. 1986). 277-284.*

Chem Codes: Chemical of Concern: DCNA; Rejection Code: HUMAN HEALTH.

BIOSIS COPYRIGHT: BIOL ABS. A strain of Penicillium sclerotigenum isolated from decaying yellow yams (Dioscorea cayenensis) was found to have developed resistance to benzimidazole fungicides and the use of imazalil was investigated as an alternative agent for controlling it. Two formulations were tested and proved to be equally effective in controlling decay at a concentration of 50 mg imazalil litre-1 if the yams were dipped in it for 5 s; concentrations down to 10 mg litre-1 were effective if the immersion time was increased to 5 min or more. These treatments gave good control of decay when applied up to 24 h after inoculation but were less effective when application was 48 h after inoculation, although at 500 mg litre-1 there was some indication that levels of decay were decreased when compared with untreated tubers. Fungal penetration was unaffected or increased by increasing delays in the time of the fungicide application depending on the concentration applied. In trial shipments of yams from

87. PRIVMAN, M., RUPP EB, and ZUMAN, P. (1994). **Hexazinone: Polarographic reduction and adsorption on lignin.** *JOURNAL OF AGRICULTURAL AND FOOD CHEMISTRY;* 42: 2946-2952.

Chem Codes: Chemical of Concern: DCNA; Rejection Code: CHEM METHODS.
BIOSIS COPYRIGHT: BIOL ABS. Hexazinone (3-cyclohexyl-6-(dimethylamino)-1-methyl-1,3,5-triazine-2,4(1H,3H)-dione) (I) is reduced in acidic media at the dropping mercury electrode in two two-electron steps. The first step corresponds to a reduction of a protonated azomethine bond which is complicated at pH 2-4 by the establishment of a hydration-dehydration equilibrium. Measurement of the first wave at pH 3.7 is suitable for analytical purposes and was used for following the adsorption of hexazinone on lignin. In comparison with acifluorfen, thiram, and DCNA which had been studied earlier, hexazinone is less strongly adsorbed and is rapidly desorbed. Biology/Methods/ Biochemistry/ Comparative Study/ Biochemistry/Methods/ Biochemistry/ Minerals/ Biophysics/Methods/ Biophysics/ Macromolecular Systems/ Molecular Biology/ Biomedical Engineering/ Biophysics/ Engineering/ Biophysics/ Plants/Chemistry/ Biophysics/ Plants/Physiology/ Plants/Metabolism/ Grasses/Growth & Development/ Soil/ Herbicides/ Pest Control/ Pesticides/ Plants

88. Readman, J. W., Albanis, T. A., Barcelo, D., Galassi, S., Tronczynski, J., and Gabrielides, G. P. (1997). **Fungicide contamination of Mediterranean estuarine waters: Results from a MED POL pilot survey.** *Marine Pollution Bulletin [MAR. POLLUT. BULL.]* 34: 259-263.

Chem Codes: Chemical of Concern: DCNA; Rejection Code: SURVEY.
Fungicides are used extensively in agriculture. Negligible information is, however, available concerning the potential for these compounds to reach and impact estuarine and marine systems. To investigate possible contamination of the Mediterranean Sea from this class of agrochemicals, a pilot survey was undertaken during 1994. Riverine, estuarine and marine water samples were taken from the Ebro Delta, Spain, the Rhone Delta in the south of France, the River Po in Italy/Northern Adriatic sea and the Amvrakikos and Thermaikos Gulfs in Greece. They were analysed for selected fungicides which are used extensively in the countries involved. Compounds screened for included: captafol; captan; carbendazim; chlorothalonil; dicloran; ethirimol; folpet; fenpropimorph; metalaxyl; and vinclozolin. Results from the survey indicate that most of these fungicides are insufficiently persistent to impact estuarine and marine environments. Some, however, were detected during this survey: dicloran (Rhone Delta); carbendazim (Ebro Delta); captafol (River Po and N. Adriatic); captan (Greek rivers and lagoons); folpet (River Po, N. Adriatic and Loudias River, Greece); and vinclozolin (River Po). Contamination in these instances was generally restricted to drainage canals and riverine samples and was associated with known

agricultural applications. AFSA Input Center Number: CS9720111
Classification: Q5 01503 Characteristics, behavior and fate; O 4060 Pollution - Environment; P 1000 MARINE POLLUTION; SW 3020 Sources and fate of pollution; SW 0890 Estuaries fungicides/ estuarine chemistry/ agricultural pollution/ agricultural runoff/ Mediterranean Sea/ estuaries/ contamination/ water pollution/ MED

89. RED DW, SILLIVAN, P., and KAZEMZADEH, M. (1986). **INHIBITION OF ADVENTITIOUS ROOTING OF CHRYSANTHEMUM-MORIFOLIUM BY FUNGICIDES.** *ANNUAL MEETING OF THE AMERICAN SOCIETY FOR HORTICULTURAL SCIENCE (SOUTHERN REGION), ORLANDO, FLA., USA, FEB.* 2-4, 1986. HORTSCIENCE; 21: 935.

Chem Codes: Chemical of Concern: DCNA; Rejection Code: ASBTRACT.
BIOSIS COPYRIGHT: BIOL ABS. RRM ABSTRACT BOTRAN BANROT THIRAM BENLATE CAPTAN DACONIL LESAN TRUBAN Congresses/ Biology/ Biochemistry/ Biophysics/ Plants/Physiology/ Plants/Metabolism/ Plants/Growth & Development/ Biophysics/ Plant Growth Regulators/Pharmacology/ Plants/Physiology/ Plants/Metabolism/ Plants/Growth & Development/ Plants/Drug Effects/ Plants/Growth & Development/ Herbicides/ Pest Control/ Pesticides/ Plants

90. Rosenblum, Laura, Garris, Sherry T, and Morgan, Jeffrey N (**Comparison of five extraction methods for determination of incurred and added pesticides in dietary composites.** *Journal Of AOAC International* 85: 1167-1176.

Chem Codes: Chemical of Concern: DCNA; Rejection Code: CHEM METHODS.
The National Exposure Research Laboratory of the U.S. Environmental Protection Agency conducts research to measure exposure of individuals to chemical pollutants through the diet. In support of this research, methods are being evaluated for the determination of pesticides in dietary composite samples. In the present study, Soxhlet, blender, microwave-assisted, pressurized fluid, and supercritical fluid extraction methods were compared for the determination of incurred and added pesticides in 4 dietary composites, which varied in fat and water content. Incurred pesticides were chlorothalonil, chlorpyrifos, DDE, dicloran, dieldrin, endosulfan I, malathion, cis- and trans-permethrin, and trifluralin. Added pesticides were alpha- and gamma-chlordane, hexachlorobenzene, and fonofos. Concentrations of the individual pesticides were between 0.2 and 20 ng/g composite. All 5 methods tested could extract pesticides from dietary composites. Most incurred pesticides were recovered from the dietary composites within the range of 59-140% of expected values. Recoveries of added pesticides were between 60 and 130%. Microwave-assisted extraction led to significantly higher concentrations of 7 pesticides. Blender extraction yielded significantly higher concentrations of chlorothalonil and fonofos. Water content was a significant factor in the recovery of chlorothalonil, and fat content was a significant factor in the recovery of fonofos. In designing an exposure study, the selection of the extraction method would be determined by number of samples to be extracted, analyte stability, and cost. [Journal Article; In English; United States]

91. Sakai, Kiyoshi, Tsubouchi, Haruo, and Mitani, Kazunori (2003). **Airborne concentrations of fungal and indoor air pollutants in dwellings in Nagoya, Japan.** *[Nippon Koshu Eisei Zasshi] Japanese Journal Of Public Health* 50: 1017-1029.

Chem Codes: Chemical of Concern: DCNA; Rejection Code: NO TOX DATA.

