STATE OF WASHINGTON

DEPARTMENT OF AGRICULTURE

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# WASHINGTON STATE
# ETHOPROP USE SUMMARY

- Ethoprop is registered for use in Washington State under the trade name Mocap. There are five formulations registered for potatoes, corn and several other vegetable crops. Ethoprop is a restricted use pesticide (RUP).
- Ethoprop is a non-systemic, non-fumigant nematicide, which is also effective against soil-dwelling insects. It has a wide spectrum of activity with contact action against many underground vegetable pests, particularly nematodes, insect larvae and myriopods.
- In Washington State, it is used mostly to control wireworm and flea beetle larva infestations in potatoes. First marketed in the 1960's, ethoprop use is increasing on potato farms due to the cancellation of fonofos (*ex*. Difonate).
- Ethoprop is available in granular and emulsifiable concentrate formulations.
- Ethoprop is classified toxicity category I – highly toxic. Products containing ethoprop bear the signal word, "Danger." Ethoprop belongs to the organophosphate chemical class.
- Major crop uses in Washington State, listed alphabetically, are as follows:

| CROP | WASS* 2001 EST. ACRES PLANTED | EST. % ACRES TREATED | EST. LBS. A.I./ACRE | # OF APPS | EST. ACRES TREATED | EST. LBS. A.I. APPLIED |
|---|---|---|---|---|---|---|
| Beans, snap** | NA | | | | | |
| Corn, grain and silage | 115,000 | Ethoprop not used on this crop in WA State. See narrative. | | | | |
| Potato, Irish*** | 15,000 | 80 | 3 | 1 | 12,000 | 36,000 |

* Washington Agricultural Statistics Service

** Commodities noted in **BLUE** have not had peer review input.

*** Data in the above table for potatoes is provided for only potatoes grown in western Washington State. Information provided in the narrative reflects pesticide use practices for both western and eastern Washington State. However, only the data for western Washington State has been peer reviewed.

## MAJOR USES (listed alphabetically):

***The major use listing supplies the most commonly used formulations of the active ingredient. No discrimination or endorsement is intended.***

***The pesticide labels take precedence over any information contained herein. It is the responsibility of the user to comply with the label directions provided.***

***The following pesticide use summary reflects the general pesticide practices for the listed commodities. The use information is not intended to reflect the pesticide application practices of any individual.***

### BEANS, GREEN & LIMA:

- *Includes both green (snap) and lima beans but not dry edible or seed beans.
- Green fresh market beans are grown in Grant, Adams and Franklin counties in eastern Washington.
- In western Washington, there are several small farms, most of them organic, growing green beans for the fresh market. Most of these farms are located in King, Snohomish, Clallum, Kitsap, Pierce, Mason, Skagit and Thurston counties.
- Ethoprop is labeled for control of nematodes and garden symphylans in green and lima beans. If used, ethoprop used once at a rate of 2 – 3 pounds a.i. per acre row (or 6 – 8 pounds a.i. broadcast). Ethoprop is applied preplant broadcast and incorporated.

### CORN, GRAIN & SILAGE:

- In 2001, 115,000 acres of field corn were planted. Of that acreage, 55,000 acres were harvested for grain and 60,000 acres were cut for silage. Most corn is grown in the following eastern Washington counties: Yakima (20,800 acres), Grant (22,400 acres) and Franklin (9,400 acres). However, western Washington produces 28,500 acres of corn in the following counties: Whatcom (16,200 acres), Skagit (7,000 acres) and Snohomish (5,300 acres).
- Ethoprop (Mocap EC) may be used to control corn rootworm (larvae), black cutworm, wireworm, and garden symphylans. Ethoprop may be applied at a rate of 0.067 – 0.11 pounds a.i. per 1,000 feet of row. Apply band on row over closed furrow or as a sidedress from planting to lay-by.
- Consultants and manufacturers representatives know of no grain or silage corn growers using ethoprop for insect control.

### POTATOES, IRISH (WHITE):

- Potatoes are grown in Grant (36,000 acres), Franklin (33,000 acres), Benton (32,000 acres), Adams (24,000 acres), Walla Walla (12,000 acres), Skagit (8,000 acres), Lincoln (7,000 acres), Yakima (2,200 acres), Whatcom (3,000 acres), Klickitat (2,300 acres) and Kittitas (500 acres) counties. Most of the acreage grown in eastern Washington is under contract for processing (fries, etc.) Western Washington produces potatoes (approximately 11,000 acres) for fresh market and seed.

- Potatoes are usually grown in a four-year rotation (one year in four planted to potatoes) typically with wheat, alfalfa, field and/or sweet corn.
- Ethoprop (Mocap 10% Granular, 15% Granular, or EC) may be broadcast and tillage incorporated prior to planting or at plant to control wireworms. Ethoprop is applied at a rate of 2 – 6 pounds a.i. per acre.
- Timing of applications is geographically specific:
  - ✓ Columbia Basin & Yakima Valley: February – April
  - ✓ Western Washington: April
- The primary use of ethoprop in potatoes is for control of wireworms. Wireworm damage is more common in spring planted crops where the soil has a high organic content. Wireworms do not significantly damage older plants.
- Ethoprop (Mocap 10% Granular, 15% Granular, or EC) may also be applied at plant at a rate of 4 – 6 pounds a.i. per acre to control garden symphylan and nematodes.

