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Vegetable Notes

For Vegetable Farmers in Massachusetts

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This issue of Vegetable Notes features information about Plectosporium blight and news about changes in administration of the NEVBGA. Also included are weed management updates, fungicide updates, and insecticide updates in sweet corn for 2004.

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Changes at the Helm of the New England Vegetable & Berry Growers Association

After 18 years of dedicated service, Dominic Marini is stepping down as Secretary/Treasurer of the NEVBGA. Dom has served the Association since 1986. He also served as Treasurer and Trade Show Chair for the New England Vegetable & Berry Conference. Beginning in mid-May, 2004 John Howell will assume Dom's responsibilities. John recently retired as vegetable specialist for UMass Extension. We will all miss Dom and wish him well. He will have a great deal more time to devote to his vegetable and fruit plantings at his home. We welcome John and look forward to many years of continued service to New England agriculture.

At its February meeting, the NEVBGA elected new officers. Edward Davidian, Northborough, MA is President. Bill Stamp III, Cranston, RI is 1st Vice President. Paul Gove, Leominster, MA is 2nd Vice President. John Kelly, East Otis, MA has completed two years as President. We wish John well as he continues to pioneer in the vast and hilly expanses of western Massachusetts.

- Rich Bonanno, Univ. Massachusetts Amherst
Extension Weed Management Specialist

Plectosporium Blight: A New Destructive Disease of Pumpkins and Summer Squash in New England

Plectosporium blight caused by the fungus *Plectosporium tabacinum* (formerly known as *Fusarium tabacinum* and then *Microdochium tabacinum*) has arrived in southern New England. This disease was first reported in the U.S. in Tennessee in 1988 and in Virginia in 1994. It has since occurred on an annual basis in Virginia. *Plectosporium* blight destroyed half the pumpkin crop in Illinois in 2000. It has now been reported in most states east of the Mississippi River, but has not yet been documented in New York or northern New England.

There was a single occurrence on a Massachusetts farm in 1999, which has not had a problem with the disease since, perhaps owing to crop rotation. However, pathologists confirmed the occurrence of the disease on four Connecticut and three Massachusetts farms in 2003, as well as in several backyard plantings. Based on grower descriptions of cucurbit crop problems, it is believed that *P. tabacinum* was far more wide spread than indicated by these few confirmed cases. The 2003 season was one of the wettest years on record in southern New England and many growers may have dismissed crop loses as normal fruit rot problems associated with wet weather.

Plectosporium blight is known to cause damage to a wide variety of cucurbit crops in Europe and Asia, but the strain present in the U.S. seems to primar-

Figure 1: White, diamond-shaped lesions on vine.

ily damage pumpkins, summer squash and zucchini. One large Connecticut farm lost 60-70% of their pumpkin crop in 2003. Another small farm lost all its pumpkins. A third farm lost all its zucchini and summer squash plants in a two week period in late July and early August, while the last Connecticut farm experienced only mild vine and foliar symptoms on summer squash.

A Case Study of an Epidemic on One Connecticut Farm

Figure 2: Lesions on leaf petiole.

A large pumpkin producer direct seeded Howden pumpkins in most of his fields between 8 and 11 June. Heavy, late-June rains delayed further planting, so that the remainder of his fields were transplanted on 1 July with a short-season jack-o-lantern variety and sugar pumpkins. His fields were located in three towns and most were separated by several miles.

The farmer followed the IPM fungicide program recommended in the state and used the same program on all his fields. Fungicide applications began on 30 July, just after powdery mildew was first detected on the underside of leaves during scouting. Three applications were applied 10 days apart. He alternated between the systemic fungicides azoxystrobin (Quadris) and myclobutanil (Nova) for resistance management and added chlorothalonil (i.e. Bravo) to the myclobutanil (Nova) application for better protection against a wider range of diseases. The grower had a good crop rotation program and generally went 2 to 3 years before replanting pumpkins. Some of the 2003 pumpkin fields had been in field crops for 7 to 20 years.