PURPOSE: The purpose of this study was to determine airborne fungal concentrations in dwellings and to evaluate the relationship between indoor air concentrations of fungi and those of indoor air pollutants, temperature and relative humidity. METHODS: Indoor and outdoor concentrations of total fungi, xerophiles (xerophilic fungi), indoor air pollutants such as formaldehyde, nitrogen dioxide, carbon dioxide, carbon monoxide, temperature and relative humidity were measured in 54 dwellings in Nagoya, Japan. This study was performed in summer and winter from 1995 to 1998. The airborne fungal concentrations were analyzed using a pinhole air sampler and dichloran 18% glycerol agar (DG18), and compared with the levels assessed with potato dextrose agar (PDA). RESULTS: 1. DG18 can be recommended as an excellent medium for determining viable fungi concentrations in indoor air. 2. In indoor air, geometric means of total fungal and xerophile concentrations in summer were 237-301 CFU/m3 and 24.1-26.8 CFU/m3, as compared to 78.7-87.5 CFU/m3 and 18.2-29.5 CFU/m3, respectively, in winter. In outdoor air, geometric means of total fungal and xerophile concentrations in summer were 208 CFU/m3 and 9.2 CFU/m3, and 72.7 CFU/m3 and 10.1 CFU/m3, respectively, in winter. 3. The predominant genera in indoor and outdoor air were Cladosporium spp., followed by Penicillium spp. and Aspergillus spp. The major Aspergillus spp. was A. restrictus. 4. Indoor as well as outdoor air concentrations of total fungi were significantly higher in summer than in winter ($P < 0.01$), whereas differences in total fungal concentrations between indoor and outdoor air were not. Airborne xerophile concentrations in summer and winter were significantly higher in indoor air than in outdoor air ($P < 0.01$), while indoor as well as outdoor air xerophile concentrations in summer were similar to those in winter. 5. The total fungal and xerophile concentrations were not dependent on dwelling factors such as the type of dwellings, the type of flooring materials and the use of air-conditioners and/or heaters. 6. The total fungal and xerophile concentrations were not significantly correlated with the concentrations of all the indoor air pollutants. In winter, the total fungal and xerophile concentrations significantly increased in proportion to the average relative humidity ($P < 0.01$). CONCLUSION: The total fungal concentrations in indoor air were significantly correlated with those in outdoor air, while xerophile concentrations were not. The indoor air concentrations of total fungi and xerophiles were not dependent on those of indoor air pollutants. [Journal Article; In Japanese; Japan]

92. Schattenberg, H. J Iii and Hsu, J. P. (1992). **Pesticide residue survey of produce from 1989 to 1991.** *J Aoac (Assoc Off Anal Chem) Int* 75 : 925-933.

Chem Codes: Chemical of Concern: PNB,MTL,MOM,CBF,ADC,DCNA,DMT,CLNB; Rejection Code: HUMAN HEALTH.

ABSTRACT: BIOSIS COPYRIGHT: BIOL ABS. A pesticide residue screening program for 111 pesticides was performed on 6970 produce samples. Of the 81 varieties of samples, 2.4% contained illegal levels of pesticide residues (that is, higher than U.S. Environmental Protection Agency (EPA) tolerance or no tolerance specified), and 13.3% contained levels within tolerable limits established by EPA. Pesticide results are presented both by commodity and category type. The nature of violative residues is discussed.

KEYWORDS: General Biology-Institutions
KEYWORDS: Food Technology-Fruits
KEYWORDS: Food Technology-Evaluations of Physical and Chemical Properties (1970-)
KEYWORDS: Toxicology-Foods
KEYWORDS: Pest Control

93. SCHMIDT, M., WALKER RB, HOFFMAN DR, and MCCONNELL TJ (1993). **Nucleotide sequence of cDNA encoding the fire ant venom protein Sol i II.** *FEBS (FED EUR BIOCHEM SOC) LETT;* 319: 138-140.

Chem Codes: Chemical of Concern: DCNA; Rejection Code: NO TOX DATA.
BIOSIS COPYRIGHT: BIOL ABS. For the first time the cDNA encoding a fire ant (Solenopsis invicta) venom protein has been sequenced. Oligonucleotides were designed according to the amino acid sequence. The cDNA sequence was obtained by hybridizing these primers to mRNA and enhancement by the PCR technique. Comparison to the amino acid sequence of the venom protein shows a leader sequence 19 amino acids long. Nucleic Acids/ Purines/ Pyrimidines/ Amino Acids/ Peptides/ Proteins/ Biophysics/ Macromolecular Systems/ Molecular Biology/ Inflammation/Pathology/ Poisoning/ Animals, Laboratory/ Immunity, Cellular/ Hypersensitivity/ Animals/ Arachnida/ Entomology/Economics/ Pest Control/ Animal/ Insects/Physiology/ Physiology, Comparative/ Pathology/ Hymenoptera

94. Schrap, S M, van den Heuvel, H, van der Meulen, J, Ruiter, H, and Parsons, J R (2000). **A chemostat system for investigating pesticide biodegradation in continuous mixed bacteria cultures originating from surface water.** *Chemosphere* 40: 1389-1397.

Chem Codes: Chemical of Concern: DCNA; Rejection Code: BACTERIA.
To be able to predict the degradation (rate) of organic chemicals (e.g. pesticides) in the field, knowledge of the environmental conditions that are of influence on the degradation process are of importance. In the present study an experimental system is described which is used to study the degradation of organic pollutants in mixed bacteria cultures originating from surface water With this system the degradation of compounds can be followed for relatively long experimental periods (months). In addition, it is possible to vary different environmental parameters in order to investigate their influences on the degradation of the chemical. These preliminary experiments show that growth and 'composition' of the bacteria culture have comparable patterns in parallel experiments. The first order degradation rate constant for the test compound dichloran, as calculated from these experiments under these circumstances, is about 0.002 h(-1). [Journal Article; In English; England]

95. SCHULTZ TW and CRONIN, M. TD (1997). **Quantitative structure-activity relationships for weak acid respiratory uncouplers to Vibrio fisheri.** *ENVIRONMENTAL TOXICOLOGY AND CHEMISTRY;* 16: 357-360.

Chem Codes: Chemical of Concern: DCNA; Rejection Code: BACTERIA.
BIOSIS COPYRIGHT: BIOL ABS. Acute toxicity values (5- and 30-min Vibrio fisheri 50% luminescence inhibition) of 16 organic compounds thought to elicit their response via the weak acid respiratory uncoupling mechanism of toxic action were secured from the literature. Regression analysis of toxicities revealed that a measured 5-min V. fisheri potency value can be used as a surrogate for the 30-min value. Regression analysis of toxicity (30-min for potency (log pT30-1)) versus hydrophobicity, measured as the 1-octanol/water partition coefficient (log Kow), was used to formulate a quantitative structure-activity relationship (QSAR). The equation log pT30-1 = 0.489(log Kow) + 0.126 was found to be a highly predictive model (r2 adj. = 0.848). This V. fisheri QSAR is statistically similar to QSARs generated from weak acid uncoupler potency data for Pimephales promelas survivability and Tetrahymena pyriformis population growth impairment. This work, therefore, suggests that the weak acid respiratory unco

Biochemistry/ Biophysics/ Energy Metabolism/ Respiration/ Poisoning/ Animals, Laboratory/ Cell Differentiation/ Fetal Development/ Morphogenesis/ Embryology/ Vibrionaceae/ Fishes

96. SHAW P-C, ZHU R-H, YUNG M-H, YEUNG H-W, and HO, W. K-K (1992). **CLONING AND EXPRESSION OF TRICHOSANTHIN AND ALPHA MOMORCHARIN CDNA.** *FRANKEL, A. E. (ED.). TARGETED DIAGNOSIS AND THERAPY SERIES,7. GENETICALLY ENGINEERED TOXINS. XVI+494P. MARCEL DEKKER, INC.: NEW YORK, NEW YORK, USA; BASEL, SWITZERLAND. ILLUS. ISBN 0-8247-8454-5.; 0* 213-221.

Chem Codes: Chemical of Concern: DCNA; Rejection Code: NO TOXDATA.
BIOSIS COPYRIGHT: BIOL ABS. RRM TRICHOSANTHES-KIRILOWII MOMORDICA-CHARANTIA COMPLEMENTARY DNA PLANT TOXINS AMINO ACID SEQUENCE NUCLEOTIDE SEQUENCE MOLECULAR SEQUENCE DATA Plants/Cytology/ Plants/Genetics/ Nucleic Acids/ Purines/ Pyrimidines/ Amino Acids/ Peptides/ Proteins/ Biophysics/ Macromolecular Systems/ Molecular Biology/ Poisoning/ Animals, Laboratory/ Pharmacognosy/ Plants, Medicinal/ Plants

97. SIMMONS GF, SMILANICK JL, JOHN, S., and MARGOSAN DA (1997). **Reduction of microbial populations on prunes by vapor-phase hydrogen peroxide.** *JOURNAL OF FOOD PROTECTION;* 60: 188-191.

