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FROM: Jon B. Mann, Assistant Research Professor

RE: DOMINICAN REPUBLIC ASSESSMENT

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Our portion of the Environmental Assessment was conducted in the Dominican Republic from May 15th to the 22nd, 1988. A copy of this report was sent to Dr. Charles Ward.

JBM:sm

cc: Carroll Collier
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## CONSTANZA PILOT STUDY

The Department of Sanidad Vegetal has the responsibility for monitoring food and assuring the quality of formulated products. The only laboratories to accomplish the directive are located in San Cristobal. The laboratories are not functioning for lack of an operating budget. Two (2) chemists from these laboratories and one (1) chemist from the neighboring meat analysis laboratory (Ganaderia) received training in pesticide residue analysis at the University of Miami. Several other chemists have received training in other countries. Additional training will not improve the laboratory performance at this time.

It may be possible to raise funds for an operating budget by requiring that the agribusiness must have a representative sampling of products tested by the laboratory and charge for the analyses.

The laboratory needs to have some equipment repairs before they can be operational. One (1) gas chromatograph (G.C.) needs an oven limit switch and motor assembly which controls the oven temperature settings, and; one (1) G.C. needs repairs to the nitrogen-phosphorus (N-P) detector, the electron capture detector (E.C.D.) and to the applied voltage circuitry. They also need reagents and supplies. Then the laboratory should be able to analyze for Organochlorines, Organophosphates, and Carbamates (excluding the bisdithiocarbamates). The funds necessary to make the laboratory operational is $8,255 U.S. A more complete list of needs was provided by MOA/DOSV and is presented in Annex .

A pilot study should be initiated to: (1) determine the pesticide residues of selected pesticides on certain crops at harvest; (2) initiate the operation of the sanidad vegetal laboratory giving the country a resource for pesticide residue analysis; (3) use the study to check the capabililty of the lab by sending split samples to an independent laboratory in the U.S.; and, (4) measure the toxic effects on applicators and handlers of the concentrated pesticides.

## Pilot Study (cont'd)

Three crops which represent a large portion of the output in the Constanza area are potatoes, onions, and cabbage. The pesticides that are available in the area and which are registered for use on these crop in the U.S. are:

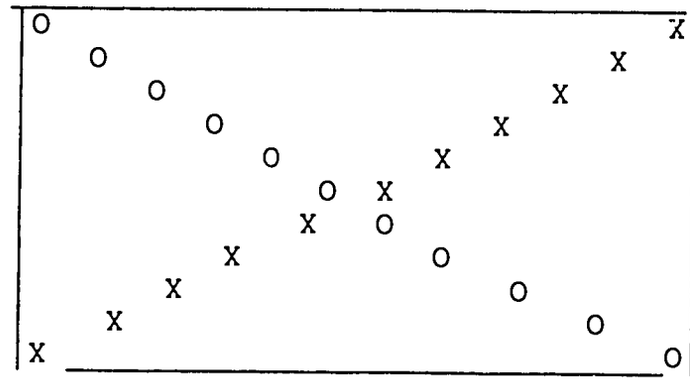
| Potatoes | Onions | Cabbage |
|---|---|---|
| Aldicarb | Chlorpyrifos | Chlorpyrifos |
| Endosulfan | Methomyl | Disulfoton |
| Linuron | Methyl Parathion | Endosulfan |
| Methamidophos | Oxamyl | Methamidophos |
| Methomyl | *Diazinon | Methomyl |
| Methyl Parathion | *Malathion | Methyl Parathion |
| Metribuzin | | Permethrin |
| Oxamyl | | Carboryl |
| Permethrin | | *Diazinon |
| Benomyl | | Dimethoate |
| *Diazinon | | *Malathion |
| Dimethoate | | |
| *Malathion | | |

Taking into account the analytical capabilities of the sanidad vegetal laboratory, keeping consistancy in the experiment and with the necessary spray and safety equipment, and considering the toxicities of the pesticides, the recommended pesticides are diazinon and malathion. Methyl Parathion would give a better index of human toxicity, but should only be used by properly trained personnel using the specified safety equipment.

A plot (average size for the crop) of each of the selected crops should be sprayed in a manner consistent with the normal maintenance of the crop. Blood samples of the mixer/loader/applicator should be taken after each spray and analyzed by the hospital in Constanza for cholinesterase inhibition. Samples of crop material are taken before spraying to determine the background residue level. After spraying, samples of crop material can be taken to monitor residue levels, but this would be an academic exercise. To determine the residue levels at time of harvest will give the information on exposure of the consumers.