The garden symphylan is a serious root-feeding pest in the Pacific Northwest that depends on channels and tunnels formed by other organisms such as earthworms. Although garden symphylans are listed on ethoprop labels, efficacy is uncertain because of the symphylan's ability to migrate deep into the soil. Insecticide treatments may only allow plants to establish in a protected soil zone. The following crops have labeled uses for ethoprop but are infrequently applied.

**CABBAGE:**

- Most of the commercial fresh cabbage (less than 200 acres) is grown in the Fife area of Pierce County. Pierce County has the only commercial fresh cabbage warehouse in Washington State.
- There are several small fresh cabbage growers in King, Pierce, Skagit, Clallam, Thurston, Island, and Kitsap counties. However, most of these small farms are organic and many sell their cabbage through the Puget Sound Fresh Program.
- Ethoprop (Mocap) is labeled band or broadcast treatment to control garden symphylans in cabbage. However, the more typical treatment is chloropicrin (Telone II, C-17 or C-35).

**CORN, SWEET:**

- In 2001, 97,400 acres of sweet corn were harvested (2,300 acres for the fresh market and 95,100 picked for processing). Grant (35,500 acres), Benton (17,000 acres) and Franklin (20,500 acres) counties are Washington State's leading producers of sweet corn for processing.
- Ethoprop (Mocap EC) may be used to control corn rootworm (larvae), cutworm and wireworm, and garden symphylans. If used, ethoprop may be applied band on row over closed furrow at a rate of 0.075 pounds a.i. per 1,000 feet of row
- Processors know of no sweet corn growers using ethoprop for insect control.

**CUCUMBER:**

- There are approximately 4,000 acres of cucumbers produced in Washington State with the majority of the crop grown in Skagit (3,000 acres in western Washington) and Franklin (150 acres in eastern Washington) counties.

- Slicing and pickling cucumbers are the most common. More than 90 percent of the cucumbers grown in Washington State are produced for pickling.
- Most cucumbers are picked by hand although 25 percent of the processing cukes are machine harvested.
- Ethoprop (Mocap 10% Granular, 15% Granular, or EC) is registered for use as a band or broadcast treatment to control symphylans. However, the more typical treatment is chloropicrin (Telone II, C-17 or C-35).

## PRODUCT NAMES AND LABELED CROP:

A complete list of all products currently registered for use in Washington State and their respective labeled crops is attached.

| PRODUCT NAME | LABELED CROP |
|---|---|
| MOCAP 10% GRANULAR LOCK 'N LOAD NEMATICID INSECTICIDE | BEAN (GREEN) |
| MOCAP 10% GRANULAR LOCK 'N LOAD NEMATICID INSECTICIDE | BEAN (LIMA) |
| MOCAP 10% GRANULAR LOCK 'N LOAD NEMATICID INSECTICIDE | CABBAGE |
| MOCAP 10% GRANULAR LOCK 'N LOAD NEMATICID INSECTICIDE | CORN (FIELD) |
| MOCAP 10% GRANULAR LOCK 'N LOAD NEMATICID INSECTICIDE | CORN (SWEET) |
| MOCAP 10% GRANULAR LOCK 'N LOAD NEMATICID INSECTICIDE | CUCUMBER |
| MOCAP 10% GRANULAR LOCK 'N LOAD NEMATICID INSECTICIDE | POTATO |
| MOCAP 10% GRANULAR LOCK 'N LOAD NEMATICID INSECTICIDE | SWEET POTATO |
| MOCAP 10% GRANULAR NEMATICIDE INSECTICIDE | BEAN (GREEN) |
| MOCAP 10% GRANULAR NEMATICIDE INSECTICIDE | BEAN (LIMA) |
| MOCAP 10% GRANULAR NEMATICIDE INSECTICIDE | CABBAGE |
| MOCAP 10% GRANULAR NEMATICIDE INSECTICIDE | CORN (FIELD) |
| MOCAP 10% GRANULAR NEMATICIDE INSECTICIDE | CORN (SWEET) |
| MOCAP 10% GRANULAR NEMATICIDE INSECTICIDE | CUCUMBER |
| MOCAP 10% GRANULAR NEMATICIDE INSECTICIDE | POTATO |
| MOCAP 10% GRANULAR NEMATICIDE INSECTICIDE | SWEET POTATO |
| MOCAP 15% GRANULAR LOCK'N LOAD | BEAN (GREEN) |
| MOCAP 15% GRANULAR LOCK'N LOAD | BEAN (LIMA) |
| MOCAP 15% GRANULAR LOCK'N LOAD | CABBAGE |
| MOCAP 15% GRANULAR LOCK'N LOAD | CORN (FIELD) |
| MOCAP 15% GRANULAR LOCK'N LOAD | CORN (SWEET) |
| MOCAP 15% GRANULAR LOCK'N LOAD | CUCUMBER |
| MOCAP 15% GRANULAR LOCK'N LOAD | POTATO |
| MOCAP 15% GRANULAR LOCK'N LOAD | SWEET POTATO |
| MOCAP 15% GRANULAR NEMATICIDE-INSECTICIDE | BEAN (GREEN) |
| MOCAP 15% GRANULAR NEMATICIDE-INSECTICIDE | BEAN (LIMA) |
| MOCAP 15% GRANULAR NEMATICIDE-INSECTICIDE | CABBAGE |
| MOCAP 15% GRANULAR NEMATICIDE-INSECTICIDE | CORN (FIELD) |
| MOCAP 15% GRANULAR NEMATICIDE-INSECTICIDE | CORN (SWEET) |
| MOCAP 15% GRANULAR NEMATICIDE-INSECTICIDE | CUCUMBER |
| MOCAP 15% GRANULAR NEMATICIDE-INSECTICIDE | POTATO |
| MOCAP 15% GRANULAR NEMATICIDE-INSECTICIDE | SWEET POTATO |