Chem Codes: Chemical of Concern: DCNA,AZD; Rejection Code: NO TOX DATA.
BIOSIS COPYRIGHT: BIOL ABS. Vapor-phase hydrogen peroxide (VPHP) was used to disinfect prunes. Concentrated hydrogen peroxide solution (35%, wt/wt) was volatilized into a stream of dried air to approximately 3.1 mg/l (wt/vol) of hydrogen peroxide. Dried prunes obtained from commercial dehydrators were treated with VPHP and compared to untreated prunes. Microbial populations were determined for treatment comparisons. Untreated dried prune microbial populations were 155, 107, and 111 CFU/g of prunes on aerobic plate count agar, potato dextrose agar, and dichloran rose bengal agar, respectively. In contrast, VPHP-treated prune microbial populations were reduced to near zero on all media after 10 minutes of VPHP exposure. The color of prunes exposed for 20 min or longer, however, showed oxidation damage. No hydrogen peroxide residues were detected 90 days after treatment. Biochemistry/ Biophysics/Methods/ Food Technology/ Fruit/ Nuts/ Vegetables/ Food Analysis/ Food Technology/ Food-Processing Industry/ Food Technology/ Food Microbiology/ Food Contamination/ Beverages/ Industrial Microbiology

98. SKAAR, I. and STENWIG, H. (1996). **Malt-yeast extract-sucrose agar, a suitable medium for enumeration and isolation of fungi from silage.** *APPLIED AND ENVIRONMENTAL MICROBIOLOGY;* 62: 3614-3619.

Chem Codes: Chemical of Concern: DCNA; Rejection Code: HUMAN HEALTH.
BIOSIS COPYRIGHT: BIOL ABS. A general medium named malt-yeast extract-sucrose agar (MYSA) containing oxgall was designed. The medium was intended for the enumeration and isolation of molds and yeasts in routine examinations of animal feed stuffs. In this study MYSA was tested as a general medium for mycological examination of silage. The medium was compared with dichloran-rose bengal medium (DRBC) in an examination of more than 500 specimens of big bale grass silage. Selected characteristics of known fungal species commonly isolated from feeds were examined after growth on MYSA and DRBC and on malt extract agar, used as a noninhibitory control medium. MYSA suppressed bacterial growth, without affecting the growth

of fungi common in feeds. The fungi growing on MYSA were easily recognized, and the medium seemed to slow radial growth of fungal colonies, which permitted easy counting. The number of species found was higher on MYSA than on DRBC. When we compared MYSA with DRBC for mycological examinati Biochemistry/ Animal Feed/ Animal Nutrition/ Feeding Behavior/ Microbiological Techniques/ Beverages/ Food Microbiology/ Food Contamination/ Industrial Microbiology/ Biophysics/ Nutrition/ Plants/Physiology/ Plants/Metabolism/ Biophysics/ Plants/Physiology/ Plants/Metabolism/ Plants/Growth & Development/ Biophysics/ Plants/Physiology/ Plants/Metabolism/ Fungi

99. SMITH BJ, FOX JA, KILLEBREW JF, and HEGWOOD, C. P. JR (1993). **FUNGICIDAL CONTROL OF BLACKBERRY ROSETTE CERCOSPORELLA RUBI.** *JOINT MEETING OF THE AMERICAN PHYTOPATHOLOGICAL SOCIETY AND THE SOCIETY OF NEMATOLOGISTS ON PLANT PATHOLOGY BEYOND* 2000, NASHVILLE, TENNESSEE, USA, NOVEMBER 6-10, 1993. PHYTOPATHOLOGY; 83: 1408.

    Chem Codes: Chemical of Concern: DCNA,PCZ; Rejection Code: ABSTRACT.
    BIOSIS COPYRIGHT: BIOL ABS. RRM MEETING ABSTRACT CERCOSPORELLA-RUBI PLANT FUNGUS BENOMYL BORDEAUX MIXTURE DCNA MYCLOBUTANIL FERBAM PROPICONAZOLE IPRODIONE METALAXYL FRUITS CROP INDUSTRY AGRICULTURE Congresses/ Biology/ Biochemistry/ Fruit/ Fungi/ Plant Diseases/ Plant Diseases/ Preventive Medicine/ Herbicides/ Pest Control/ Pesticides/ Mitosporic Fungi/ Plants, Medicinal

100. SMITH FD, PHIPPS PM, and STIPES RJ (1989). **EFFECTS OF FUNGICIDE RH-3486 ON SCLEROTINIA BLIGHT OF PEANUT IN FIELD AND MICROPLOT TESTS.** *ANNUAL MEETING OF THE AMERICAN PHYTOPATHOLOGICAL SOCIETY, RICHMOND, VIRGINIA, USA, AUGUST* 20-24, 1989. PHYTOPATHOLOGY; 79: 1170.

    Chem Codes: Chemical of Concern: DCNA; Rejection Code: ABSTRACT.
    BIOSIS COPYRIGHT: BIOL ABS. RRM ABSTRACT CULTIVAR FLORIGIANT PLANT SCLEROTINIA-MINOR FUNGUS MICROORGANISM YIELD IPRODIONE VINCLOZOLIN DICLORAN DICARBOXIMIDE CROP INDUSTRY Congresses/ Biology/ Biochemistry/ Oils/ Plants/Growth & Development/ Soil/ Fungi/ Plant Diseases/ Plant Diseases/ Preventive Medicine/ Herbicides/ Pest Control/ Pesticides/ Mitosporic Fungi/ Legumes

101. Soleas, G. J., Yan, J., Hom, K., and Goldberg, D. M. (**Multiresidue analysis of seventeen pesticides in wine by gas chromatography with mass-selective detection.** *Journal of Chromatography A, 882 (1-2) pp. 205-212, 2000*.

    Chem Codes: Chemical of Concern: DMT,DCNA; Rejection Code: METHODS.
    We have developed a multiresidue method permitting the simultaneous quantitation of 17 pesticides in wine: dicloran, dimethoate, diazinon, chlorpyrifos-methyl, vinclozolin, carbaryl, methiocarb, dichlofluanid, parathion-ethyl, triadimefon, procymidone, myclobutanil, iprodione, imidan, dicofol, phosalone and azinphos-methyl. Solid-phase extraction of 0.5 ml of wine sample is followed by direct injection of 1 mu l of the eluent onto a DB-5 MS gas chromatographic column followed by mass-selective detection using one target and two qualifier ions for each pesticide. The extraction and injection steps are carried out with automatic instrumentation. Good resolution of all compounds was achieved with a run-time approximating 23 min. Detection and quantitation limits were around 2 mu g/l and 10 mu g/l, respectively, with linear calibration curves up to 3 mg/l for most constituents. Recovery in half the compounds was greater than 90%,

and greater than 80% in most of the remainder. Imprecision (relative standard deviation) was less than 10% for most pesticides and less than 18% in all. Further analytes can be added to the repertoire without difficulty. The method merits consideration together with four other multiresidue methods now available that offer similar analytical characteristics, slower run-times, and a different selection of analytes. Copyright (C) 2000 Elsevier Science B.V. Classification: 92.10.4.9 CROP SCIENCE: Crop Protection: Chemical residues Wine/ Food analysis/ Sample preparation/ Pesticides

102. Spangenberg, D S and Ingham, S C (2000). **Comparison of methods for enumeration of yeasts and molds in shredded low-moisture, part-skim mozzarella cheese.** *Journal Of Food Protection* 63: 529-533.

Chem Codes: Chemical of Concern: DCNA; Rejection Code: HUMAN HEALTH.
Two studies were conducted to compare established and new methods for enumerating yeasts and molds in shredded low-moisture, part-skim mozzarella cheese stored under refrigeration and temperature-abuse conditions. Yeast and mold counts covered a range of 6 log10 units. In study 1, the potato dextrose agar plus chlortetracycline (PDA) pour plate, dichloran rose bengal chloramphenicol (DRBC) spread plate, Petrifilm, and Iso-Grid hydrophobic grid-membrane filtration methods were used to analyze samples after or = 0.96). In study 2, the PDA, DRBC, and Iso-Grid methods were compared with the Simplate 2-day method in an analysis of 42 samples stored for various times at 8, 11, 15, and/or 22 degrees C. The results of all methods except the Simplate method were again highly correlated (r2 > or = 0.94), although yeasts and molds were not always detected by all methods. Compared with the PDA, DRBC, and Iso-Grid methods, the Simplate method most often (10 of 42 samples, 23.8%) failed to detect yeasts and molds when at least one other method did, and the results were less highly correlated with those of other methods (r2 = 0.88 to 0.90). Our results suggest that the PDA, DRBC, Petrifilm, and Iso-Grid methods are equivalent for enumerating yeasts and molds in shredded low-moisture, part-skim mozzarella cheese samples. [Journal Article; In English; United States]

103. Stan, Hans-Jurgen (2000). **Pesticide residue analysis in foodstuffs applying capillary gas chromatography with mass spectrometric detection. State-of-the-art use of modified DFG-multi-method S19 and automated data evaluation.** *Journal of Chromatography, A* 892: 347-377.

