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TRI-CITIES

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Subject: Carbofuran: Low-Use Crops

The following information is provided to you from the Western Integrated Pest Management Center in response to your February 22, 2006 inquiry regarding carbofuran. You asked the following five questions regarding carbofuran use on crops where less than 1% of the acreage was treated (banana, barley, coffee, cotton, cranberry, flax, grapes, melons (except watermelons), oats, ornamentals, pine forests, plantains, sorghum, soybeans, spinach, sugar beets, sugarcane, sunflower, tobacco, wheat):

(1) In what region (state/county, etc.) of the US does the use occur?
(2) What pests are driving the low usage of carbofuran? Do they occur yearly or sporadically?
(3) What are the details of the typical usage pattern (e.g., number of applications per season, use rate per application, application equipment, acres treated, time of application in the season?)
(4) What worker activities typically occur during and after carbofuran applications?
(5) What available alternatives, if any, could replace carbofuran? For this question please consider alternative costs, effectiveness, residual activity, resistance issues, impacts on beneficial insects/mites, etc.

The information below was gathered from the six-state Pacific Northwest (PNW) region comprised of Alaska, Idaho, Oregon, Montana, Utah, and Washington for the crops listed above.

For the reasons stated below we are asking that carbofuran use on barley, oats, wheat, melons, spinach seed, and sugarbeets be retained and that EPA consider again allowing use on cranberries.

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Barley, Oats, Wheat

While no use of carbofuran was reported in Idaho or Washington on barely, oats, or wheat, use was reported in Montana, Oregon, and Utah. Further, one wheat expert in Washington anticipates future problems with cereal leaf beetle and stated that carbofuran use will likely become more important in this state.

(1) In what region (state/county, etc.) of the US does the use occur?

Carbofuran is used on barley, oats, and wheat grown in Eastern Oregon and Utah (Box Elder, Cache, Davis, Juab, and Morgan counties), and in barley and wheat grown in Montana.

(2) What pests are driving the low usage of carbofuran? Do they occur yearly or sporadically?

In Montana carbofuran is used for the control of grasshopper and cereal leaf beetle in wheat and cereal leaf beetle and barley thrips in barley. All three insects are sporadic pests.

In Eastern Oregon carbofuran is used to control grasshoppers and, particularly in Malheur County, it is also used for the control of cereal leaf beetle. Cereal leaf beetle has had a severe impact in Malheur County, especially in oats and barley. In Oregon grasshoppers are a sporadic pest with severe outbreaks occurring every 10 or 15 years while cereal leaf beetle is an annual problem.

In Utah carbofuran is used annually to control cereal leaf beetle and aphids but is only used sporadically for the control of grasshoppers (including Mormon crickets).

(3) What are the details of the typical usage pattern (e.g., number of applications per season, use rate per application, application equipment, acres treated, time of application in the season?)

For grasshopper control in Montana, carbofuran is applied once per season, by air or ground, at rates between 0.125 and 0.25 # ai/A. Note that in some cases where field borders are sprayed, a second application may be made. For cereal leaf beetle generally only one application is made per season at 0.165 to 0.25 # ai/A with most applications made by air. Aerial applications are necessary because at the time carbofuran is applied the crop is too advanced to spray using ground equipment.

In Oregon for grasshopper control, when necessary, one application is made per season at the full labeled use rate of 0.25 # ai/A. Most applications are by air but border applications and some others are made using ground equipment. For cereal leaf beetle one application, also at 0.25 # ai/A is made seasonally either using ground equipment or by air.

In Utah carbofuran is used at 0.125 to 0.25 # ai/A. It is applied as often as twice a season for cereal leaf beetle and aphid control and as infrequently as every four years for grasshopper control. Approximately two thirds of the applications are made using ground equipment and one third by air. In Utah for wheat, barley, and oats combined, an average of 2500 acres is treated annually with carbofuran. Most carbofuran applications are made at the soft dough stage; however this varies somewhat by pest.

(4) What worker activities typically occur during and after carbofuran applications?

In both Montana and Utah workers are not required to access fields at the time carbofuran is applied.

