IPM AND CRANBERRY GENETIC ENGINEERING
A GOOD MARRIAGE?

IPM has progressed a long way with cranberry crop production. With a pest like blackheaded fireworm, one can envision very effective control when utilizing the battery of IPM tools that are available now or in the near future.

The genetic engineering of cranberry plants has also progressed a very long way. For example, we now have dozens of transformed plants containing a BT gene that, in some of the selections, is disrupting the feeding behavior and growth of blackheaded fireworm. In other crops like potato, such genetically-engineered plants when planted in fields in Wisconsin have been totally protected against certain major pests.

So why do genetic engineering of cranberries when we have an effective IPM approach? Why worry about complicated IPM programs when we can simply genetically engineer a cranberry to constantly resist a pest? One answer to each question is that the most effective and permanent solution to a pest problem may entail a control program that uses a diverse array of control measures. In fact, we envision genetic engineering approaches becoming a major part of IPM programs in cranberry pest control.

Let's look at several scenarios for blackheaded fireworm as examples of how this might work. First is the 'killer cranberry scenario'. Yes, with enough effort, we could come up with a 'Stevens' cranberry on which, after only a little feeding, a young blackheaded fireworm would stop eating and eventually die. This would leave the cranberry essentially untouched. This "killer cranberry" might have a gene called BT that was taken from the BT. bacteria that is now cleared for use on cranberries as a biopesticide. This BT gene codes for the protein that disrupts the digestive system of the blackheaded fireworm larvae. Since all the leaves of the "killer Stevens" have the BT. protein, they are all protected throughout the year without having to use any pesticides to control blackheaded fireworm.

Sound too good to be true? It is in a way. If we were to plant large acreages of these 'killer Stevens' vines, how would the blackheaded fireworms react? Year after year, in the very same marshes, we would essentially kill all the blackheaded fireworms that fed on our plants--EXCEPT those very few individuals that had some sort of inherent tolerance to BT. These few blackheaded fireworms would be in insect heaven on earth! All those cranberry plants for dinner and no competition from my relatives. The obvious result is that these would be the only blackheaded fireworms that could grow to adults and reproduce. Eventually, the pest problem would return and we would again have to use pesticides on our genetically-engineered 'Stevens'. However, now that the blackheaded fireworm is tolerant of BT., we can no longer use the biopesticide as a spray, as it would be ineffective. So the end result of this scenario is that we are worse-off than when we started; we should never have used the genetically-engineered cranberry. Here, the use of genetically-engineered plants destroyed one of the tools used in IPM

Let's try a different scenario, the 'easy-does-it cranberry scenario'. Now let's genetically-engineer 'Stevens' so that it still contains the BT gene as above. However, we now use a modified BT gene that does not

usually produce a killer amount of the B.t. protein. Some of the larvae

feeding on these 'easy-does-it Stevens' will die from the BT, but many of the others will live but still suffer from the low levels of B.t.- kind of like a permanent stomach ache. Such larvae might take longer to complete their life cycle, maybe 50% more time spent as a larva in the field before they pupate. During this extended life as a larva, they are vulnerable to all the natural and I.P.M. controls- diseases, predators, weather, sprays. Thus the population of blackheaded fireworm in the marsh is readily maintained below economic threshold levels, but no *one* control is responsible. Many different factors have kept the pest population down, including our inserted BT gene. This 'low dosage' strategy may reduce dramatically the chance the insect pests developing a tolerance to our BT.

Many other scenarios can be envisioned. However, the general approach of marrying genetic-engineering and IPM seems both aesthetic and rational to us.

Anyone for a June wedding?

Brent McCown
Gottschalk Endowed Cranberry Research Chair
Dept. of Horticulture
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LADY BUG NEWS CLIPS

HAVE A GAME PLAN

As we are entering the most beautiful time of our season, blossom time, keep in mind that the second generation pest is close at hand. A rule of thumb has been that once we peak in flight activity we can expect threshold levels of larval activity 7 to 10 days later. At the present time, we are just starting to see flight. Pyrenone did a wonderful job for use last year on early BHFW. We used 8 to 12 ounces per acre by itself, late at night or early in the morning while bees were not foraging. (Always check with your beekeeper prior to making any insecticide application). We centered our attention on hot spots, hoping to keep things in check and not harm our beneficial pollinators. BT products allowed us a leading edge as well. Keep in mind that these products break down in sunlight and must be repeated 3 to 4 days later. You will not see instant death, but they are not feeding if they have eaten a BT product.

Watch for blossom burn. Know your product, and plan now, for it is inevitable that we will have threshold levels while we need our bees working.

CROP POTENTIAL

Last October and this April, I gathered ½ square foot samples and analyzed buds for reproductive and vegetative characteristics and I incorporated a tipworm study as well.

Bud injury from tipworm ranged from 1 to 73 uprights per square foot sample site. A cross check of injured buds showed that tipworm were responsible because of the lack of any terminal bud development--a cupped area with no side shooting. ON the plus side, of the 39,640 buds under analysis, not one of them had a pupated tipworm larvae with which makes me a believer in a good winter sanding program as a cultural control. These little maggots are smart! At the present time, we readily find a silken cocoon with the cupped upright, and this is true for the 2nd and 3rd generation. Tell me, how dies this little larvae know when it should fall to the bed floor and not remain in the cupped upright? After completing all the reproductive and vegetative counts I feel very good about the 1994 crop. We are seeing numerous double budding in . Stevens. Visually our hook counts are higher this year than last. Stevens are showing 3 to 7 hooks per upright, Searles 3 to 5, Macs 1 to 3, Ben Lear 4 to 4 Lemunyon 1 to 4, Pilgrim 1 to 5, and Crowley (well. . . .)