Chem Codes: Chemical of Concern: TCZ,DCNA; Rejection Code: CHEM METHODS.
This paper focuses on recent developments in the author's lab. and reports on the \"ultimate\" anal. scheme which has evolved over the last 20 yr. This demonstrates the feasibility of screening analyses for pesticide residue identification, mainly by full scan GC-MS, down to the 0.01 ppm concn. level in plant foodstuffs. It is based on a miniaturized DFG S19 extn. applying acetone for extn. followed by liq.-liq. extn. with Et acetate-cyclohexane followed by gel permeation chromatog. The final chromatog. detn. is carried out with a battery of 3 parallel operating gas chromatog. systems using effluent splitting to electron-capture and nitrogen-phosphorus detection, one with a SE-54 the other with a OV-17 capillary column and the 3rd one with a SE-54 capillary column and mass selective detection for identification and quantitation. The method is established for monitoring >400 pesticides amenable to gas chromatog. These pesticide residues are identified in screening analyses by means of the dedicated mass spectral library PEST.L contg. ref. mass spectra and retention times of >400 active ingredients and also metabolites applying the macro program AuPest (Automated residue anal. on Pesticides) for automated evaluation which runs with Windows based HP ChemStation software. The 2 gas chromatog. systems with effluent splitting

to electron-capture and nitrogen-phosphorus detection are used to check the results obtained with the automated GC-MS screening and also to detect those few pesticides which exhibit better response to electron-capture and nitrogen-phosphorus detection than to mass spectrometry in full scan. [on SciFinder (R)] pesticide/ residue/ detection/ food/ GC/ MS Copyright: Copyright 2004 ACS on SciFinder (R))
Database: CAPLUS
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Section Code: 17-1
Section Title: Food and Feed Chemistry
Document Type: Journal
Language: written in English.
Index Terms: Mass spectrometry; Mass spectrometry (gas chromatog. combined with, capillary; pesticide residue anal. in foodstuffs applying); Gas chromatography; Gas chromatography (mass spectrometry combined with, capillary; pesticide residue anal. in foodstuffs applying); Food contamination (pesticide residue anal. in foodstuffs applying capillary gas chromatog. with mass spectrometric detection); Cinerins; Pyrethrins Role: ANT (Analyte), POL (Pollutant), ANST (Analytical study), OCCU (Occurrence) (pesticide residue anal. in foodstuffs applying capillary gas chromatog. with mass spectrometric detection); Food analysis (pesticide residue anal. in foodstuffs applying capillary gas chromatog. with mass spectrometric detection in); Pesticides (residue; anal. in foodstuffs applying capillary gas chromatog. with mass spectrometric detection)
CAS Registry Numbers: 50-29-3; 51-03-6 (Piperonyl butoxide); 52-68-6 (Trichlorfon); 53-19-0; 53-60-1 (Propazine); 55-38-9 (Fenthion); 56-38-2 (Parathion); 56-72-4 (Coumaphos); 58-89-9 (g-HCH); 60-51-5 (Dimethoate); 60-57-1 (Dieldrin); 62-73-7 (Dichlorvos); 63-25-2 (Carbaryl); 72-20-8 (Endrin); 72-43-5 (Methoxychlor); 72-54-8; 72-55-9; 72-56-0 (Perthane); 76-44-8 (Heptachlor); 78-48-8; 80-33-1 (Chlorfenson); 80-38-6 (Fenson); 82-68-8 (Quintozene); 84-61-7; 84-62-8; 84-66-2; 84-69-5; 84-74-2; 85-41-6 (Isoindole-1,3-dione); 85-68-7; 86-50-0 (Azinphos-methyl); 87-82-1 (Hexabromobenzene); 87-86-5; 88-85-7 (Dinoseb); 90-43-7 (2-Phenylphenol); 90-98-2; 92-52-4 (Biphenyl); 95-76-1 (3,4-Dichloroaniline); 97-17-6 (Dichlofenthion); 99-30-9 (Dicloran); 101-05-3 (Anilazine); 101-21-3 (Chlorpropham); 101-27-9 (Barban); 102-36-3 (3,4-Dichlorophenylisocyanate); 103-17-3 (Chlorbenside); 103-33-3 (Azobenzene); 106-47-8 (4-Chloroaniline); 107-49-3 (TEPP); 114-26-1 (Propoxur); 115-32-2 (Dicofol); 115-90-2 (Fensulfothion); 116-29-0 (Tetradifon); 117-18-0 (Tecnazene); 117-80-6 (Dichlone); 117-81-7; 117-84-0 (Phthalic acid dioctyl ester); 118-74-1 (Hexachlorobenzene); 119-12-0 (Pyridaphenthion); 121-75-5 (Malathion); 122-14-5 (Fenitrothion); 122-34-9 (Simazine); 122-39-4 (Diphenylamine); 122-42-9 (Propham); 131-11-3; 131-16-8; 133-06-2 (Captan); 133-07-3 (Folpet); 140-57-8 (Aramite); 141-66-2 (Dicrotophos); 148-79-8 (Thiabendazole); 150-50-5 (Merphos); 297-97-2 (Thionazin); 298-00-0 (Parathion-methyl); 298-02-2 (Phorate); 298-04-4 (Disulfoton); 299-84-3 (Fenchlorphos); 299-86-5 (Crufomate); 300-76-5 (Naled); 309-00-2 (Aldrin); 311-45-5 (Paraoxon); 314-40-9 (Bromacil); 319-84-6 (a-HCH); 319-85-7 (b-HCH); 319-86-8 (d-HCH); 327-98-0 (Trichloronat); 330-55-2 (Linuron); 333-41-5 (Diazinon); 470-90-6 (Chlorfenvinphos); 485-31-4 (Binapacryl); 500-28-7 (Chlorthion); 510-15-6 (Chlorobenzilate); 533-74-4 (Dazomet); 534-52-1 (DNOC); 563-12-2 (Ethion); 584-79-2 (Allethrin); 608-93-5 (Pentachlorobenzene); 640-15-3 (Thiometon); 709-98-8 (Propanil); 731-27-1 (Tolylfluanid); 732-11-6 (Phosmet); 759-94-4 (EPTC); 786-19-6 (Carbophenothion); 789-02-6; 834-12-8 (Ametryne); 841-06-5 (Methoprotryne); 886-50-0 (Terbutryn); 919-76-6 (Amidithion); 919-86-8 (Demeton-S-methyl); 933-78-8 (2,3,5-Trichlorophenol); 944-22-9 (Fonofos); 950-35-6 (Paraoxon-methyl); 950-37-8 (Methidathion); 957-51-7 (Diphenamid); 959-98-8 (a-Endosulfan); 973-21-7 (Dinobuton); 1007-28-9 (Desisopropylatrazine); 1014-69-3 (Desmetryne); 1014-70-6 (Simetryn);

