**Update Briefing Paper #10 -- DRAFT - CRANBERRY - Transition Strategy**: Background Information- June 17, 1998
(Note: Needed review and update in progress)

## Production Information:

| Production Area | Acres Grown | Percent Total US Acres | Percent Total US Production | Crop Utilization |
|---|---|---|---|---|
| Massachusetts | 14,400 | 43 | 39 | Processed=<br>Fresh= |
| Wisconsin | 12,200 | 36 | 40 | Processed=<br>Fresh= |
| New Jersey | 3,600 | 11 | 10 | Processed= 99%<br>Fresh= 1% |
| Oregon | 1,800 | 5 | 7 | Processed= 100% |
| Washington | 1,500 | 4 | 4 | Processed= 50%<br>Fresh= 50% |
| RI, ME, CT, MI, NH, DE, MN, NY | 200 | 1 | | Processed=100% |

## Production Notes:

Cranberries are a high value crop, especially when sold on fresh market. Estimated value of $224,000,000 in 1995.
Over 400 million pounds of fruit produced annually; 95% processed into juices, sauces, or dried; 5% sold fresh market.
72% of all cranberry acres treated with insecticides are treated with OP's.
National usage estimates (% crop treated) for major insecticides used on cranberries:

Acephate: 20 - 34%
Azinphos-methyl: 43%
Carbaryl: 6 - 39%
Carbofuran: 1% (only in WA)
Chlorpyrifos: 44 - 75%
Diazinon: 48 - 64%
Esfenvalerate: 26% (WA only)
Pyrethrins: 40%
Cryolite: NA
Btk: 9%
Methoxychlor: <1%

**PEST**: **Cranberry fruitworm**

Most economically important pest of cranberry, causes direct damage to berries.
Occurs in East Coast and Midwest production areas, most damaging in WI and MA.
Daizinon, chlorpyrifos and azinphos-methyl provide very effective control.
Carbaryl provides good control.
Some signs of possible resistance developing to currently used insecticides (OP's) on East Coast.

**Pest management practices used to control this pest**.

| **OP's** | **Carbamates** | **Pyrethroids/ Pyrethrins** | **Other Chemistries** | **IPM Strategies** |
|---|---|---|---|---|
| Acephate:<br>Max 2 apps/yr; one can be applied after bloom<br>PHI = 75 days<br>Ground/air/chemigation<br><br>Azinphos-methyl:<br>Max 3 apps/yr<br>PHI = 21 days<br>Ground/air/chemigation<br><br>Chlorpyrifos:<br>Max 2 apps/yr<br>PHI = 60 days<br>Ground/air/chemigation<br><br>Diazinon:<br>As needed<br>PHI = 7 days<br>Ground/air/chemigation | Carbaryl:<br>As needed every 7-10 days<br>PHI = 1 day<br>Ground/air/chemigation | Pyrethrins: in tank mix with other insecticides<br>Acts as exciter<br>Improves efficacy | Methoxychlor:<br>As needed at 7-14 day intervals beginning at petal fall.<br>PHI = 14 days | Much of the cranberry acreage in the US is under IPM programs. For this pest IPM programs include scouting, pheromones, economic thresholds, precise insecticide timing, and cultural practices (including winter flooding). The OP's play a major role in the success of these IPM programs. |

**PIPELINE INFORMATION (leading to a Section 3 registration): Cranberry fruitworm**

*A. Chemical Uses*

| IR-4 AND REGISTRANT DEVELOPMENT | TOLERANCE PETITIONS SUBMITTED TO EPA | TOLERANCES PROPOSED BY EPA | TOLERANCES APPROVED BY EPA | SECTION 18's/ EUP's APPROVED BY EPA | APPLICATIONS FOR REGISTRATION SUBMITTED TO EPA |
|---|---|---|---|---|---|
| Spinosad: (Success)<br>IR-4 Project<br>Lepidoptera pests<br>Field trials begun - 1998<br>Expected submittal to EPA - 2000 | Esfenvalerate: (Asana)<br>Dupont<br>Insects - general<br>Published - April, 1998 | NONE | Kaolin: (aluminosilicates)<br>Engelhard Corp.<br>Insects - general<br>Temporary tolerance expires 12/31/99<br>Published - April 1997 | Tebufenozide: (Confirm)<br>Rohm & Haas<br>Lepidoptera pests<br>Sect. 18 - MA | NONE |

*B. Nonchemical Uses:*

None identified.

