

# IR-4 REPORTS

*A National Agricultural Program to Clear Safe and Effective Pest Control Agents for Minor Uses*



Contact: Dr. Robert Holm, Executive Director  
 IR-4 Project  
 Center for Minor Crop Pest  
 Management  
 Technology Centre of New Jersey  
 681 U.S. Highway #1 South  
 North Brunswick, NJ 08902-3390  
 Phone: 732-932-9575 Ext. 604  
 FAX: 732-932-8481  
 E-mail: holm@aesop.rutgers.edu

Since its beginning in 1963, the IR-4 Project has cooperated with researchers, producers, the agricultural chemicals industry and federal agencies to secure clearances for pest control products on minor crops or for minor uses on major crops. During this time, IR-4 has assisted with over 5500 clearances including tolerances, exemptions, label expansions, crop groupings, crop definitions, and reregistrations.

contribution of IR-4 to the availability of minor use/crop pest control products because IR-4's role in the clearance process ceases with the establishment of a tolerance or exemption. This report briefly summarizes some of the contributions IR-4 has made to establish tolerances and exemptions on a variety of minor crops since the program's reorganization in 1976. Other accomplishments, such as data to support registrations and label expansions through crop groupings and crop definitions, are not included in this *IR-4 Reports*.

There is often little public recognition of the

## IR-4 Has Obtained or Supported Tolerances and Exemptions for the Following Crops Grown in **Indiana**:

ALFALFA Aluminum Phosphide Glyphosate Magnesium Phosphide MCPA Pronamide	ALL RAW AGRICULTURAL COMMODITIES (Con't) Kaolin Methyl Eugenol + Malathion Nitrogen	ASPARAGUS 2,4-D <i>Bacillus thuringiensis</i> Chlorpyrifos Clopyralid Dimethoate Disulfoton Fenamiphos Fluazifop Fosetyl Al Glyphosate Linuron Malathion Myclobutanil Methyl Bromide Norflurazon Paraquat Permethrin	ASPARAGUS (Con't) Terbacil Triforine
ALL RAW AGRICULTURAL COMMODITIES <i>Bacillus thuringiensis</i> Carbon Dioxide Cinnamaldehyde <i>Codling Moth</i> <i>Granulosis Virus</i> Combustion Product Gas Gibberellic Acid	APPLE 2,4-D Aluminum Phosphide <i>Codling Moth</i> <i>Granulosis Virus</i> Magnesium Phosphide Phospholipid (EUP)		BEAN (DRY) <i>Bacillus thuringiensis</i> Chlorothalonil Sodium Chlorate
			BEET (GARDEN) <i>Bacillus thuringiensis</i> Endothal Fenamiphos Sethoxydim