1024-57-3; 1085-98-9 (Dichlofluanid); 1113-02-6 (Omethoate); 1114-71-2 (Pebulate); 1134-23-2 (Cycloate); 1194-65-6 (Dichlobenil); 1563-66-2 (Carbofuran); 1582-09-8 (Trifluralin); 1593-77-7 (Dodemorph); 1610-17-9 (Atraton); 1610-18-0 (Prometon); 1634-78-2 (Malaoxon); 1689-83-4 (Ioxynil); 1689-84-5 (Bromoxynil); 1713-15-1 (2,4-D Isobutyl ester); 1715-40-8 (Bromocyclen); 1746-81-2 (Monolinuron); 1836-75-5 (Nitrofen); 1861-32-1 (Chlorthal-dimethyl); 1861-40-1 (Benfluralin); 1897-45-6 (Chlorothalonil); 1912-26-1 (Trietazine); 1918-16-7 (Propachlor); 1918-18-9 (Swep); 1928-37-6 (2,4,5-T, Methyl ester); 1928-38-7 (2,4-D Methyl ester); 1929-77-7 (Vernolate); 1929-82-4 (Nitrapyrin); 1967-16-4 (Chlorbufam); 2008-41-5 (Butylate); 2032-59-9 (Aminocarb); 2032-65-7 (Methiocarb); 2104-64-5 (EPN); 2104-96-3 (Bromophos); 2163-69-1 (Cycluron); 2164-08-1 (Lenacil); 2164-17-2 (Fluometuron); 2212-67-1 (Molinate); 2227-13-6 (Tetrasul); 2275-14-1 (Phenkapton); 2275-18-5 (Prothoate); 2275-23-2 (Vamidothion); 2303-16-4 (Diallate); 2303-17-5 (Triallate); 2307-68-8 (Pentanochlor); 2310-17-0 (Phosalone); 2312-35-8 (Propargite); 2314-09-2 (Flurenol-butyl); 2385-85-5 (Mirex); 2425-06-1 (Captafol); 2436-73-9 ((2-Methyl-4-chlorophenoxy)acetic acid Methyl ester); 2439-01-2 (Quinomethionate); 2536-31-4 (Chlorflurenol-methyl); 2540-82-1 (Formothion); 2593-15-9 (Etridiazole); 2595-54-2 (Mecarbam); 2597-03-7 (Phenthoate); 2631-37-0 (Promecarb); 2631-40-5 (Isoprocarb); 2636-26-2 (Cyanophos); 2642-71-9 (Azinphos-ethyl); 2675-77-6 (Chloroneb); 2686-99-9 (3,4,5-Landrin); 2813-95-8 (Dinoseb acetate); 2921-88-2 (Chlorpyrifos); 2941-55-1 (Ethiolate); 3060-89-7 (Metobromuron); 3397-62-4 (Desethyldesisopropylatrazine); 3424-82-6; 3689-24-5 (Sulfotep); 3878-19-1 (Fuberidazole); 4147-51-7 (Dipropetryn); 4466-14-2; 4658-28-0 (Aziprotryne); 4710-17-2 (DMSA); 4726-14-1 (Nitralin); 4824-78-6 (Bromophos-ethyl); 5131-24-8 (Ditalimphos); 5234-68-4 (Carboxin); 5259-88-1 (Oxycarboxin); 5598-13-0 (Chlorpyrifos-methyl); 5836-10-2 (Chloropropylate); 5915-41-3 (Terbuthylazine); 6164-98-3 (Chlordimeform); 6190-65-4 (Desethylatrazine); 6923-22-4 (Monocrotophos); 7012-37-5 (PCB 28); 7286-69-3 (Sebuthylazine); 7287-19-6 (Prometryn); 7287-36-7 (Monalide); 7696-12-0 (Tetramethrin); 7700-17-6 (Crotoxyphos); 7786-34-7 (Mevinphos); 8065-48-3 (Demeton); 8065-62-1 (Demephion); 10265-92-6 (Methamidophos); 10311-84-9 (Dialifos); 10453-86-8 (Resmethrin); 10552-74-6 (Nitrothal-isopropyl); 12771-68-5 (Ancymidol); 13067-93-1 (Cyanofenphos); 13071-79-9 (Terbufos); 13121-70-5 (Cyhexatin); 13171-21-6 (Phosphamidon); 13194-48-4 (Ethoprophos); 13457-18-6 (Pyrazophos); 13593-03-8 (Quinalphos); 14214-32-5 (Difenoxuron); 14255-88-0 (Fenazaflor); 14437-17-3 (Chlorfenprop-methyl); 14816-18-3 (Phoxim); 15299-99-7 (Napropamide); 15310-01-7 (Benodanil); 15457-05-3 (Fluorodifen); 15972-60-8 (Alachlor); 16118-49-3 (Carbetamide); 18181-70-9 (Jodfenphos); 18181-80-1 (Bromopropylate); 18625-12-2 (2,4-DB Methyl ester); 19666-30-9 (Oxadiazon); 20354-26-1 (Methazole); 21087-64-9 (Metribuzin); 21725-46-2 (Cyanazine); 22212-55-1 (Benzoylprop-ethyl); 22224-92-6 (Fenamiphos); 22248-79-9 (Tetrachlorvinphos); 22781-23-3 (Bendiocarb); 23103-98-2 (Pirimicarb); 23184-66-9 (Butachlor); 23505-41-1 (Pirimiphos-ethyl); 23560-59-0 (Heptenophos); 23844-56-6 (Mecoprop Methyl ester); 23844-57-7 (Methyl Dichlorprop); 23950-58-5 (Propyzamide); 24017-47-8 (Triazophos); 24579-73-5 (Propamocarb); 24934-91-6 (Chlormephos); 25057-89-0 (Bentazone); 25059-80-7 (Benazolin-ethyl); 25311-71-1 (Isofenphos); 26002-80-2 (Phenothrin); 26225-79-6 (Ethofumesate); 26259-45-0 (Secbumeton); 26399-36-0 (Profluralin); 27314-13-2 (Norflurazon); 28044-83-9; 28553-12-0; 29232-93-7 (Pirimiphos-methyl); 29973-13-5 (Ethiofencarb); 30560-19-1 (Acephate); 30864-28-9 (Methacriphos); 31218-83-4 (Propetamphos); 31251-03-3 (Fluotrimazole); 31895-21-3 (Thiocyclam); 32809-16-8 (Procymidone); 33089-61-1 (Amitraz); 33213-65-9 (b-Endosulfan); 33245-39-5 (Fluchloralin); 33629-47-9 (Butralin); 33693-04-8 (Terbumeton); 33820-53-0 (Isopropalin); 34256-82-1 (Acetochlor); 34643-46-4 (Prothiophos); 35065-27-1 (PCB 153); 35065-28-2 (PCB 138); 35065-29-3 (PCB 180); 35256-85-0 (Tebutam); 35400-43-2 (Sulprofos); 35554-44-0 (Imazalil); 35575-96-3 (Azamethiphos); 35693-99-3 (PCB 52); 36734-19-7

(Iprodione); 36756-79-3 (Tiocarbazil); 37680-73-2 (PCB 101); 37893-02-0 (Flubenzimine); 38260-54-7 (Etrimfos); 39300-45-3 (Dinocap); 39515-41-8 (Fenpropathrin); 40487-42-1 (Pendimethalin); 41198-08-7 (Profenofos); 41394-05-2 (Metamitron); 41483-43-6 (Bupirimate); 42509-80-8 (Isazophos); 42576-02-3 (Bifenox); 43121-43-3 (Triadimefon); 50471-44-8 (Vinclozolin); 50563-36-5 (Dimethachlor); 51218-45-2 (Metolachlor); 51235-04-2; 51338-27-3 (Diclofop-methyl); 51630-58-1 (Fenvalerate); 52315-07-8 (Cypermethrin); 52645-53-1 (Permethrin); 52756-22-6 (Flamprop-isopropyl); 52888-80-9 (Prosulfocarb); 52918-63-5 (Deltamethrin); 53112-28-0 (Pyrimethanil); 55179-31-2 (Bitertanol); 55219-65-3 (Triadimenol); 55283-68-6 (Ethalfluralin); 55285-14-8 (Carbosulfan); 55290-64-7 (Dimethipin); 57018-04-9 (Tolclofos-methyl); 57052-04-7 (Isomethiozin); 57837-19-1 (Metalaxyl); 57966-95-7 (Cymoxanil); 58138-08-2 (Tridiphane); 58810-48-3 (Ofurace); 60168-88-9 (Fenarimol); 60207-90-1 (Propiconazole); 60207-93-4 (Etaconazole); 61213-25-0 (Flurochloridone); 62924-70-3 (Flumetralin); 63284-71-9 (Nuarimol); 65907-30-4 (Furathiocarb); 66063-05-6 (Pencycuron); 66246-88-6 (Penconazole); 67129-08-2 (Metazachlor); 67306-00-7 (Fenpropidin); 67564-91-4 (Fenpropimorph); 67747-09-5 (Prochloraz); 68085-85-8 (Cyhalothrin); 68359-37-5 (Cyfluthrin); 69327-76-0 (Buprofezin); 69335-91-7 (Fluazifop); 69377-81-7 (Fluroxypyr); 69409-94-5 (Fluvalinate); 69581-33-5 (Cyprofuram); 70124-77-5 (Flucythrinate); 71626-11-4 (Benalaxyl); 72490-01-8 (Fenoxycarb); 74070-46-5 (Aclonifen); 74738-17-3 (Fenpiclonil); 75736-33-3 (Diclobutrazol); 76578-14-8 (Quizalofop-ethyl); 76674-21-0 (Flutriafol); 76738-62-0 (Paclobutrazol); 77501-90-7 (Fluoroglycofen-ethyl); 77732-09-3 (Oxadixyl); 79241-46-6; 79622-59-6 (Fluazinam); 79983-71-4 (Hexaconazole); 81777-89-1 (Clomazone); 82558-50-7 (Isoxaben); 82657-04-3 (Bifenthrin); 84332-86-5 (Chlozolinate); 85509-19-9 (Flusilazole); 87130-20-9 (Diethofencarb); 87674-68-8 (Dimethenamid); 88283-41-4 (Pyrifenox); 88671-89-0 (Myclobutanil); 95465-99-9 (Cadusafos); 96489-71-3 (Pyridaben); 107534-96-3 (Tebuconazole); 110235-47-7 (Mepanipyrim); 112281-77-3 (Tetraconazole); 116255-48-2 (Bromuconazole); 118134-30-8 (Spiroxamine); 119168-77-3 (Tebufenpyrad); 120928-09-8 (Fenazaquin); 121552-61-2 (Cyprodinil); 124495-18-7 (Quinoxyfen); 131341-86-1 (Fludioxonil); 133855-98-8 (Epoxiconazole); 135590-91-9 (Mefenpyr-diethyl); 143390-89-0 (Kresoxim-methyl) Role: ANT (Analyte), POL (Pollutant), ANST (Analytical study), OCCU (Occurrence) (pesticide residue anal. in foodstuffs applying capillary gas chromatog. with mass spectrometric detection)