## MINIMUM RESIDUE TESTING

| | POTATOES | ONIONS | CABBAGE |
|---|---|---|---|
| -1 Day (Before Spray) | 5 spls | 5 spls | 5 spls |
| 0 Day (After Spray) | 5 spls | 5 spls | 5 spls |
| HARVEST DAY | 5 spls | 5 spls | 5 spls |



Samples are taken on an imaginary diagonal across the field. Two (2) composite samples are taken along the diagonal indicated by the X's and two (2) composite samples along the O diagonal plus one (1) sample in the center of the field. The sample in the center of the field will give the highest residue possible, whereas the composite samples will show the average level.

## TOXICITY TESTING

| | POTATOES | ONIONS | CABBAGE |
|---|---|---|---|
| -1 Day (Before Spraying) | 1 | 1 | 1 |
| 0 Day (1 Hour After Spraying) | 1 | 1 | 1 |

One (1) applicator should be used for each field crop. A blood sample should be taken the day before spraying.

The budget associated with this project assumes that salaries are not included in the costs. If possible, split samples for pesticide residues should be sent to a laboratory in the U.S. to confirm the residue levels.

## CONFIRMATION OF RESIDUES

| | POTATOES | ONIONS | CABBAGE |
|---|---|---|---|
| -1 Day | 1 spl | 1 spl | 1 spl |
| 0 Day | 1 spl | 1 spl | 1 spl |
| HARVEST DAY | 1 spl | 1 spl | 1 spl |

After mixing well, a half of one (1) of the composite samples from each sprayed crop should be sent for confirmation. As part of the CICP sub-contract to the University of Miami, laboratory analytical services are provided to the extent as they do exceed the sub-contract budget. The nine (9) samples indicated will be analyzed free of charge if they are delivered frozen to the laboratory in Miami. Import permits from the U.S. Department of Agriculture will be necessary.

## BUDGET FOR PILOT STUDY

| | |
|---|---|
| Cost of Analyses for Residues (45 Samples) | $ 1,900 |
| Sampling & Transportation Costs (320 $R.D./day x 9 days) | 2,800 |
| Cost for Cholinesterase Determinations (6-25 spls) | 500 |
| Sampling Costs (Blood Taken at Hospital) | 300 |
| Transportation of Samples to Miami (With Dry Ice) | 1,250 |
| Analyses Sub Total: | $ 6,830 |
| Cost of Mochilero (3 Plots X 1 Spray) | 300 |
| Cost of Pesticides | 800 |
| Cost of Crop Maintenance (2500 $R.D./plot x 3 Plots) | 7,500 |
| Other Costs Sub Total: | $ 8,600 |
| PROJECT TOTAL | $15,430 |

This budget assumes the use of 3 spray applicators (1 for each crop) to be used for only the 1st spray on each crop. The human toxicity testing will be completed at this time. Any subsequent sprays used for normal maintenance of the crop using the same pesticide(s) will be performed by Department of Sanidad Vegetal personnel. The cost for sampling and transportation also assumes that the first spray on all three (3) crops will be performed on different days and that the crops will be harvested on different days.

## REFERENCES


1. "Managing Insect and Mite Pests of Sorghum; Texas Agricultural Extension Service;" The Texas A & M University System, College Station, Texas.

2. "Texas Guide for Controlling Insects on Commercial Vegetable Crops;" Texas Agricultural Extension Service.

3. "Managing Insect and Mite Pests of Corn;" Texas Agricultural Extension Service.

4. "Management of Cotton Insects;" Texas Agricultural Extension Service.

5. "The Status of Chemicals in the Special Review Program, Registration Standards Program, Data Call-In Program, and Other Registration Activities 1987;" U.S.E.P.A., 401 M Street, S. W., Washington, D. C. 20460.

6. "Pacific North West Weed Control Handbook January 1986;" Extension Services of Oregon State University, Washington-State University, and the University of Idaho.

7. "1988 Farm Chemicals Handbook;" Copyright Clearance Center, 21 Congress Street, Salem, MA 01970.

8. Harlschorn, G. et.al. 1981. The Dominican Republic, Country Environmental Profile, A Field Study. A.I.D. Contract No. AID/SOD/PDC-C00247. J.R.B. Associates, 8400 Westpark Drive, McLean, Virginia 22102, U.S.A. 109p.

9. "Code of Federal Regulations," Vol. 40, Parts 150-189 (1983).