BELGIAN ENDIVE Vinclozolin	BRUSSELS SPROUTS <i>Bacillus thuringiensis</i> Benomyl Chlorpyrifos Dimethoate Endothall Sodium Hypochlorite	CHERRY (SWEET) 2,4-D Chlorpyrifos Dimethoate Iprodione Methyl Anthranilate NAA Permethrin Pronamide	CRABAPPLE 2,4-D Phosmet
BLACKBERRY Bifenthrin Captan Chlorpyrifos Esfenvalerate Glyphosate Norflurazon Malathion Myclobutanil Oxyfluorfen Sethoxydim	CABBAGE <i>Bacillus thuringiensis</i> Benomyl Chlorpyrifos Clomazone DCPA Diazinon Endothall Glyphosate Magnesium Phosphide Malathion Methomyl Methyl Parathion Metolachlor Oxyfluorfen Paraquat Sodium Hypochlorite	CHERRY (TART) 2,4-D Methyl Anthranilate Permethrin Pronamide	CUCUMBER <i>Bacillus thuringiensis</i> Clomazone Glyphosate Paraquat Permethrin
BLUEBERRY 2,4-D Captan Chlorothalonil Chlorpyrifos Esfenvalerate Ethephon Fenbuconazole (Sec. 18) Fosetyl-Al Glyphosate Hexazinone Methyl Anthranilate Methyl Bromide Norflurazon Tebufenozide Terbacil Ziram	CANTALOUPE <i>Bacillus thuringiensis</i> Glyphosate Imidacloprid Malathion Metalaxyl + Mancozeb Paraquat Permethrin	CHINESE CABBAGE (NAPA) <i>Bacillus thuringiensis</i> Benomyl Chlorothalonil Chlorpyrifos Clomazone Cyromazine DCPA Diazinon Fenamiphos Glyphosate Magnesium Phosphide Malathion Methamidophos Methomyl Methyl Parathion Metolachlor Oxyfluorfen Paraquat Sodium Hypochlorite	DILL <i>Bacillus thuringiensis</i> Carbaryl Prometryn
BOK CHOY <i>Bacillus thuringiensis</i> Benomyl Chlorpyrifos Cyromazine DCPA Diazinon Methomyl	CARROT <i>Bacillus thuringiensis</i> Glyphosate Iprodione Malathion Metribuzin Paraquat Sethoxydim Thiabendazole	CHINESE MUSTARD <i>Bacillus thuringiensis</i> Cyromazine DCPA Diazinon Iprodione Malathion Methomyl Methyl Parathion Sodium Hypochlorite	EGGPLANT <i>Bacillus thuringiensis</i> Bifenthrin Fenamiphos Glyphosate Hexakis Magnesium Phosphide Oxamyl Paraquat Permethrin
BROCCOLI <i>Bacillus thuringiensis</i> Benomyl Chlorpyrifos Glyphosate Malathion Oxyfluorfen Paraquat Sodium Hypochlorite	CAULIFLOWER <i>Bacillus thuringiensis</i> Benomyl Chlorpyrifos DCPA Diazinon Endothall Glyphosate Malathion Methomyl Methyl Parathion Oxyfluorfen Paraquat Sodium Hypochlorite	CHINESE RADISH <i>Bacillus thuringiensis</i> Diazinon	ENDIVE (ESCAROLE) <i>Bacillus thuringiensis</i> DCNA Fluazifop Imazethapyr Sethoxydim
BROCCOLI RAAB <i>Bacillus thuringiensis</i> Benomyl Chlorpyrifos Esfenvalerate Glyphosate Methomyl Permethrin Sodium Hypochlorite		COLLARDS <i>Bacillus thuringiensis</i> Bensulide Chlorpyrifos Endothall Esfenvalerate Methomyl PCNB Sodium Hypochlorite	FIELD CORN <i>Bacillus thuringiensis</i> Sodium Chlorate
			GRAPE Aluminum Phosphide Bifenthrin Chlorpyrifos Fosetyl-Al Glyphosate Metalaxyl + Copper Methyl Anthranilate Zinc Phosphide
			HONEY and BEESWAX <i>Bacillus thuringiensis</i> Benzaldehyde Formic Acid Menthol
			HONEYDEW MELONS <i>Bacillus thuringiensis</i> Metalaxyl + Mancozeb Paraquat