104. STEVENS, C. , KHAN VA, LU JY, WILSON CL, PUSEY PL, IGWEGBE, E. CK, KABWE, K., MAFOLO, Y., LIU, J., CHALUTZ, E., and DROBY, S. (1997). **Integration of ultraviolet (UV-C) light with yeast treatment for control of postharvest storage rots of fruits and vegetables.** *BIOLOGICAL CONTROL;* 10: 98-103.

Chem Codes: Chemical of Concern: DCNA; Rejection Code: YEAST.
BIOSIS COPYRIGHT: BIOL ABS. Applications of low doses of ultraviolet light-C (254 nm, UV-C), UV-C in combination with a biocontrol agent, Debaryomyces hansenii, or postharvest fungicides were compared for their ability to reduce the incidences of brown rot caused by Monilinia fructicola of peach, green mold (Penicillium digitatum) of tangerine, and Rhizopus soft rot (Rhizopus stolonifer) of tomato and sweetpotato that resulted from both field infections and artificial inoculations. UV-C light alone reduced the incidence of storage rots of all produce. However, in general, application of the postharvest fungicide benomyl (Benlate 50 DF; methyl-1-(butylcarbomoyl)-2-benzimidazole carbamate) or dichloran (Botran 75WP; 2,6-dichloro-4-nitroaniline) was more effective than UV-C treatment alone. When the produce were treated with D. hansenii 2 to 3 days after UV-C treatment, the reduction of storage rots was better than when UV-C was used alone. The percentage of brown rot infection of "Elberta" peaches 3 Biochemistry/

Food Technology/ Fruit/ Nuts/ Vegetables/ Food-Processing Industry/ Food Technology/ Fungi/ Plant Diseases/ Herbicides/ Pest Control/ Pesticides/ Ascomycota/ Mitosporic Fungi

105. STEVENS, C. , KHAN VA, TANG AY, and LU JY (1990). **The effect of UV radiation on mold rots and nutrients of stored sweet potatoes.** *J FOOD PROT;* 53: 223-226.

Chem Codes: Chemical of Concern: DCNA; Rejection Code: NO TOX DATA.
BIOSIS COPYRIGHT: BIOL ABS. Jewel, Carver, and Georgia Jet sweet potatoes were irradiated with ultraviolet radiation (UV). UV irradiation effectively decreased the percentage rot of sweet potatoes during storage. The optimum dose was 4.82 for Jewel and Carver, and 3.6UV was effective Botran (2, 6-dichloro-4-nitroaniline) in controlling of Fusarium rot. The effect of UV irradiation on nutrients of Jewel was not significant except that starch content was higher for UV-irradiated roots than for the non-irradiated roots. Isotopes/ Radiation/ Carbohydrates/ Nutrition/ Nutritional Status/ Food Technology/ Fruit/ Nuts/ Vegetables/ Food-Processing Industry/ Food Technology/ Food Microbiology/ Food Contamination/ Beverages/ Industrial Microbiology/ Mitosporic Fungi

106. Sugita, T, Nishikawa, A, Ichikawa, T, Ikeda, R, and Shinoda, T (2000). **Isolation of Trichosporon asahii from environmental materials.** *Medical Mycology: Official Publication Of The International Society For Human And Animal Mycology* 38: 27-30.

Chem Codes: Chemical of Concern: DCNA; Rejection Code: HUMAN HEALTH.
Trichosporon asahii is the most clinically important pathogenic yeast in the genus Trichosporon, as this species causes both deep-seated infection and summer-type hypersensitivity pneumonitis. We isolated 29 T. asahii colonies from environmental samples using the polymerase chain reaction (PCR) and dichloran rose bengal chloramphenicol (DRBC) medium. Our results suggest that T. asahii is common in nature. [Journal Article; In English; England]

107. Suzuki, H, Ogawa, M, Hironaka, K, Ito, K, and Sunada, H (2001). **A nifedipine coground mixture with sodium deoxycholate. I. Colloidal particle formation and solid-state analysis.** *Drug Development And Industrial Pharmacy* 27: 943-949.

Chem Codes: Chemical of Concern: DCNA; Rejection Code: NO TOX DATA.
Sodium deoxycholate (DCNa) is a bile salt that forms multimolecular inclusion compounds with a variety of organic substances. In this study, complex formulation of DCNa with nifedipine, a poorly water soluble drug, by grinding was investigated. The coground mixture was prepared with a vibration rod mill, and its solid state was characterized using powder X-ray diffraction, differential scanning calorimetry (DSC), and Fourier transform infrared (FTIR) spectroscopy. A laser diffraction particle size analyzer was also used to determine the particle size distribution curve in solution. When a nifedipine-DCNa (1:2 w/w) mixture coground for 30 min was dispersed into water and a pH 6.8 buffer solution, a semitransparent colloidal solution occurred immediately; 90% of the total particles formed in solution had a diameter less than 600 nm. Both powder X-ray diffraction peaks and DSC endothermic peak of nifedipine crystals were not found for the coground mixture, whereas a new exothermic peak was observed on DSC thermograms. The magnitude of this exothermic peak depended on the weight fraction of DCNa and the grinding time, indicating that nifedipine crystals changed into an amorphous state by complex formation with DCNa during the grinding process. In the FTIR spectrum of the coground mixture, the peaks of aromatic CH out-of-plane bend and dihydropyridine NH stretch of nifedipine were considerably weakened, suggesting that van der Waals interaction may be present between the drug and DCNa

molecules. From these results, it is clear that the cogrinding method with DCNa is very useful for the formation of amorphous nifedipine in the solid state and the production of colloidal particles of the drug in solution. [Journal Article; In English; United States]

108. Taniwaki, M H, Silva, N, Banhe, A A, and Iamanaka, B T (2001). **Comparison of culture media, simplate, and petrifilm for enumeration of yeasts and molds in food.** *Journal Of Food Protection* 64: 1592-1596.

Chem Codes: Chemical of Concern: DCNA; Rejection Code: HUMAN HEALTH.
The efficacy of three culture media, dichloran rose bengal chloramphenicol (DRBC), dichloran 18% glycerol agar (DG18), and potato dextrose agar (PDA) supplemented with two antibiotics, were compared with the Simplate and Petrifilm techniques for mold and yeast enumeration. The following foods were analyzed: corn meal, wheat flour, cassava flour, bread crumbs, whole meal, sliced bread, ground peanuts, mozzarella cheese, grated parmesan cheese, cheese rolls, orange juice, pineapple pulp, pineapple cake, and mushroom in conserve. Correlation coefficients of DRBC versus PDA and DG18 for recovering total mold and yeast counts from the composite of 14 foods indicated that the three media were generally equivalent. Correlation coefficients for Petrifilm versus culture media were acceptable, although not as good as between culture media. Correlation coefficients of Simplate versus DRBC, DG18, PDA, and Petrifilm for recovering total yeasts and molds from a composite of 11 foods demonstrated that there was no equivalence between the counts obtained by Simplate and other culture media and Petrifilm, with significant differences observed for the most foods analyzed. [Journal Article; In English; United States]

109. Thrane, U (1996). **Comparison of three selective media for detecting Fusarium species in foods: a collaborative study.** *International Journal Of Food Microbiology* 29: 149-156.