In Oregon most of the worker activity at the time of carbofuran applications involves furrow irrigation where workers are working on field perimeters.

(5) What available alternatives, if any, could replace carbofuran? For this question please consider alternative costs, effectiveness, residual activity, resistance issues, impacts on beneficial insects/mites, etc.

Lambda-cyhalothrin (Warrior) is one alternative to carbofuran and while it is less expensive it does not have the residual activity of carbofuran. Carbofuran is also considered a valuable pest control tool because it is one of the few remaining carbamate insecticides and because of its systemic activity. Alternative carbamates labeled for small grains include carbaryl (Sevin) (wheat only) and methomyl (Lannate). Alternative systemic insecticides labeled for small grains include disulfoton (Di-Syston) (barley and wheat only), dimethoate (wheat only), and methomyl (Lannate). Thus while there are alternatives to the use of carbofuran, this chemical provides an alternative to synthetic pyrethroids. Growers also wish to retain the use of carbofuran because it provides good control at low use rates, is inexpensive, and is also readily available.

While not much resistance is seen in grasshoppers because of the long outbreak cycle, crop experts feel that it is still a good idea to rotate chemicals used for control. There is also no evidence of resistance yet developing in cereal leaf beetle but again crop experts believe that rotating control chemistries is prudent.

Cranberry

(1) In what region (state/county, etc.) of the US does the use occur?

Carbofuran has not been widely used in western Washington cranberry production in several years; however one grower reported using existing stocks of carbofuran for a spot treatment on about 7 acres in 2005. Because EPA asked for cranberry use information, growers are encouraged that carbofuran might again become and available for use.

(2) What pests are driving the low usage of carbofuran? Do they occur yearly or sporadically?

Carbofuran has been used to control black vine weevil.

(3) What are the details of the typical usage pattern (e.g., number of applications per season, use rate per application, application equipment, acres treated, time of application in the season?)

In Washington carbofuran was only used on non-flooded cranberry acreage. (Black vine weevil is controlled via flooding.) Currently there are about 1600 acres in cranberry production in

Washington and of this about 1000 are non-flooded. Of the 1000 acres of non-flooded cranberries, only 100 to 200 have the potential to have a severe outbreak of black vine weevil. When it was used for black vine weevil control carbofuran was applied at 13.3 # ai/A. Two applications were made: the first between June 15 and 25, and the second one month later.

Were carbofuran available for black vine weevil control, use would be sporadic. It is estimated that only one or two growers a year would require the use of carbofuran on a maximum of 10 acres in any given year.

(4) What worker activities typically occur during and after carbofuran applications?

Cranberries are blooming at the time a first carbofuran application would be made and fruit has set by the time the second application is necessary. Access to beds is restricted once bloom begins. Workers would typically only enter cranberry beds at this time to repair irrigation equipment.

(5) What available alternatives, if any, could replace carbofuran? For this question please consider alternative costs, effectiveness, residual activity, resistance issues, impacts on beneficial insects/mites, etc.

Alternatives to the use of carbofuran for black vine weevil control are imidacloprid (Admire) and cryolite (Cryolite Bait). Because severe outbreaks of black vine weevil can cause damage to cranberries, growers would like to have the option to use carbofuran for several reasons:

- imidacloprid doesn't show efficacy in the highly organic soils common in cranberry production,
- imidacloprid has shown only a 50 to 60% efficacy, and
- recently there have been cryolite supply problems.

Grapes

While there is a tolerance for grapes, there are no carbofuran products registered containing use directions for grapes in Idaho, Oregon, or Washington.

Melons

Carbofuran is not labeled for use on melons in Idaho, Oregon, or Washington; however, a label for carbofuran use on melons is registered in Utah.

(1) In what region (state/county, etc.) of the US does the use occur?

Carbofuran is used in southeastern Utah on about 400 acres of melons grown in Grand and Emery counties.

(2) What pests are driving the low usage of carbofuran? Do they occur yearly or sporadically?