| | |
|---|---|
| MOCAP EC NEMATICIDE-INSECTICIDE | BEAN (GREEN) |
| MOCAP EC NEMATICIDE-INSECTICIDE | BEAN (LIMA) |
| MOCAP EC NEMATICIDE-INSECTICIDE | CABBAGE |
| MOCAP EC NEMATICIDE-INSECTICIDE | CORN (FIELD) |
| MOCAP EC NEMATICIDE-INSECTICIDE | CORN (SWEET) |
| MOCAP EC NEMATICIDE-INSECTICIDE | CUCUMBER |
| MOCAP EC NEMATICIDE-INSECTICIDE | POTATO |
| MOCAP EC NEMATICIDE-INSECTICIDE | SWEET POTATO |

## References:


*2002 Crop Protection Guide for Tree Fruit*, WSU EB 0419, WSU Extension Service
*2002 Cranberry Pest Management Guide*, WSU EB 0845, WSU Extension Service
*2002 Washington Agricultural Statistics,* Washington Agricultural Statistics Service
*2003 Farm Chemicals Handbook,* Meister Pro Information Resources
*2003 Pacific Northwest Insect Management Handbook,* Extension Services of OSU, WSU, and UI
*2002 Pest Management Guide for Commercial Small Fruits*, WSU EB 1491, WSU Extension Service

2003 Washington State registered pesticide labels

CDMS Label Database: http://www.cdms.net/manuf/manuf.aspwebsite
Crop Profile for Potatoes in Oregon: http://pestdata.ncsu.edu/cropprofiles/docs/orpotatoes.html
ExToxNet Pesticide Information Profiles: http://ace.orst.edu/info/extoxnet/pips/pips.html
Greenbook, Chemical & Pharmaceutical Press Inc.: http://www.greenbook.net/
National Agricultural Statistics Service – Agricultural Chemical Use Database: http://www.pestmanagement.info/nass/
National Center for Food & Agricultural Policy: http://www.ncfap.org/database/ingredient/default.asp
National Pesticide Use Database: http://www.ncfap.org/database/ingredient/default.asp
NW Berry and Grape Information Network: http://berrygrape.orst.edu/
Pesticide Action Network Pesticide Database: http://www.pesticideinfo.org/index.html
Puget Sound Farm Direct Marketing Association: http://dnr.metrokc.gov/wlr/farms/locate_search.htm
Tree Fruit Extension Team References: http://fruit.wsu.edu/
U.S. Department of Agriculture National Agricultural Statistics Service: http://www.usda.gov/nass/
U.S. Department of Agriculture Crop Profiles: http://pestdata.ncsu.edu/cropprofiles/_(apples)
Washington State Pesticide Management Practices: http://www.tricity.wsu.edu/~cdaniels/wapiap.html
Washington State Tree Fruit IPM Project (1997-2001) – Integrated Pest Management for Washington Pears: http://www.agcenter.org/wa_pears/pears.htm
WSU PICOL Label/Crop Profile Database: http://picol.cahe.wsu.edu/LabelTolerance.html

Pest Management Strategic Plan, summary of workshop held February 19-20, 2002 in Boise, Idaho (potatoes)

Personal communication – Stephen Garratt, March 19, 2002, WSU Cooperative Extension, Puyallup (cabbage)
Personal communication – Tim Hayes, November 21, 2003, Bayer CropScience (corn)
Personal communication – Gary Hertel, August 4, 2003, Fieldman, Elenbaas Company, Lynden (potatoes)
Personal communication – Andrew Jenson, September 3, 2002, Washington State Potato Commission (potatoes)
Personal communication – Richard Leitz, Fieldman, Wilbur-Ellis Company, Mattawa (potatoes)
Personal communication – Galen Ringer, November 4, 2003, Twin City Foods, Ellensburg (corn)
Personal communication and e-mail correspondence – Alan Schreiber, January 31, 2002 & March 24, 2003, Ag Development Group (potatoes)
Personal communication – Joe Yenish, June 10, 2003, WSU Cooperative Extension