Chem Codes: Chemical of Concern: PNB,DCNA; Rejection Code: NO TOX DATA.
At the Second International Workshop on Standardisation of Methods for the Mycological Examination of Foods in Baarn, 1990, three selective media for food-borne Fusarium species were recommended: Czapek-Dox Iprodione Dichloran Agar (CZID), Dichloran Chloramphenicol Peptone agar (DCPA) and Pentachloronitrobenzene Peptone agar (PPA). Lack of sufficient data made it impossible to recommend one Fusarium selective medium. In the present study nine laboratories from seven countries compared CZID, DCPA, and PPA by analysing 10 samples of flour spiked with conidia of Fusarium avenaceum and F. verticillioides (= F. moniliforme). The colony forming units were counted. The total counts on each of the three media were within a similar range for each participant, and no significant differences between the three media were evident. However, the development of Fusarium colonies was quite different on the three media, and most collaborators found it possible to differentiate these Fusarium species by pigmentation on CZID. Pigmentation was much less conspicuous on PPA, and inconspicuous in DCPA cultures. CZID is recommended as the best currently available selective medium for Fusarium isolates from foods. [Journal Article; In English; Netherlands]
http://www.sciencedirect.com/science/article/B6WVB-45D2R67-3PJ/2/58860570fcdff625987a03bd330c7e0a

110. Torp, M. and Langseth, W. (**Production of T-2 toxin by a Fusarium resembling Fusarium poae.** *Mycopathologia [Mycopathologia]. Vol. 147, no. 2, pp. 89-96. 1999.*

Chem Codes: Chemical of Concern: DCNA; Rejection Code: NO TOX DATA.
A Fusarium species with a micro morphology similar to F. poae and a metabolite profile

resembling that of F. sporotrichioides has been identified. Like typical F. poae, the microconidia have a globose to pyriform shape, but the powdery appearance, especially on Czapek-Dox Iprodione Dichloran agar (CZID), less aerial mycelium and the lack of fruity odour on Potato Sucrose Agar (PSA) make it different from F. poae. The lack of macroconidia, polyphialides and chlamydospores differentiates it from F. sporotrichioides. All 18 isolates investigated, 15 Norwegian, two Austrian and one Dutch, produced T-2 toxin (25-400 mu g/g) on PSA or Yeast Extract Sucrose agar (YES). In addition, neosolaniol, iso-neosolaniol, HT-2 toxin, 4- and 15-acetyl T-2 tetraol, T-2 triol and T-2 tetraol and 4,15-diacetoxyscirpenol were formed in variable amounts. Neither nivalenol, 4- or 15-acetylnivalenol or 4,15-diacetylnivalenol were detected in any of the cultures, while these toxins were produced at least in small amounts by all the 12 typical F. poae isolates studied. The question of whether this Fusarium should be classified as F. poae or F. sporotrichioides or a separate taxon should be addressed. Classification: K 03082 Mycotoxins; X 24171 Microbial Conidia/ Agar/ Mycelia/ Mycotoxins/ Toxins/ T-2 toxin/ Fusarium poae/ Fusarium sporotrichioides

111. Viljoen, B C, Knox, A, Beuchat, L R, Deak, T, Malfeito-Ferreira, M, Hansen, T K, Hugo, A, Jakobsen, M, Loureiro, V, and Lourens-Hattingh et, al. (2004). **An inter-laboratory evaluation of selective media for the detection and enumeration of yeasts from blue-veined cheese.** *International Journal Of Food Microbiology* 94: 9-14.

Chem Codes: Chemical of Concern: DCNA; Rejection Code: YEAST.
Five countries representative of laboratories 1-5 evaluated 11 different selective media, designed to suppress mould and bacterial growth and support yeasts growth, for the recovery of yeast populations from blue veined cheeses. In addition, qualitative results were also incorporated. The yeast enumeration values were subjected to statistical analysis using analysis of variance (ANOVA) and the Tukey-Kramer multiple comparison test. With the exception of Laboratory 3, none of the other laboratories was successful in recovering yeasts on all the media. Six of the media proved inadequate for the enumeration of yeasts in the mould invested environment and were therefore omitted from statistical analysis. No significant differences in quantitative data obtained on Rose-Bengal Chloramphenicol Agar (RBCA), Dichloran Rose-Bengal Chloramphenicol Agar (DRBC), Dichloran 18% Glycerol Agar (DG18), and Malt extract agar supplemented with NaCl and oxytetracycline (MES) were detected by four of the collaborating laboratories whereas one laboratory found RBCA to be superior for yeast enumeration. DG18 and Malt Extract Agar with Biphenyl (MEB), however, were ranked superior based on qualitative results compared to the other media, attributed to distinctive individual yeast colonies and mould inhibition. RBCA, DRBC, DG18, and MES on the other hand, all proved to be adequate in supporting yeast colony development for quantitative analysis in samples obtained from blue veined cheeses. [Journal Article; In English; Netherlands]

112. Wade, Wendy N and Beuchat, Larry R (2003). **Proteolytic fungi isolated from decayed and damaged raw tomatoes and implications associated with changes in pericarp pH favorable for survival and growth of foodborne pathogens.** *Journal Of Food Protection* 66: 911-917.

Chem Codes: Chemical of Concern: DCNA; Rejection Code: HUMAN HEALTH.
Raw and minimally processed high-acid fruits and vegetables are considered to be at low or no risk for supporting growth of foodborne pathogens. The potential increase in the pH of tissues as a result of fungal growth, however, may enhance the potential for survival and growth. We examined 77 decayed and 138 damaged, raw, ripe tomatoes for the presence of yeasts and molds that produce proteolytic enzymes and other metabolites that can potentially increase the pH of pulp

tissue. The pH of decayed and sound radial pericarp tissues (pulp) of decayed tomatoes ranged from 4.7 to 7.8 (mean = 6.2) and 4.3 to 5.8 (mean = 5.0), respectively, whereas the pH of damaged and sound pericarp of damaged tomatoes ranged from 4.2 to 7.8 (mean = 5.2) and 4.2 to 8.0 (mean = 4.9), respectively. The pH of sound pericarp of 8.5% of decayed tomatoes and 3.4% of damaged tomatoes, respectively, was > 5.41. In contrast, the pH of 70% of the decayed tissue and 18% of the damaged tissue was > 5.41. Fungal isolates (n = 371) recovered from decayed and damaged tomatoes on dichloran rose bengal chloramphenicol agar were examined for proteolytic activity on gelatin agar and standard methods caseinate agar. One hundred eight (29%) of the isolates exhibited proteolytic activity on one or both differential media; 96 (89%) were molds, and 12 (11%) were yeasts. The pH of both media increased at the edge of proteolytic fungal colonies. Growth of proteolytic isolates from decayed tomatoes on tomato juice agar (pH = 4.3) and on the surface of tomato juice (pH = 4.1) caused an increase in mean pH values at the colony/medium interface to 7.2 and 6.4, respectively. Results show that some fungi capable of infecting raw tomatoes, as well as the mycoflora incident on tomato surfaces, can increase the pH of pericarp and juice to levels favorable for growth of most foodborne pathogenic bacteria. [Journal Article; In English; United States]

113. WANG, H., CHANG KF, HWANG SF, TURNBULL GD, and HOWARD RJ (1998). **EFFICACY OF FUNGICIDES AGAINST SCLEROTINIA DISEASE OF ECHINACEA.** *ANNUAL MEETING OF THE AMERICAN PHYTOPATHOLOGICAL SOCIETY, LAS VEGAS, NEVADA, USA, NOVEMBER* 8-12, 1998. PHYTOPATHOLOGY; 88 : S94.

Chem Codes: Chemical of Concern: DCNA; Rejection Code: ABSTRACT.
BIOSIS COPYRIGHT: BIOL ABS. RRM MEETING ABSTRACT SCLEROTINIA-SCLEROTIORUM ECHINACEA-ANGUSTIFOLIA ECHINACEA-PALLIDA ECHINACEA-PURPUREA FUNGUS PATHOGEN PLANT INFECTION PEST MANAGEMENT PHYTOPATHOLOGY BENOMYL FUNGICIDE VINCLOZOLIN IPRODIONE DICHLORAN PESTICIDES MEDICINAL PLANT PROTECTION ALBERTA CANADA Congresses/ Biology/ Plants/Growth & Development/ Pharmacognosy/ Plants, Medicinal/ Fungi/ Plant Diseases/ Plant Diseases/ Preventive Medicine/ Herbicides/ Pest Control/ Pesticides/ Ascomycota/ Plants

114. Wells, J. M. and Cooley, T. N. (1973). **Control of Pythium and Sclerotinia Rots of Snap Beans with Post Harvest Hot Water and Chemical Dips.** *Plant Dis.Rep.* 57: 234-236.