## PEST: Blackheaded fireworm

Occurs in all cranberry growing areas, primary pest in Wisconsin and West Coast, sporadic in East Coast.
Second generation a direct pest on berries.
Most registered ai's provide good level of control.
Possible resistance to OP's developing in mid-west.

## Pest management practices used to control this pest.

| OP's | Carbamates | Pyrethroids/ Pyrethrins | Other Chemistries | IPM Strategies |
|---|---|---|---|---|
| Acephate:<br>2 app/season; one can be applied after bloom<br>PHI = 75 days<br>Ground/air/chemigation<br><br>Azinphos-methyl:<br>Max 3 apps/year; 14 days between apps.<br>PHI = 21 days<br>Ground/air/chemigation<br><br>Chlorpyrifos:<br>Max 2 apps/yr<br>PHI = 60 days<br>Ground/air/chemigation<br><br>Diazinon:<br>Max 6 apps/yr; 14 day intervals<br>PHI = 7 days<br>Ground/air/chemigation | Carbaryl:<br>As needed, every 7-10 days<br>PHI = 1 day<br>Ground/air/chemigation | Pyrethrins: in tank mix with other insecticides<br>Acts as exciter<br>Improves efficacy | | Much of the cranberry acreage in the US is under IPM programs. For this pest IPM programs include scouting, pheromones, economic thresholds, precise insecticide timing, and cultural practices (including spring and early summer flooding). The OP's play a major role in the success of these IPM programs. |

**PIPELINE INFORMATION: Blackheaded fireworm**

*A. Chemical Uses*

| IR-4 AND REGISTRANT DEVELOPMENT | TOLERANCE PETITIONS SUBMITTED TO EPA | TOLERANCES PROPOSED BY EPA | TOLERANCES APPROVED BY EPA | SECTION 18's/EUP's APPROVED BY EPA | APPLICATIONS FOR REGISTRATION SUBMITTED TO EPA |
|---|---|---|---|---|---|
| Spinosad: (Success)<br>IR-4 Project<br>Lepidoptera pests<br>Field trials begun - 1998<br>Expected submittal to EPA - 2000 | Esfenvalerate: (Asana)<br>Dupont<br>Insects - general<br>Published - April 1998 | NONE | Kaolin: (aluminosilicates)<br>Engelhard Corp.<br>Insects - general<br>Temporary tolerance expires 12/31/99<br>Published - April 1997 | Tebufenozide: (Confirm)<br>Rohm & Haas<br>Lepidoptera pests<br>Sect. 18 - NJ, WA, MA | NONE |

*B. Nonchemical Uses:*

None identified.

**PEST**: **Sparganothis fruitworm**

Primary pest on East Coast and Wisconsin.
Second generation direct pest on berries.
Chlorpyrifos chemical of choice, carbaryl provides good control.
Possible development of resistance to OP's in mid-west.

**Pest management practices used to control this pest**.

| **OP's** | **Carbamates** | **Pyrethroids/ Pyrethrins** | **Other Chemistries** | **IPM Strategies** |
|---|---|---|---|---|
| Acephate:<br>2 app/season; one can be applied after bloom<br>PHI = 75 days<br>Ground/air/chemigation<br><br>Azinphos-methyl:<br>Max 3 apps/yr, 14 days between apps<br>PHI = 21 days<br>Ground/air/chemigation<br><br>Chlorpyrifos:<br>Max 2 apps/yr<br>PHI = 60 days<br>Ground/air/chemigation | Carbaryl:<br>As needed every 7-10 days<br>PHI = 1 day<br>Ground/air/chemigation | Pyrethrins: in tank mix with other insecticides<br>Acts as exciter<br>Improves efficacy | | Much of the cranberry acreage in the US is under IPM programs. For this pest IPM programs include scouting, pheromones, economic thresholds, precise insecticide timing, and cultural practices (including winter flooding). The OP's play a major role in the success of these IPM programs. |