HORSERADISH <i>Bacillus thuringiensis</i> DCPA Methomyl Oxyfluorfen Permethrin	MINT (Con't) Quizalofop Sethoxydim Tebufenozide Trifluralin	PARSLEY (Con't) Prometryn Sethoxydim	POTATO 2,4-D <i>Bacillus thuringiensis</i> Calcium Hypochlorite Copper Complex Sethoxydim Sodium Chlorate Spinosad Sulfuric Acid
KALE <i>Bacillus thuringiensis</i> Chlorpyrifos Methomyl PCNB Sodium Hypochlorite	MUSHROOM Benomyl Chlorothalonil Cinnamaldehyde DDVP Diazinon Diflubenzuron Malathion Naled Propiconazole <i>Pseudomonas fluorescens</i>	PARSNIP <i>Bacillus thuringiensis</i> Chlorothalonil Glyphosate Linuron	PUMPKIN <i>Bacillus thuringiensis</i> Benomyl Clomazone Glyphosate Metalaxyl + Mancozeb Oxamyl Paraquat
KOHLRABI <i>Bacillus thuringiensis</i> Chlorpyrifos DCPA Endothall Esfenvalerate Methomyl Sodium Hypochlorite	MUSTARDGREENS <i>Bacillus thuringiensis</i> Bensulide Chlorpyrifos Esfenvalerate Glyphosate Malathion Methomyl PCNB Sodium Hypochlorite	PEACH 2,4-D Carbofuran Chlorpyrifos Dodine Glyphosate Iprodione Malathion Oxytetracycline	RADISH <i>Bacillus thuringiensis</i> DCPA Methomyl Sodium Hypochlorite
LEEK <i>Bacillus thuringiensis</i> Chlorpyrifos Glyphosate Methomyl	OKRA <i>Bacillus thuringiensis</i> Carbaryl Esfenvalerate Fenamiphos Glyphosate Malathion	PEAR 2,4-D <i>Codling Moth</i> <i>Granulosis Virus</i> Diphenylamine Lignin Sulfonate Malathion Methomyl Oxytetracycline Permethrin	RASPBERRY 2,4-D Bifenthrin Captan Chlorpyrifos Endosulfan Fenamiphos Glyphosate Hexakis Malathion Myclobutanil Norflurazon Oxyfluorfen Sethoxydim Sulfur Triadimefon
LETTUCE <i>Bacillus thuringiensis</i> Bifenthrin Imazethapyr Magnesium Phosphide Methyl Bromide Sethoxydim	ONION (DRY) <i>Bacillus thuringiensis</i> Bromoxynil Chlorpyrifos Glyphosate Methyl Bromide Metolachlor Pendimethalin Permethrin	PEPPER (BELL) <i>Bacillus thuringiensis</i> Bifenthrin Clomazone Glyphosate Imidacloprid Magnesium Phosphide Metolachlor Paraquat Permethrin	RHUBARB <i>Bacillus thuringiensis</i> Fluazifop Gibberellic Acid Napropamide Paraquat Pronamide Sethoxydim
LIMA BEAN <i>Bacillus thuringiensis</i> Cyromazine Sodium Chlorate	ONION (GREEN) Bromoxynil Cypermethrin Glyphosate Methomyl Paraquat	PEPPER (NON-BELL) <i>Bacillus thuringiensis</i> Bifenthrin Clomazone Fenamiphos Glyphosate Imidacloprid Oxamyl	SNAP BEAN Clomazone Lactofen
MARIGOLD Hexakis	PARSLEY Azinphos-methyl <i>Bacillus thuringiensis</i> Linuron Methyl Parathion	PERSIMMON Glyphosate Magnesium Phosphide	SOUTHERN PEAS <i>Bacillus thuringiensis</i> Chlorothalonil Sodium Chlorate

<p>SOYBEAN</p> <p>2,4-D</p> <p>Aluminum Phosphide</p> <p>Azoxystrobin</p> <p>Glyphosate</p> <p><i>Lagenidium giganteum</i></p> <p>Magnesium Phosphide</p> <p>Sodium Chlorate</p>	<p>STRAWBERRY</p> <p>2,4-D</p> <p>Acifluorfen</p> <p>Captan</p> <p>Chlorpyrifos</p> <p>Fenamiphos</p> <p>Glyphosate</p> <p>Malathion</p> <p>Methyl Bromide</p> <p>Myclobutanil</p>	<p>SWEET POTATO</p> <p><i>Bacillus thuringiensis</i></p> <p>Calcium Hypochlorite</p> <p>Carbaryl</p> <p>Clomazone</p> <p>Fluazifop</p> <p>Magnesium Phosphide</p> <p>Napropamide</p> <p>Phosmet</p> <p>Pyrethrin + Piperonyl Butoxide</p> <p>Sethoxydim</p> <p>Thiabendazole</p>	<p>TURNIP(ROOT/GREENS)</p> <p><i>Bacillus thuringiensis</i></p> <p>Benomyl</p> <p>Chlorpyrifos</p> <p>Esfenvalerate</p> <p>Malathion</p> <p>Methomyl</p> <p>Paraquat</p> <p>Permethrin</p> <p>Spinosad</p> <p>Tebufenozide</p>
<p>SPINACH</p> <p>Azoxystrobin</p> <p><i>Bacillus thuringiensis</i></p> <p>Benomyl</p> <p>Glyphosate</p> <p>Malathion</p> <p>Metolachlor</p> <p>Phenmedipham</p> <p>Sethoxydim</p>	<p>SUGAR PEA</p> <p><i>Bacillus thuringiensis</i></p>	<p>SWISS CHARD</p> <p><i>Bacillus thuringiensis</i></p> <p>Endothall</p> <p>Sethoxydim</p>	<p>VETCH</p> <p>Pronamide</p>
<p>SQUASH (WINTER/ SUMMER)</p> <p><i>Bacillus thuringiensis</i></p> <p>Clomazone</p> <p>Glyphosate</p> <p>Imidacloprid</p> <p>Metalaxyl + Mancozeb</p> <p>Paraquat</p> <p>Permethrin</p>	<p>SUNFLOWER</p> <p>Carbaryl</p> <p>Glyphosate</p> <p>Malathion</p>	<p>TOMATILLO</p> <p><i>Bacillus thuringiensis</i></p> <p>Glyphosate</p>	<p>WATERMELON</p> <p><i>Bacillus thuringiensis</i></p> <p>Bifenthrin</p> <p>Glyphosate</p> <p>Imidacloprid</p> <p>Metalaxyl + Mancozeb</p> <p>Methyl Bromide</p> <p>Paraquat</p> <p>Permethrin</p>
	<p>SWEET CORN</p> <p>2,4-D</p> <p><i>Bacillus thuringiensis</i></p> <p>Propargite</p>	<p>TOMATO</p> <p><i>Bacillus thuringiensis</i></p> <p>Glyphosate</p> <p>Imidacloprid</p> <p>Magnesium Phosphide</p> <p>Paraquat</p>	