Table 2

Restricted and/or U.S. Prohibited Pesticides
Currently Used in the Dominican Republic

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Aldicarb (TEMIK); Insecticide, Nematocide
Dicrotophos (BIDRIN, CARBICRON); Insecticide
Paraquat (GRAMOXONE); Herbicide
Fenamiphos (NEMACUR); Nematocide
Monocrotophos (AZODRIN); Insecticide
Carbofuran (FURADAN); Insecticide 1/
Metaldehyde (METALDEHYDE); Mollusicide
Dinocap (KARATHANE); Fungicide, Acaricide 2/
Dibromochloropropane (DBCP); Soil Fumigant 2/
Methomyl (LANNATE); Insecticide
Mevinphos (PHOSDRIN); Insecticide
Monocrotophos (AZODRIN); Insecticide
Oxamyl (VYDATE); Insecticide, Nematocide
Disulfoton (SOLVIREX); Insecticide, Acaricide
Ethoprop (MOCAP); Mematocide
Methamidophos (TAMARON); Insecticide, Acaricide
Methidathion (SUPRACID); Insecticide
Phoxim (VOLATON) 2/
Prophenofos (TAMBO, SELECRON); Insecticide, Acaricide
Vamidothion (KILVEL) 2/

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1/Only liquid formulations are restriced.
2/This product is not permitted for use in U.S.

Table

Pesticides Used in the Dominican Republic
According to Categories

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ORGANOPHOSPHATES

Acephate, Chlorpyrifos, Dichlorvos, Dicrotophos, Disulfoton, Diazinon, Ethoprop, Dimethoate, Fenamiphos, Fenitrothion, Fenthion, Glyphosate, Malathion, Mephosfolan, Methamidophos, Methidathion, Methyl Parathion, Monocrotophos, Phosalone, Profenofos, Triazophos, and Vamidothion.

CARBAMATES

Aldicarb, Carbaryl, Carbofuran, Carbendazim, Methomyl, Oxamyl, Benomyl

BISDITHIOCARBAMATES

Maneb, Propineb and Zineb

ORGANOCHLORINES

Captofol, Captan, Endosulfan, Dicofol Oxyfluorfen, Propanil

TRIAZINES

Atrazine, Metribuzin

PYRETHROIDS

Cyfluthrin, Cypermethrin, Deltamethrin, Permethrin

MISCELLANEOUS

DCNA, Fentin Acetate, Linuron, Oxadiazon, Paraquat, Pendametholin. Phoxim, Trichlorfon

CHLOROPHENOXY ACIDS

2,4-D, MCPB

## POSSIBLE HUMAN EFFECTS

Organophosphates anad carbamates (See Table ) are cholinesterasse inhibitors causing symptomatology of varying severity from illness to death by paralysis depending on the dose (concentration) exposure. The LD 50 is an indicator of human sensitivity (extrapolated from animal studies) to a particular pesticide. The mixer/loader/applicator group has the greatest risk of exposure and therefore has the greatest risk of intoxication. Treatment is possible with atropine and 2-PAM, and the effect is reversible if treated in time. No known long term effects are noted with the organophosphates available in the Dominican Republic (DR), with the exception of: 1) Chlorpyrifos and Dichlorvos which are lipophilic and can be stored in body fat; and 2. mephosfolan which was shown to cause demylinization, (removal of the mylial nerve sheath) and permanent paralysis in chickens. Leptophos is registered for use, although none was observed to be available. Leptophos is more lipophilic than DDT and is knowns to cause delayed neurotoxic effects and demylinization.

Carbamate exposure can be treated with atropine (2-PAM is contraindicated). Bisdithiocarbamate metabolites include ethylene dithio-urea (EDTU) which is a carcinogen. There is very little evidence of EDTU being found under actual field conditions.

If labeling instructions are followed for the use of these types of pesticides, there should not be any long term effects associated with organophosphate or carbamate residues on food excluding the noted exceptions. Organochlorinated pesticides are lipophilic and are stored in body fat. Since they are carcinogens, exposure should be minimized. Studies should be conducted to determine the half-life of available pesticides as used on selected crops. Dicofol contains DDE, DDD and DDT as impurities. Use of this product will lead to residues of DDT and metabolites.

Use of the esters of chlorophenoxy acids instead of the salts is more dangerous because of respiratory exposure even though the oral LD 50 of both are approximately the same. The salts are systemic, therefore, there is a chance of residues within the food crop. Chlorophenoxy acids and organochlorines are central nervous system stimulators.