Only the Howden pumpkin fields suffered damage from *Plectosporium* **blight**! This left us with more questions than answers. Did the fungi arrive on Howden pumpkin seeds or were the other short-season varieties resistant? If spores arrived on the wind, how had the disease skipped NY state? Did somebody import infected fruit from another region? Did the spores spread and infect pumpkin seedlings in late June, before the late season varieties were transplanted? What type of spray program do we need in the future to prevent damage from *Plectosporium* blight and the rest of the cucurbit disease complex? The good news is that this disease is easily recognized, if you know what you're looking for, and can be effectively managed if you know how. Hopefully, this fact sheet will help you recognize and effectively manage *Plectosporium* if it occurs on your farm this summer.

Description and Management

Figure 3: Round fruit lesions on pumpkin.

Plectosporium blight is favored by cool, humid or rainy weather. The fungus can overwinter on crop residue and can persist in the soil for several years. The fungus has not been reported to be seed-borne and no pumpkin or summer

squash varieties are known to be resistant to the disease. Tiny, one or two-celled, sickle-shaped spores are formed in lesions on vines, stems, fruit, leaf veins and petioles. Spores are spread by rain-splash and wind. Lesions are small (<1/4 inch) and white. On vines, the lesions tend to be diamond to lens shaped; on fruit they are round to irregular (fig. 1, 2 & 3). The lesions increase in number and coalesce until most of the vines and leaf petioles turn white and the foliage dies. Severely infected pumpkin vines become brittle and will shatter if stepped on (fig. 4). Early in the infection cycle, foliage tends to collapse in a circular pattern before damage becomes more universal throughout the field. These circular patterns can be easily detected when viewing an infected field from a distance. Fruit lesions produce a white russeting on the surface and stems that render the fruit unmarketable (fig. 5). The fruit lesions also allow for entry of soft rot pathogens that hasten the destruction of the crop (fig. 6). If you detect *Plectosporium* blight in your fields, please bring a sample in to the diagnostic laboratory for conformation.

Figure 4: Severely infected vines become brittle.

Disease management recommendations include a three-year crop rotation, planting in sites with good air circulation to encourage rapid drying of the foliage, switching to trickle irrigation, scouting fields to confirm the presence of *Plectosporium*, applying fungicides if necessary, and plowing under crop residue after harvest. Chlorothalonil (e.g. Bravo) and trifloxystrobin (i.e. Flint) are effective fungicides for controlling *Plectosporium* blight. Selection of fungicides for summer squash is straightforward since this crop has a relatively short season. In most cases, two or three applications of a fungicide such as chlorothalonil, beginning at fruit set, will control *Plectosporium* blight as well as most other important diseases of summer squash. However, fungicide selection is more challenging and expensive when it comes to choosing the most effective materials for chemical control on a long-season crop such as pumpkins.

Fungicide Group	Trade Name	Common Name
Strobilurin	Quadris	azoxystrobin
	Amistar	azoxystrobin
	Cabrio	pyraclostrobin
	Flint	trifloxystrobin
Demethylation inhibitor (DMI)	Nova	myclobutanil
	Procure	triflumizole
Dithiocarbamate	Maneb	maneb
Chloronitrile	Bravo	chlorothalonil
Inorganics	Microthiol Dispress	sulfur
	Kocide	copper hydroxide

One problem limiting the effectiveness of using chlorothalonil (i.e. Bravo) for control of *Plectosporium* blight on pumpkins is that it does not work as well as many systemic fungicides on powdery mildew. Although trifloxystrobin (Flint) works well to control *Plectosporium* blight and powdery mildew, it is not the best selection for some other important cucurbit diseases such as black rot (gummy stem blight). Other systemic strobilurin fungicides such as azoxystrobin and pyraclostrobin (e.g. Quadris, Amistar and Cabrio) work pretty well on most of the important cucurbit diseases, but repeated use of systemics from the same fungicide group can hasten pesticide resistance and can lead to control failure. Powdery mildew and black rot have already developed resistance to stobilurins in some states. The best resistance management strategy to help preserve the useful life of the systemics is to make a single application from each of the stobilurin and demethylation inhibitors (DMI) fungicide groups in a given season.