Carbofuran is used to control both striped and spotted cucumber beetle. According to Dan Drost, Utah State University's Vegetable Specialist, beetle pressure has been increasing since about 2003 with damage last year surpassing 80%. Two photos taken in 2005 showing the extent of beetle damage are included here. The photo on the right shows beetle larvae burrowing into the rind of the cantaloupe. Damage occurs where the fruit rests on the soil, making melons unmarketable. Adult beetles also feed on the rind of watermelon (left photo) stripping off the outer epidermis. While the damage is only on the surface, it renders fruit unmarketable.

(3) What are the details of the typical usage pattern (e.g., number of applications per season, use rate per application, application equipment, acres treated, time of application in the season?)

Typically carbofuran is applied either at seeding or at transplanting from late April to early June. Only one application is made per season at the labeled use rates. With the recent increase in beetle pressure, growers are interested in the possible use of carbofuran later in the season.

(4) What worker activities typically occur during and after carbofuran applications?

Two to three weeks following a carbofuran application, workers must enter fields for cultivation. (Melons grown in Utah are furrow or rill irrigated. All irrigation activities occur at field perimeters thus access is not required.)

(5) What available alternatives, if any, could replace carbofuran? For this question please consider alternative costs, effectiveness, residual activity, resistance issues, impacts on beneficial insects/mites, etc.

Growers are also using esfenvalerate (Asana), carbaryl (Sevin), permethrin (Ambush), and imidacloprid (Admire) but report that these chemicals do not provide adequate control for striped and spotted cucumber beetle. In addition, growers have expressed concerns about the cost of these alternatives compared to carbofuran and believe that resistance is an issue with this pest.

Ornamentals

No use of carbofuran was reported in PNW ornamentals production.

Forests
No carbofuran use was reported for pines in the PNW.

Sorghum
No carbofuran labels containing use directions for sorghum are registered in Idaho, Oregon, Utah, or Washington and there is little or no sorghum grown in Montana or Alaska.

Spinach Seed
(1) In what region (state/county, etc.) of the US does the use occur?

Carbofuran is used on spinach seed grown in Western Washington in Skagit and Snohomish counties. Use on spinach seed crops is provided by SLN WA-860012.

(2) What pests are driving the low usage of carbofuran? Do they occur yearly or sporadically?

Carbofuran is used to control both European cranefly and springtails.

(3) What are the details of the typical usage pattern (e.g., number of applications per season, use rate per application, application equipment, acres treated, time of application in the season?)

Carbofuran is applied at planting at a rate of 6 to 7 pounds per acre. Approximately 75% of Washington's 2,000 to 3,000 acres of spinach seed are treated with carbofuran each year.

(4) What worker activities typically occur during and after carbofuran applications?

Carbofuran is band-applied in the furrow at the time of planting. Furrows are immediately closed and no worker activity occurs in the field for about 40 days. Because the carbofuran is applied in-furrow, 1.5 to 2 inches below the soil surface, workers are not exposed to this chemical after planting.

(5) What available alternatives, if any, could replace carbofuran? For this question please consider alternative costs, effectiveness, residual activity, resistance issues, impacts on beneficial insects/mites, etc.

According to the *Crop Profile for Spinach Seed in Washington*, WSU researchers have tested other insecticide but have found none that are effective against springtails.

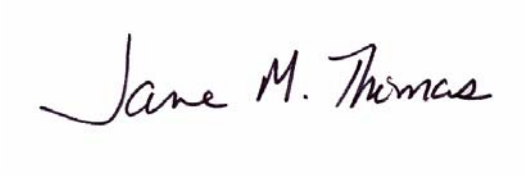
Sugarbeets
The people at Western Sugar reported that they had not used carbofuran for at least two years. They are using chlorpyrifos and synthetic pyrethroids. However, carbofuran is being used on approximately 9,500 acres of sugarbeets grown in Idaho, Oregon, and Washington that are under contract with Amalgamated Sugar. No details of this use are available at this time. When more detailed use information becomes available I will forward it to you.

Sunflower

I received no information regarding carbofuran use on sunflowers.

I am including a contact list should you have further questions. I hope that you find this information useful.

Sincerely,



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Carbofuran: Low-Use Crops
Contact List

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