Pyrethroids have low mammalian toxicity and do not pose an acute poisoning threat to applicators. Residues may build up in human tissue, but little is known of long term effects. Pyrethroids are primary irritant and can cause dermal problems for applicators.

The proposed pesticides are generally non-persistent and, if used in accordance with their labels, should present no unusal hazards to the natural environment (See Section 7). The project will share with the Plant Protection and Agromedical Personnel

(DOSV) information concerning toxicity of pesticides and procedures for mitigating hazards. Some of the possible environmental hazards are discussed below.

## Possible Environmental Effects

Organophosphates and carbamates are less persistent than the organochlorines and therefore pose less of a danger to the environment than the more persistent organochlorines. The triazines and miscellaneous pesticides generally are the most water soluble. Usually, the higher the water solubility, the lower the soil sorption. The higher the water solubility , the greater the threat to water systems. As the soil sorption coefficient increases, the stronger the chemical is held in the soil, which lessens the chance of contaminating water systems. Table is a list of water solubilities and sorption coefficients.

One of the other possible non-target effects is the hazard of pesticides to honeybees. The relative danger of selected pesticides is as follows:

HIGHLY TOXIC-CARBARYL, CARBOFURAN, CHLORPYRIFOS, DIAZINON, DIMETHOATE, MALATHION, METHIDATHION, PERMETHRIN
MODERATELY TOXIC - DISULFOTON, METHOMYL
RELATIVELY NON-TOXIC - TRICHLORFON

Beef cattle are raised mainly in the La Romana area where pesticide use is not concentrated. Cotton is grown in this area. If chlorinated pesticides are used on cotton, and cattle are allowed to feed on cotton stocks and on the cotton seed cake left after cottonseed oil extraction, beef cattle will bioaccumulate the organochlorines in their fat. This can lead to residue levels which exceed the tolerances of importing countries and impose an economic burden on the Dominican Republic as well as a health hazard.

Animal feed development is being considered at the Instituto Dominicana de Tecnologia Industrial (INDOTEC) using otherwise discarded material such as cacao shells. Pesticide residue levels should be determined to prevent animal contamination. In Hawaii, an animal feed was developed from pineapple stock without consideration of residues of heptachlor which is used on pineapple. This led to contamination of milk (heptachlor epoxide) from cows fed this material.

Table 1. Pesticides Available in the Dominican Republic and Used in Crops Indicated. Also Shown are Toxicity Categories of Listed Pesticides. (1,2,3,4,5,6,7)