Chem Codes: User Define 2: CORE
Chemical of Concern: Cl,DCNA; Rejection Code: NO TOX DATA.

115. Wittenberg, K. M., Smith, S. R., Katepa-Mupondwa, F., and Yang, J. F. (1998). **Screening methodology for post-harvest fungal resistance in alfalfa.** *Canadian Journal of Plant Science* 78: 481-488.

Chem Codes: Chemical of Concern: DCNA; Rejection Code: Alfalfa/Aspergillus flavus/Aspergillus fumigatus/Aspergillus glaucus/Aspergillus repens/Aspergillus spp./Aspergillus versicolor/Genotype/NO TOXICANT/Post-harvest fungi/Resistance/Screening.
0008-4220. Forage deterioration due to field and storage fungi represents a major economic loss for hay producers. A series of experiments was conducted to develop a methodology for screening alfalfa plants for resistance to post-harvest fungal colonization. Pure cultures of Aspergillus glaucus, Aspergillus repens, Aspergillus flavus, Aspergillus versicolor and Aspergillus fumigatus, isolated from alfalfa forage sampled during field wilting and storage, were established and

maintained to pr duce a 10 superior 5 spore mL superior - superior 1 suspension containing an equal proportion of spores from each Aspergillus spp. Alfalfa leaves were dipped in concentrations of propionic acid solution to simulate levels of resistance to fungal activity. Fully-developed trifoliate leaves were placed adaxial side down onto petri plates containing a dichloran (2 mg mL superior - superior 1) and glycerol (18% vol /vol) agar. The Aspergillus spp. spore suspension was sprayed onto each petri plate and the plates were incubated under dark conditions at 25 degree C and 70% relative humidity. Plates were monitored daily for percent of leaf area colonized. The random screening of a small population of cloned alfalfa genotypes using this screening procedure indicated that variation in post-harvest resistance to fungal attack does exist for greenhouse and field-grown plants harvested at an early vegetative stage. Leaf dry matter was not related to genotype variation in post-harvest susceptibility to fungal colonization; however, leaf soluble carbohydrate level was negatively correlated (P less than 0.05) with leaf area colonized. The screening procedure did not detect consistent differences among genotypes when dried leaves were used

116. Wu, Pei-Chih, Su, Huey-Jen Jenny, and Ho, Hsiao-Man (2000). **A Comparison of Sampling Media for Environmental Viable Fungi Collected in a Hospital Environment.** *Environmental Research* 82: 253-257.

Chem Codes: Chemical of Concern: DCNA; Rejection Code: SURVEY.
Quantitative evaluation of fungal exposure is often conducted by analysis of the composition of microbes in air samples and calculation of the concentrations afterward. The collecting medium that favors the growth for most saprophytic fungi is considered to be the ideal choice in most circumstances. Currently, the culture medium most frequently adopted in environmental sampling for airborne fungi is MEA (malt extract agar) recommended by the ACGIH for its suitability for most fungal growth. DG18 (dichloran glycerol-18), developed in 1980, is suggested for growth at lower water activity (aw=0.95) specifically and is not as commonly used in general studies. This investigation collected airborne viable fungi using a single stage/N6 Andersen impactor with MEA and DG18 agar plates attached simultaneously to the same set of samplers. The sampling locations were at 17 sites within a central air-conditioned hospital. After incubation and morphological identification, concentrations of airborne fungi and bacteria were expressed as CFU/m3 (colony forming units/m3). There are 405 DG18 plates and 378 plates available for statistical analysis. Results show that the airborne fungal concentrations, shown by geometric mean (GM), are higher from the DG18 plates than from the MEA plates. The total fungal concentrations is 68.6 vs 12.94 CFU/m3, and for Aspergillus spp., the concentration is 1.58 vs 0.72 CFU/m3; for Penicillium spp., 3.37 vs 0.71; and for yeast, 5.09 vs 0.49 CFU/m3. In addition, the number of different genera present is greater on the DG18 plates than on the MEA plates, on average, 2.85 types vs 1.72. This study suggests that in a hospital environment with 24-h, central air conditioning, DG18 plates appear to be more effective in collecting more fungal colonies in terms of both quantity and types of genera. Such a finding is presumed to be attributed to the characteristic of DG18 in slowing colony growth so that the dominating genus will not over occupy the culture plate surface before the less competitive genus can fully develop. Future studies on related biological mechanisms are essential to conclude whether the above results sustain when sampling is conducted in other environments.

117. YU, J., CARY JW, BHATNAGAR, D., CLEVELAND TE, KELLER NP, and CHU FS (1993). **Cloning and characterization of a cDNA from Aspergillus parasiticus encoding an O-methyltransferase involved in aflatoxin biosynthesis.** *APPLIED AND ENVIRONMENTAL MICROBIOLOGY;* 59: 3564-3571.

Chem Codes: Chemical of Concern: DCNA; Rejection Code: NO TOX DATA.
BIOSIS COPYRIGHT: BIOL ABS. Aflatoxins are polyketide-derived secondary metabolites produced by the fungi Aspergillus flavus and Aspergillus parasiticus. Among the catalytic steps in the aflatoxin biosynthetic pathway, the conversion of sterigmatocystin to O-methylsterigmatocystin and the conversion of dihydrosterigmatocystin to dihydro-Omethylsterigmatocystin are catalyzed by an S-adenosylmethionine-dependent O-methyltransferase. A cDNA library was constructed by using RNA isolated from a 24-h-old culture of wild-type A. parasiticus SRRC 143 and was screened by using polyclonal antiserum raised against a purified 40-kDa O-methyltransferase protein. A done that harbored a full-length cDNA insert (1,460 bp) containing the 1,254-bp coding region of the gene omt-1 was identified by the antiserum and isolated. The complete cDNA sequence was determined, and the corresponding 418-amino-acid sequence of the native enzyme with a molecular weight of 46,000 was deduced. This 46-kDa native enzyme has a lead Plants/Cytology/ Plants/Genetics/ Nucleic Acids/ Purines/ Pyrimidines/ Amino Acids/ Peptides/ Proteins/ Biophysics/ Macromolecular Systems/ Molecular Biology/ Enzymes/Chemistry/ Poisoning/ Animals, Laboratory/ Biophysics/ Plants/Enzymology/ Mitosporic Fungi

118. ZOHRI AA, ABDEL-SATER MA, and ISMAIL MA (1995). **Incidence of aflatoxins and mould flora in corn snacks.** *JOURNAL OF FOOD SCIENCE AND TECHNOLOGY;* 32: 289-294.

Chem Codes: Chemical of Concern: DCNA; Rejection Code: HUMAN HEALTH.
BIOSIS COPYRIGHT: BIOL ABS. Survey on the occurrence of aflatoxins and mould flora in 60 different corn snack samples showed that all the kody samples were contaminated with aflatoxins B1, B2, G1 and G2 at concentrations, ranging from 50 to 100 mug/kg. Fifty-one species and 1 variety belonging to 26 genera were isolated from all samples, at 28ê C. The predominant mesophiles were: Aspergillus flavus, A. fumigatus A. niger on dicloran rose-Bengal agar. A. niger and A. flavus. Cladosporium sphaerospermum, Eurotium amstelodami and Penicillium chrysogenum on 15% NaCl-Czapek's agar. On YPSS agar at 45ê C, 9 species belonging to 6 genera and some yeasts were identified. A. fumigatus was the most common species on all kinds of corn snacks, Papulaspora sp. and A. niger were recorded in high frequencies on dracula and kody samples, respectively. Yeasts were isolated in low occurrence from karate, and high occurrence on the other three kinds of snacks at 45êC. Biochemistry/ Food Technology/ Food Analysis/ Food Technology/ Food-Processing Industry/ Food Technology/ Food Additives/Poisoning/ Food Additives/Toxicity/ Food Contamination/ Food Poisoning/ Food Preservatives/Poisoning/ Food Preservatives/Toxicity/ Beverages/ Food Microbiology/ Food Contamination/ Industrial Microbiology/ Biophysics/ Plants/Chemistry/ Ascomycota