**PIPELINE INFORMATION (leading to a Section 3 registration): Sparganothis fruitworm**

*A. Chemical Uses*

| IR-4 AND REGISTRANT DEVELOPMENT | TOLERANCE PETITIONS SUBMITTED TO EPA | TOLERANCES PROPOSED BY EPA | TOLERANCES APPROVED BY EPA | SECTION 18's/EUP's APPROVED BY EPA | APPLICATIONS FOR REGISTRATION SUBMITTED TO EPA |
|---|---|---|---|---|---|
| Spinosad: (Success)<br>IR-4 Project<br>Lepidoptera pests<br>Field trials begun - 1998<br>Expected submittal to EPA - 2000 | Esfenvalerate: (Asana)<br>Dupont<br>Insects - general<br>Published - April 1998 | NONE | Kaolin: (aluminosilicates)<br>Engelhard Corp.<br>Insects - general<br>Temporary tolerance, expires 12/31/99<br>Published - April 1997 | Tebufenozide (Confirm)<br>Rohm & Haas<br>Lepidoptera pests<br>Sect 18 - MA | NONE |

*B. Nonchemical Uses:*

None identified.

**PEST**: **Cranberry tipworm**

Only important on East Coast and Wisconsin.
Long term feeding effects on yield uncertain.

**Pest management practices used to control this pest**.

| **OP's** | **Carbamates** | **Pyrethroids/ Pyrethrins** | **Other Chemistries** | **IPM Strategies** |
|---|---|---|---|---|
| Azinphos-methyl:<br>Max 3 apps/yr<br>PHI = 21 days<br>Ground/air/chemigation<br><br>Diazinon:<br>Max 6 apps/yr, 14 day intervals<br>PHI = 7 days<br>Ground/air/chemigation | | Pyrethrins: in tank mix with other insecticides<br>Acts as exciter<br>Improves efficacy | | Much of the cranberry acreage in the US is under IPM programs. For this pest IPM programs include scouting, economic thresholds, precise insecticide timing, and cultural practices (including sanding). The OP's play a major role in the success of these IPM programs. |

**PIPELINE INFORMATION (leading to a Section 3 registration): Cranberry tipworm**

*A. Chemical Uses*

| IR-4 AND REGISTRANT DEVELOPMENT | TOLERANCE PETITIONS SUBMITTED TO EPA | TOLERANCES PROPOSED BY EPA | TOLERANCES APPROVED BY EPA | SECTION 18's/EUP's APPROVED BY EPA | APPLICATIONS FOR REGISTRATION SUBMITTED TO EPA |
|---|---|---|---|---|---|
| | Esfenvalerate:<br>(Asana)<br>Dupont<br>Insects - general<br>Published - April 1998 | NONE | Kaolin:<br>(aluminosilicates)<br>Engelhard Corp.<br>Insects - general<br>Temporary tolerance expires 12/31/99<br>Published - April 1997 | NONE | NONE |

*B. Nonchemical Uses:*

None identified.

## PEST: Cranberry girdler

Important but sporadic pest in most areas, very damaging in OR, serious pest in MA.
Girdled vines lose foliage and die.
Becomes more important as growers switch from wet to dryland production.
IPM - a day degree model is available for timing insecticide applications.

## Pest management practices used to control this pest.

| OP's | Carbamates | Pyrethroids/ Pyrethrins | Other Chemistries | IPM Strategies |
|---|---|---|---|---|
| Diazinon 14G: 24c<br>Max 1 app/yr in WI, cannot be applied by air<br>Max 2 apps/yr in other states<br>PHI = 7 days | | Pyrethrins: in tank mix with other insecticides<br>Acts as exciter<br>Improves efficacy | | Much of the cranberry acreage in the US is under IPM programs. For this pest IPM programs include scouting, pheromones, economic thresholds, precise insecticide timing, cultural practices (including late summer and fall flooding, sanding). The OP's play a major role in the success of these IPM programs. |

**PIPELINE INFORMATION (leading to a Section 3 registration): Cranberry girdler**

*A. Chemical Uses*

| IR-4 AND REGISTRANT DEVELOPMENT | TOLERANCE PETITIONS SUBMITTED TO EPA | TOLERANCES PROPOSED BY EPA | TOLERANCES APPROVED BY EPA | SECTION 18's/EUP's APPROVED BY EPA | APPLICATIONS FOR REGISTRATION SUBMITTED TO EPA |
|---|---|---|---|---|---|
| Spinosad: (Success)<br>IR-4 Project<br>Lepidoptera pests<br>Field trials begun - 1998<br>Expected submittal to EPA - 2000 | Esfenvalerate: (Asana)<br>Dupont<br>Insects - general<br>Published - April 1998 | NONE | Kaolin: (aluminosilicates)<br>Engelhard Corp.<br>Insects - general<br>Temporary tolerance expires 12/31/99<br>Published - April 1997 | NONE | NONE |

*B. Nonchemical Uses:*

Nematodes - Biocontrols for management of this pest with nematodes are being tested

**PEST: Black vine weevil**

The most destructive pest in WA and OR, especially on dryland cranberries, sporadic pest in MA.
No insecticide completely effective against this pest.
Very difficult pest to control.
Damage may not appear for 2-3 years.
Esfenvalerate provides some control of adults.
Nematodes are very effective but expensive ($200-$300/A).