| Common Name and (Brand Name) | Action | Toxicity Category | TOMATO 1 | RICE 2 | POTATO 3 | SWEET POTATO 4 | YAMS 5 | CABBAGE 6 | CASSAVA 7 | PIGEON PEAS 8 | SNOW PEAS 9 | CUCUMBERS 10 | RED KIDNEY BEANS 11 | CORN 12 | SORGHUM 13 | ONIONS 14 | CARROTS 15 | PAPAYA 16 | BEANS 17 | BEETS 18 | MELONS 19 | GREEN SQUASH YAUITIA 20 | COTTON 21 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Acephate (ORTHENE) | Insecticide | III | | X | | | | X | | | | | | X | | | | | X | | | | X |
| Aldicarb (TEMIK)* | Insecticide & Nematocide | I | | | X | X | | | | | | | | | X | | | | X | | | | X |
| Atrazine | Herbicide | III | | | | | | | | | | | | X | X | | | | | | | | |
| Bacillus Thuringiensis (DIPEL) | Insecticide | III | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| Benomyl (BENLATE)[7] | Fungicide | III | X | X | | X | | X | | | | X | | X | X | | X | | X | | X | X | |
| Bromopropylate (NEORON)[2] | Acaricide | III | | | | | | | | | | | | | | | | | | | | | |
| Butyl Fluazifop (FUSILLADE) | Herbicide | II | | | X[3] | | | | | | | | | | | | | | | | | | X |
| Captafol (DIFOLATAN) | Fungicide | II | X | | X | | | | | | | X | | X | | X | | | | | X | | |
| Captan (CAPTAN) | Fungicide | III | X | | X | | | X | | X[3] | | X | X[3] | X | | X | X | | X | X | X | X | |
| Carbaryl (SEVIN) | Insecticide | III | X | X | X | X | | X | | | | X | X | X | X | X | X | | X | X | X | X | X |
| Carbofuran (FURADAN) | Insecticide Acaricide Nematocide | II,I | X | X | X | | | | | | | X | | X | X | | | | | X | X | X | |
| Carbendazim BENCARB) | Fungicide | III | | | | | | | | | | | | | | X | | | | | | | X |
| Chlorpyrifos (LORSBAN) | Insecticide | II | X | | X | | X | | | | | | | X | X | X | | | | | | | X |
| Copper hydroxide (KOCIDE) | Fungicide | III;I | X | | X | X | X | X | | X | | X | | | | | | | X | | X | X | |
| Copper oxychloride (CUPRAVIT) | Fungicide | III | X | | X | X | X | | | X | | | | | | | | | X | | | | |
| Cyfluthrin (BAYTROID) | Insecticide | I | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| Cypermethrin (SHARPA, CYMBUSH, RIPCORD) | Insecticide | III | | | | | | | | | | | | | | | | | | | | | X |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2,4-D | Herbicide | I;III | | X | X | | | | | | | | | X | X | | | | | | | | |
| Daconate (DCPA) | Herbicide | III | | | | | | | | | | | | | | | | | | | | | |
| DCNA (BOTRAN) | Fungicide | III | X | | X | X | | | | | | X | | | | X | X | | | | | | X |
| Deltamethrin (DECIS) | Insecticide | ? | | | | | | | | | | | | | | | | | | | | | X |
| Diazinon (BASUDIN) | Insecticide | III;II | X | | X | X | | X | X | X | | X | X | X | X | X | X | | X | X | X | X | |
| Dicofol (KELTHANE)[6] | Acaricide | III;II | X | | | | | | X[3] | | | X | | | | | | | X | | X | X | X |
| Dichlorvos (SUPONA)[4] | Insecticide | I | X | | | | | | | | | | | | | | | | | | | | |
| Dicrotophos (BIDRIN;CARBICRON)* | Insecticide | I | | | | | | | | | | | | | | | | | | | | | X |
| Dimethoate (ROGAR)[7] | Insecticide Acaricide | II | X | | X | | | X | | | | X | | X | X | | X | | X | X | X | | X |
| Disulfoton (SOLVIREX)* | Insecticide Acaricide | I | X | | | | | X | | | | | | | X | | | | X | | | | |
| Endosulfan (THIODAN) | Insecticide Acaricide | I | X | X | X | X | | X | | | | X | | | X | | X | | X | | X | X | X |
| Ethoprop (MOCAP)* | Nematocide | II | | | X | X | | X | | | | X | | X | | | | | | | | | |
| Fenamiphos (NEMACUR)* | Nematocide | I | | | | | | | | | | | | | | | | | | | | | |
| Fenitrothion (SYMITHION) | Insecticide | II | | X | | | | | | | | | | | | | | | | | | | |
| Fenthion (FENTHION) | Insecticide | II | | X | | | | | | | | | | | | | | | | | | | |
| Fentin Acetate (BRESTAN) | Fungicide | II | | | X | | | | | | | | | | | | | | | | | | |
| Fluazifop-butyl (FUSILADE) | Herbicide | III | | | X[3] | | | | | | | | | | | | | | | | | | X |

Table 1. Pesticides Available in the Dominican Republic and Used in Crops Indicated. Also Shown are Toxicity Categories of Listed Pesticides. (1,2,3,4,5,6,7)