## Crop Group and Subgroup Successes

### Crop Group 1 - Root and Tuber Vegetables/*Glyphosate*

Arracacha; arrowroot; artichoke, Chinese; artichoke, Jerusalem; beet, garden; beet, sugar; burdock, edible; canna, edible; carrot; cassava, bitter and sweet; celeriac; chayote (root); chervil, turnip-rooted; chicory; chufa; dasheen (taro); ginger; ginseng; horseradish; leren; parsley, turnip-rooted; parsnip; potato; radish; radish, oriental; rutabaga; salsify; salsify, black; salsify, Spanish; skirret; sweet potato; tanager; turmeric; turnip; yam bean; yam, true

### Crop Subgroup 1B - Root Vegetables (except sugar beet)/*Glyphosate*

Beet, garden; burdock, edible; carrot; celeriac; chervil, turnip-rooted; chicory; ginseng; horseradish; parsley, turnip-rooted; parsnip; radish; radish, oriental; rutabaga; salsify; salsify, black; salsify, Spanish; skirret; turnip

### Crop Subgroup 1C - Tuberous and Corm Vegetables/*Imidacloprid, Spinosad*

Arracacha; arrowroot; artichoke, Chinese; artichoke, Jerusalem; canna, edible; cassava, bitter and sweet; chayote (root); chufa; dasheen (taro); ginger; leren; potato; sweet potato; tanager; turmeric; yam bean; yam, true

### Crop Group 2 - Leaves of Root and Tuber Vegetables/*Glyphosate*

Beet, garden; beet, sugar; burdock, edible; carrot; cassava, bitter and sweet; celeriac; chervil, turnip-rooted; chicory; dasheen (taro); parsnip; radish; radish, oriental (daikon); rutabaga; salsify, black; sweet potato; tanager; turnip; yam, true

### Crop Group 3 - Bulb Vegetables/*Glyphosate*

Garlic; garlic, great-headed; leek; onion, dry bulb and green; onion, Welsh; shallot

### Crop Group 4 - Leafy Vegetables (except Brassica Vegetables)/*Glyphosate*

Amaranth (Chinese spinach); arugula (rocket); cardoon; celery; celery, Chinese; celtuce; chervil; chrysanthemum, edible-leaved; chrysanthemum, garland; corn salad; cress, garden; cress, upland; dandelion; dock (sorrel); endive (escarole); fennel, Florence; lettuce, head and leaf; orach; parsley; purslane, garden; purslane, winter; radicchio (red chicory); rhubarb; spinach; spinach, New Zealand; spinach, vine; Swiss chard

### Crop Group 5 - Brassica (Cole) Leafy Vegetables/*Glyphosate*

Broccoli; broccoli, Chinese (gai lon); broccoli raab (rapini); Brussels sprouts; cabbage; cabbage, Chinese (bok choy); cabbage, Chinese (napa); cabbage, Chinese mustard (gai choy); cauliflower; cavalo broccolo; collards; kale; kohlrabi; mizuna; mustard greens; mustard spinach; rape greens

### Crop Subgroup 5A - Head and Stem Brassica/*Bifenthrin*

Broccoli; broccoli, Chinese; brussels sprouts; cabbage; cabbage, Chinese (napa); cabbage, Chinese mustard; cauliflower; cavalo broccolo; kohlrabi