Generally we have GREAT potential this year, lets bring home a bumper crop!

Jayne Sojka, Lady Bug IPM

Pesticide application techniques

For those growers who are using low gallonages when applying products such as Pyrenone, Diazinon AG500, Lorsban 4E, and other similar products with oil based carriers, please be careful to possible phytotoxicity. We have seen grower who have applied these products via misters, booms and aircraft, receive some chemical burn.

Occasionally growers may have areas where they may get some overlap of product and these areas often do show some signs of chemical burn. These problems are associated with mist blowers and some boom applications. Overlap may occur where booms have swayed or where misters reached bed centers from both sides of the bed.

In order to minimize the possibility of vine stress, apply the products only as specified on the label. Try to avoid adding or missing products such as stickers or other insecticides or fungicides when using these products with oil based carriers. Sometimes stickers may not allow the products to spread evenly over the plant's leaf surface and may result in a concentrated spray droplet binding to the plant surface and causing a burn. The synergistic effects of two products that have been tank mixed may also cause a burn.

When applying pesticides, try to avoid applying them during the heat of the day or during early mornings when extreme temperatures are expected later that day. Also, if you are going to be using low gallonage concentrated sprays, you may want to apply your products while the vines are still damp of you may want to wet the vines with your sprinklers for a few minutes before you begin applying. By applying to damp vines you will minimize the opportunity for a burn.

If you have questions about using a product or chemical phytotoxic effects, contact you sales representative, ag consultant, or me at Ocean Spray.

Leroy Kummer, Ocean Spray Cranberries, Inc.

Trap Count Data

Area	BHFW	Sparg	Girdler	CFW	#
Warrens	33	9	2	0	15
Cranmoor	0	10.3	3	0	12
Northwest	0	0	0	NA	8

***Note**: Graphs will begin with the next issue when cumulative trap counts are available.*

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PESTICIDE PROFILES: Chlorpyrifos (Lorsban)

Type of Material: Insecticide
Manufacturer: DowElanco
Chemical Group: Organophosphate
Type of Action: Contact, ingestion, respiratory; not systemic.
Formulation for cranberries: 4E (4 lbs active ingredient per gallon; emulsifiable concentrate.)
Cranberry pests labeled: Spanworms, cranberry fruitworm, fireworms, Sparganothis, cranberry weevil, cutworms (note: cranberry weevil and cutworms are not usually problems in Wisconsin).
Approved application methods:

- Ground equipment: minimum 15 gallons finished spray per acre.
- Air: Minimum 5 gallons finished spray per acre.
- Chemigation: follow label Special Use Precautions.

Maximum rate per acre: 3 pints formulated product.
Application restrictions:

- Maximum of two applications per year.
- Do not apply within 60 days before harvest.

Health and safety precautions:

- Re-entry level without protective equipment: 24 hours.
- Chlorpyrifos is a nerve poison that interferes with cholinesterase activity. It is also an eye irritant and may cause skin irritation. Dermal toxicity (skin absorption) is low with an LD50 >200 mg/kg. Oral toxicity is moderate, with an LD50 of272 mg/kg. Inhalation toxicity (breathing of vapors) is moderate and may result in cholinesterase inhibition.
- When handling, mixing or applying, or if reentering a field before the 24-hour re-entry interval has expired, wear standard pesticide safety equipment, including protective clothing, rubber gloves, and goggles.

Environmental precautions:

- Extremely toxic to fish and aquatic organisms; do not allow to enter surface water from runoff or drift. Also toxic to birds and wildlife.
- Moderately to highly toxic to beneficial insects including bees and predatory and parasitic insects. Do not apply during bloom. Do not apply in conjunction with the release of beneficial insects such as trichogramma or lacewings; chlorpyrifos has a relatively long residual and may be expected to interfere with predators and parasitic insects for a week or more after application.

Compatibility: May be inactivated by certain sulfur containing fertilizers.
General usage comments: chlorpyrifos is an excellent broad spectrum insecticide for controlling those insects listed on the label. As with all insecticides, it should be used when the larvae are as young as possible. To reduce the chances of pest insects developing resistance, chlorpyrifos should be used only when necessary based upon crop scouting and should be rotated with other products. To reduce the impact on beneficial natural enemies in an IPM program, use only when necessary.

Information derived from the Lorsban 4E label, the Lorsban 4E Material Safety Data Sheet, and a variety of other sources.

Dan Mahr, UW-Madison, Department of Entomology

DODDER STUDY COOPERATORS NEEDED

The Wisconsin Cranberry Board, Inc. funded a study to examine ways to manage dodder after germination and attachment. We need a grower cooperator to participate in the study. If you have a bed or a portion of a bed with consistent dodder problems and are willing to allow some vine damage as part of the research project, please contact Teryl Roper, Dept. of Horticulture, 1575 Linden Drive, Madison, WI 53706. 608-262-9751. Leave a message with the receptionist if I am not in.

If you want to earn more than you get, you need to be worth more than you are paid.

Author unknown

NEW BIOCONTROL PUBLICATION AVAILABLE

A new Extension publication entitled "Biological control of insects and mites" (NCR 481) has recently been published by the University of Wisconsin-Extension. The authors are Dan Mahr and Nino Ridgeway. The 90 page publication covers a variety of topics ranging from "What is biological control" to "Implementing biological controls". The publication is full of color pictures featuring beneficial insects. The bulletin is basic enough that previous experience in entomology is not required to understand the concepts presented.

Copies of the bulletin are available through your county Extension office.

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