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Glyphosate (ROUNDUP) | Herbicide | II | | | X | | | X | | | | | | X | | X | X | | X | | | | X |
| Linuron (AFALON) | Herbicide | III | | | X | | | | | | | | | X | X | | X | | | | | | X |
| Malathion (MALATHION) | Insecticide | III | X | X | X | X | | X | | X[3] | | X | X | X | X | X | X | | X | X | X | X | X |
| Maneb (MANZATE) | Fungicide | III | X | | X | | | X | | X[3] | | X | | | | X | X | | | | X | X | |
| MCPB (TOPITOX) | Herbicide | III | | | | | | | | | | | | X | | | | | | | | | |
| Mephosfolan (CYTROLANE) | Insecticide | I | | X | | | | | | | | | | X | X | | | | | | | X | |
| Metalaxyl (RIDOMIL) | Fungicide | II | X | | X | | | | | | | X | | | | X | | | | | X | X | X |
| Methamidophos (TAMARON) | Insecticide Acaricide | I | X | | X | | | X | | | | X | | | | | | | | | X | | |
| Methidathion (SUPRACIDE)* | Insecticide | I | | | | | | | | | | | | | X | | | | | | | | |
| Methomyl (LANNATE)* | Insecticide | I | X | | X | | | X | | | | X | | X | X | X | X | | X | X | X | | X |
| Methyl Parathion (FOLIDOL, MITIDOX) | Insecticide | I | X | X | X | X | | X | | | | X | | X | X | X | X | | X | X | X | X | X |
| Metribuzin (SENCOR | Herbicide | III | X | | X | | | | | | | | | X | | | | | | | | | |
| Monocrotophos (KENOPHOS, AZOMYL, AZODRIN) | Insecticide Acaricide | I | X | | X | | | | | | | | | | | | | | | | | | X |
| Oxadiazon (RONSTAR) | Herbicide | II | | X | | | | | | | | | | | | | | | | | | | |
| Oxamyl (VYDATE)* | Insecticide Nematocide Acaricide | I | X | | X | | | | | | | X | | | | X | | | | | X | X | X |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Oxifluorfen (GOAL) | Herbicide | II | | | | | | | | | | | | X | | | | | | | | | X |
| Paraquat (GRAMESEN, GRAMOXONE KENOQUAT, PARADOX GRAMAFIX) | Herbicide | I | X | | | | | X | | | | | | X | X | | X | | | | | | |
| Pendimethalin (HERBADOX) | Herbicide | II | | | | | | | | | | | | | X | | | | | | | | X |
| Permethrin (AMBUSH, LORNADA) | Insecticide | III | X | | X | | | X | | | | | | X | | | | | | | | | X |
| Phosalone (ZALONE) | Acaricide Insecticide | II | | | X | | | | | | | | | X | | | | | | | | | |
| Phoxim (VOLATON)[2] | Insecticide | | | | | | | | | | | | | | | | | | | | | | |
| Propanil (RISELECT) | Herbicide | II | X | | | | | | | | | | | | | | | | | | | | |
| Propineb (ANTRACOL)[2] | Fungicide | II | | | | | | | | | | | | | | | | | | | | | |
| Profenofos (TAMBO, SELECRON)* | Insecticide Acaricide | II | | | | | | | | | | | | | | | | | | | | | X |
| Thiram (THIRAM)[2] | Fungicide Animal Repellant | III | | | | | | | | | | | | | | | | | | | | | |
| Triadimefon (BAYLETON) | Fungicide | II | | | | | | | | | | | | | | | | | | | | | |
| Triazophos (HOSTATHION) | Insecticide Mitricide Nematocide | | | | | | | | | | | | | | | | | | | | | | |
| Trichlorfon (DIPTERAX, DANEX) | Insecticide | II | | X | | | | X | | | | | | X | | | X | | X | X | | | X |

Table 1. Pesticides Available in the Dominican Republic and Used in Crops Indicated. Also Shown are Toxicity Categories of Listed Pesticides. (1,2,3,4,5,6,7)

| Common Name and (Brand Name) | Action | Toxicity Category | TOMATO 1 | RICE 2 | POTATO 3 | SWEET POTATO 4 | YAMS 5 | CABBAGE 6 | CASSAVA 7 | PIGEON PEAS 8 | SNOW PEAS 9 | CUCUMBERS 10 | RED KIDNEY BEANS 11 | CORN 12 | SORGHUM 13 | ONIONS 14 | CARROTS 15 | PAPAYA 16 | BEANS 17 | BEETS 18 | MELONS 19 | GREEN SQUASH YAUTIA 20 | COTTON 21 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Vamidothion (KILVEL)[2] | Miticide Aphicide | I | | | | | | | | | | | | | | | | | | | | | |
| Vinclozolin (RONILON) | Fungicide | III | | | | | | | | | | | | | | | | | | | | | |
| Warfarin (WARFARIN, POUG-RAX) | Rodenticide | III;II | | | | | | | | | | | | | | | | | | | | | |
| Zineb (ZINEB: MANCOZEB) | Fungicide | III | | | | | | | | | | | | | | | | | | | | | |

1. Aerial Application Prohibited
2. Not Registered by EPA
*. Restricted Use
3. Residue tolerances have not been established by EPA or recommended by FAO/WHO.
4. Currently under review by EPA
5. Granular formulations of Carbofuran are not restricted, but all concentrate suspensions and wettable powders 40% and greater are FURADAN 10% granules are proposed here.
6. KELTHANE has recently been the subject of EPA cancellation actions. Prior to actual use by the project, the current status of this pesticide should be established.
7. Use approved subject to adherance to U.S. labelling provisions.