### Crop Group 6 - Legume Vegetables (Succulent or Dried)/*Glyphosate*

Bean (*Lupinus*) (includes grain lupin, sweet lupin, white lupin, and white sweet lupin); bean (*Phaseolus*) (includes field bean, kidney bean, lima bean, navy bean, pinto bean, runner bean, snap bean, tepary bean, wax bean); bean (*Vigna*) (includes adzuki bean, asparagus bean, blackeyed pea, catjang, Chinese longbean, cowpea, crowder pea, moth bean, mung bean, rice bean, southern pea, urd bean, yardlong bean); broad bean (fava); chickpea (garbanzo); guar; jackbean; lablab bean; lentil; pea (*Pisum*) (includes dwarf pea, edible-podded pea, English pea, field pea, garden pea, green pea, snowpea, sugar snap pea); pigeon pea; soybean; soybean (immature seed); sword bean

### Crop Subgroup 6A - Edible-podded Legume Vegetables/*Bifenthrin*

Bean (*Phaseolus*) (includes runner bean, snap bean, wax bean); bean (*Vigna*) (includes asparagus bean, Chinese longbean, moth bean, yardlong bean); jackbean; pea (*Pisum*) (includes dwarf pea, edible-podded pea, snow pea, sugar snap pea); pigeon pea; soybean (immature seed); sword bean

### Crop Subgroup 6B - Succulent Shelled Peas and Beans/*Bifenthrin*

Bean (*Phaseolus*) (includes lima bean, green; broad bean, succulent); bean (*Vigna*) (includes blackeyed pea, cowpea, southern pea); pea (*Pisum*) (includes English pea, garden pea, green pea); pigeon pea

### Crop Group 7 - Foliage of Legume Vegetables/*Glyphosate*

Plant parts of any legume vegetable included in the legume vegetables that will be used as animal feed.

### Crop Subgroup 7A - Foliage of Legume Vegetables (except soybeans)/*Glyphosate*

Plant parts of any legume vegetable (except soybeans) included in the legume vegetables group that will be used as animal feed.

**Crop Group 8 - Fruiting Vegetables (except Cucurbits)/Glyphosate**

Eggplant; groundcherry (*Physalis* spp); pepino; pepper (includes bell pepper, chili pepper, cooking pepper, pimento, sweet pepper); tomatillo; tomato

**Crop Group 9 - Cucurbit Vegetables/Bifenthrin, Glyphosate, Imidacloprid**

Chayote (fruit); Chinese waxgourd (Chinese preserving melon); citron melon; cucumber; gherkin; gourd, edible (includes hyotan, cucuzza, hechima, Chinese okra); *Momordica* spp (includes balsam apple, balsam pear, bittermelon, Chinese cucumber); muskmelon (includes cantaloupe); pumpkin; squash, summer; squash, winter (includes butternut squash, calabaza, hubbard squash, acorn squash, spaghetti squash); watermelon

**Crop Group 9B - Squash/Cucumber/Fenpropathrin, Halosulfuron**

Chayote (fruit); Chinese waxgourd; cucumber; gherkin; gourd, edible; *Momordica* spp; pumpkin; squash, summer; squash, winter

**Crop Group 11 - Pome Fruits/Glyphosate**

Apple; crabapple; loquat; mayhaw; pear; pear, oriental; quince

**Crop Group 12 - Stone Fruits/Glyphosate, Imidacloprid (Sec. 18)**

Apricot; cherry, sweet; cherry, tart; nectarine; peach; plum; plum, Chickasaw; plum, Damson; plum, Japanese; plumcot; prune (fresh)

**Crop Group 13 - Berries/Glyphosate**

Blackberry (including bingleberry, boysenberry; dewberry; lowberry, marionberry, olallieberry, youngberry); blueberry; currant; elderberry; gooseberry; huckleberry; loganberry; raspberry, black and red

**Crop Subgroup 13A - Caneberries/Tebufenozide**

Blackberry; loganberry; red and black raspberry; cultivars and/or hybrids of these

**Crop Group 14 - Tree Nuts/Glyphosate**

Almond; beech nut; Brazil nut; butternut; cashew; chestnut; chinquapin; filbert (hazelnut); hickory nut; macadamia nut; pecan; walnut, black and English

**Crop Group 15 - Cereal Grains/Glyphosate**

Barley; buckwheat; corn; millet, pearl; millet, proso; oats; popcorn; rice; rye; sorghum (milo); teosinte; triticale; wheat; wild rice