**Pest management practices used to control this pest.**

| OP's | Carbamates | Pyrethroids/ Pyrethrins | Other Chemistries | IPM Strategies |
|---|---|---|---|---|
| | Carbofuran: 15G<br>WA only<br>Dry harvested, sprinkler-irrigated beds only | Esfenvalerate:<br>WA - Section 18<br>Use only on dry harvested beds<br>Max 2 apps/yr<br>PHI = 30 days<br>Ground apps only<br><br>Pyrethrins: in tank mix with other insecticides<br>Acts as exciter<br>Improves efficacy | Cryolite: bait<br>Broadcast over bed | Much of the cranberry acreage in the US is under IPM programs. For this pest IPM programs include scouting, economic thresholds, precise insecticide timing, cultural practices, nematodes (1-2 applications per year), and biopesticides. |

**PIPELINE INFORMATION: Black vine weevils**

*A. Chemical Uses*

| IR-4 AND REGISTRANT DEVELOPMENT | TOLERANCE PETITIONS SUBMITTED TO EPA | TOLERANCES PROPOSED BY EPA | TOLERANCES APPROVED BY EPA | SECTION 18's/EUP's APPROVED BY EPA | APPLICATIONS FOR REGISTRATION SUBMITTED TO EPA |
|---|---|---|---|---|---|
| Cryolite:<br>(Kryocide, Prokil)<br>IR-4 Project<br>Submitted to EPA - 1997<br>- not yet published | Esfenvalerate:<br>(Asana)<br>Dupont<br>Insects - general<br>Published - April 1998 | NONE | Kaolin:<br>(aluminosilicates)<br>Engelhard Corp.<br>Insects - general<br>Temporary tolerance expires 12/31/99<br>Published - April 1997 | NONE | NONE |

*B. Nonchemical Uses:*

None identified.

**PEST**: **Cranberry weevil**

Primary pest on East Coast, occasional pest in WI.
Activities reduce fruit quality.
Chlorpyrifos is chemical of choice.

**Pest management practices used to control this pest**.

| **OP's** | **Carbamates** | **Pyrethroids/ Pyrethrins** | **Other Chemistries** | **IPM Strategies** |
|---|---|---|---|---|
| Azinphos-methyl:<br>Max 3 apps/yr<br>PHI = 21 days<br>Ground/air/chemigation<br><br>Chlorpyrifos:<br>Max 2 apps/yr<br>PHI = 60 days<br>Ground/air/chemigation | | Pyrethrins: in tank mix with other insecticides<br>Acts as exciter<br>Improves efficacy | | Much of the cranberry acreage in the US is under IPM programs. For this pest IPM programs include scouting, economic thresholds, and precise insecticide timing. The OP's play a major role in the success of these IPM programs. |

**PIPELINE INFORMATION**: Cranberry weevil

*A. Chemical Uses*

| IR-4 AND REGISTRANT DEVELOPMENT | TOLERANCE PETITIONS SUBMITTED TO EPA | TOLERANCES PROPOSED BY EPA | TOLERANCES APPROVED BY EPA | SECTION 18's/EUP's APPROVED BY EPA | APPLICATIONS FOR REGISTRATION SUBMITTED TO EPA |
|---|---|---|---|---|---|
| Imidacloprid:<br>(Admire)<br>IR-4 Project<br>Root weevils<br>Field trials begun - 1997<br>Expected submittal to EPA - 1999 | Esfenvalerate:<br>(Asana)<br>Dupont<br>Insects - general<br>Published - April 1998 | NONE | Kaolin:<br>(aluminosilicates)<br>Engelhard Corp.<br>Insects - general<br>Temporary tolerance expires 12/31/99<br>Published - April 1997 | NONE | NONE |

*B. Nonchemical Uses:*

None identified.