**Crop Group 17 - Grass, Forage, Fodder and Hay/Glyphosate, Spinosad**

Any grass, Gramineae family (either green or cured) except sugarcane and those included in the cereal grains group, that will be fed to or grazed by livestock, all pasture and range grasses and grasses grown for hay or silage

**Crop Group 18 - Nongrass Animal Feeds (Forage, Fodder, Straw and Hay)/Glyphosate, Spinosad**

Alfalfa; bean, velvet; clover (*Trifolium*, *Melilotus*); kudzu; lespedeza; lupin; sainfoin; trefoil; vetch; vetch, crown; vetch, milk

**Crop Subgroup 19A - Herbs/Glyphosate**

Angelica; balm; basil; borage; burnet; camomile; catnip; chervil (dried); chive; chive, Chinese; clary; coriander (leaf); costmary; culantro (leaf); curry (leaf); dillweed; horehound; hyssop; lavender; lemongrass; lovage (leaf); marigold; marjoram; nasturtium; parsley (dried); pennyroyal; rosemary; rue; sage; savory, summer and winter; sweet bay; tansy; tarragon; thyme; wintergreen; woodruff; and wormwood

**Crop Subgroup 19B - Spices/Glyphosate**

Allspice; anise (seed); anise, star; annatto (seed); caper (buds); caraway; caraway, black; cardamom; cassia (bark); cassia (buds); celery (seed); cinnamon; clove (buds); coriander (seed); culantro (seed); cumin; dill (seed); fennel, common; fennel, Florence (seed); fenugreek; grains of paradise; juniper (berry); lovage (seed); mace; mustard (seed); nutmeg; pepper, black; pepper, white; poppy (seed); saffron; and vanilla

Please keep the following in mind as you review this information:

- IR-4's role is to petition the U.S. EPA to establish tolerances or exemptions for a pest control product on a crop. Some of these tolerances are regionally restricted. Other tolerances may have been established as a result of crop groupings. The fact that each tolerance or exemption is published in the 40 Code of Federal Regulations 180 for the raw agricultural commodity **does not necessarily mean** that the pesticide is registered for use. Registration of a specific use is the responsibility of the chemical manufacturer, who is the seller of the product.

- (Sec. 18), which are state(s) specific, makes reference to the time-limited tolerance established for a Section 18 Emergency Exemption use which is supported by IR-4 data.
- (EUP), which can be regionally restricted, makes reference to the Temporary Tolerance or Exemption for the Experimental Use Permit which is supported by IR-4.
- **This compilation does not constitute a recommendation for use.** The pesticide registrant or Cooperative Extension should be consulted for specific use information.
- IR-4 thanks the Indiana State Liaison Representative for assistance in preparing this report.

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More information on the IR-4 Minor Use Program is available from the following:

**Coordinator, IR-4 Project**

Technology Centre of New Jersey  
Rutgers, The State University of New Jersey  
681 U.S. Highway #1 South  
North Brunswick, NJ 08902-3390  
Phone: (732) 932-9575 FAX: (732) 932-8481

**Northeast Regional IR-4  
Coordinator**

Cornell Analytical Laboratories  
Department of Food Science & Technology  
NYSAES-Cornell University  
Geneva, NY 14456-0462  
Phone: (315) 787-2308 FAX: (315) 787-2397

**North Central Regional IR-4  
Coordinator**

National Food Safety & Toxicology Center  
Michigan State University  
East Lansing, MI 48824-1302  
Phone: (517) 353-9497 FAX: (517) 432-2098

**Western Regional IR-4 Coordinator**

Department of Environmental Toxicology  
One Shields Avenue  
University of California  
Davis, CA 95616-8588  
Phone: (530) 752-7633 FAX: (530) 752-2866

**Southern Regional IR-4  
Coordinator**

Institute of Food & Agricultural Science  
Food & Environmental Toxicology Laboratory  
P.O. Box 110720, SW 23rd Drive  
University of Florida  
Gainesville, FL 32611-0720  
Phone: (352) 392-2399 FAX: (352) 392-1988

**United States Department of  
Agriculture Coordinator**

ARS/Office of Minor Use Pesticides  
BARC-W, NRI, Bldg. 003, Room 325  
10300 Baltimore Ave.  
Beltsville, MD 20705-2350  
Phone: (301) 504-8256 FAX: (301) 504-8142

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IR-4 Project  
Technology Centre of NJ  
681 U.S. Highway #1 South  
North Brunswick, NJ 08902-3390

2001