**PEST**: **Spanworms (Green and Brown)**

Brown - sporadic pest in WI and NJ; primary pest in MA; a more serious pest than the green spanworm.
Green - occurs in all regions

**Pest management practices used to control this pest.**

| OP's | Carbamates | Pyrethroids/ Pyrethrins | Other Chemistries | IPM Strategies |
|---|---|---|---|---|
| Acephate:<br>Max 2 apps/yr; one can be applied after bloom<br>PHI = 75 days<br>Ground/air/chemigation<br><br>Chlorpyrifos:<br>Max 2 apps/yr<br>PHI = 60 days<br>Ground/air/chemigation | | Pyrethrins: in tank mix with other insecticides<br>Acts as exciter<br>Improves efficacy | Bt: Dipel and Biobit<br>2-3 apps at 3-5 day intervals<br>PHI = 0 days<br>Ground/air<br>Chemigation of Dipel ES only | Much of the cranberry acreage in the US is under IPM programs. For this pest IPM programs include scouting, pheromones, economic thresholds, precise insecticide timing, cultural practices (including early summer flooding, sanding), and biopesticides. The OP's play a major role in the success of these IPM programs. |

**PIPELINE INFORMATION (leading to a Section 3 registration): Spanworms**

*A. Chemical Uses*

| IR-4 AND REGISTRANT DEVELOPMENT | TOLERANCE PETITIONS SUBMITTED TO EPA | TOLERANCES PROPOSED BY EPA | TOLERANCES APPROVED BY EPA | SECTION 18's/EUP's APPROVED BY EPA | APPLICATIONS FOR REGISTRATION SUBMITTED TO EPA |
|---|---|---|---|---|---|
| Spinosad: (Success)<br>IR-4 Project<br>Lepidoptera pests<br>Field trials begun - 1998<br>Expected submittal to EPA - 2000 | Esfenvalerate: (Asana)<br>Dupont<br>Insects - general<br>Published - April 1998 | NONE | Kaolin: (aluminosilicates)<br>Engelhard Corp.<br>Insects - general<br>Temporary tolerance expires 12/31/99<br>Published - April 1997 | Tebufenozide (Confirm)<br>Rohm & Haas<br>Lepidoptera pests<br>Sect 18 - MA | NONE |

*B. Nonchemical Uses:*

None

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# CRANBERRY PEST MANAGEMENT STRATEGY
## Sources of Information


Agricultural Statistics 1997, USDA/NASS.
Washington Minor Crops, Schreiber and Ritchie
Crop Profile: Cranberries in the US.
The Uses and Benefits of Organophosphate and Carbamate Insecticides in US Crop Production, 1997. Gianessi.
NAPIAP Cranberry Assessment, 1994. Mahr and Moffitt.
The Use of Organophosphates in US Crop Production, 1998. EPA/USDA/NCFAP
Cranberry Pest Management in Wisconsin, 1998.
Jere Downing, Cranberry Institute. Personal communication.

# CRANBERRY - PEST MANAGEMENT STRATEGY SUMMARY

Primary production areas include Massachusetts, Wisconsin, New Jersey, Oregon, and Washington:

- approximately 34,000 total acres grown yearly.
- 95% processed into juice, sauce, or dried; 5% goes to fresh market.
- 72 % of all cranberries treated with insecticides are treated with OP's.
- States with highest pesticide use are MA and WI.

OP's are critical to the continued production of cranberries in the US:

- Chlorpyrifos, diazinon, and azinphos-methyl are the most widely used insecticides in cranberry production.
- Chlorpyrofos most important:
    - only insecticide to control Sparganothis spanworm and cranberry weevil in MA
- Carbaryl not as effective as chlorpyrifos or diazinon for some pests.
- Bt. is limited by short persistence and most active on early larval instars.

IPM:

IPM practices are currently used on majority of cranberry acres. Programs involve the use of scouting techniques, pheromone traps, finely tuned economic thresholds, cultural practices such as flooding and sanding, augmentation of predaceous nematode populations, biopesticides when available, and the use of traditional insecticides (procedures have been developed to improve timing of pest controls to coincide with critical stages of the pests life cycle). The extent of use of these tools varies from pest to pest and season to season.

OP's and IPM:

The use of OP's are an integral part of and account for the success of these IPM programs. For most of the cranberry pests there are few if any alternatives to the OP's, a carbamate often being the only other choice. Until other chemistries are made available to the cranberry industry, the OP's play a critical role in cranberry production.