Other systemics, such as the DMI's myclobutanil and triflumizole (Nova or Procure) or protectants like sulfur (i.e. Microthiol Dispress), work well on powdery mildew but do not control *Plectosporium* blight or other important cucurbit diseases. Protectants such as copper hydroxide and maneb may aid in the control of *Plectosporium* blight and possibly other diseases, but they don't have the efficacy to provide sufficient protection when used alone. So, fungicides must be mixed or alternated to produce a combination that will provide a full range of disease protection. Systemics must be alternated with fungicides outside of their group to prevent the build up of resistance.

Figure 5: Lesions produce white russeting fruit.

Recommended Pumpkin Spray Schedules for 2004

If your farm did **not** have *Plectosporium* blight in the past, it is suggested that you scout pumpkin and summer squash plantings weekly for symptoms of both *Plectosporium* and powdery mildew. If powdery mildew is detected first, follow the first spray schedule (example 1). Strobilurin (e.g. Flint, Cabrio, Amistar or Quadris) and demethylation inhibitor (e.g. Nova or Procure) applications should be applied 7 to 10 days apart, and should be limited to a single application per season for each fungicide group. Use the shorter 7-day interval during periods of wet weather. All systemic sprays should be applied with a protectant fungicide (e.g. chlorothalonil, copper or maneb). Sulfur (i.e. Microthiol Dispress) and chlorothalonil (i.e. Bravo) can be used for late-season sprays to rest the systemic materials and still provide effective control of *Plectosporium* blight, powdery mildew and other important cucurbit diseases. If *Plectosporium* blight is detected before powdery mildew, apply chlorothalonil (i.e. Bravo) on a weekly basis until powdery mildew is found (see spray schedule example 2). Caution: do not apply sulfur if temperatures exceed 900F or after oil applications due to phytotoxicity problems.

If your farm had *Plectosporium* blight last year, it is suggested that you start your spray program as soon as the disease is detected or at fruit set (especially, if it is a wet season). Scout your fields weekly for symptoms of *Plectosporium* blight and powdery mildew. Apply chlorothalonil (i.e. Bravo) every seven days until powdery mildew is found during weekly scouting trips. Then, add a systemic material or sulfur to the spray mix for mildew control, taking care to alternate between fungicide groups to help prevent resistance. Copper or maneb can be used with the Strobilurin application to rest Bravo. Use a 10-day interval after a systemic and 7-day interval after Bravo. If the weather is wet, stay with a 7-day interval. Crop rotation is an essential component of this management program.

Figure 6: Lesions allow soft rot pathogens in.

Special thanks to Sharon Douglas, Plant Pathologist at the Connecticut Agricultural Experiment Station and Margaret Tuttle McGrath, Plant Pathologist at Cornell's Long Island Research Laboratory, for reviewing this article

- T. Jude Boucher, Univ. Connecticut Cooperative Extension System
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Spray schedule example 1:

Spray #	**(PM detected) 1**	**2**	**3**	**4**
Fungicides	Cabrio + copper	Nova + Bravo	sulfur + Bravo	repeat if necessary (sulfur + Bravo)

Spray schedule example 2:

Spray #	**(fruit set) 1-4?**	**(PM detected) 5?**	**6?**	**7?**	**8?**
Fungicides	Bravo	Cabrio + copper	Nova + Bravo	sulfur + Bravo	repeat if necessary (sulfur + Bravo)

2004 Weed Management Update

Many changes have been made to the 2004-2005 New England Vegetable Management Guide. They represent label changes that were made in both 2003 and 2004. A summary of all the label changes included in the new guide follows. Some of Stinger (clopyralid) labels did not make it into the new Guide. In all cases the Guide should be an intermediate step in weed management decision-making. The herbicide label must be read prior to application.

Asparagus

Amine 4 (2,4-D) is a new formulation of 2,4-D amine. It can be used postemergence in asparagus as a directed spray to the base of the ferns.

Sandea 75 WSG (halosulfuron) can be used during the harvest season after a clean cut. It can also be used after the harvest season but not over ferns. It is used primarily to control yellow nutsedge, smartweed, ragweed, and velvetleaf. It should be used as a supplement to either Karmex (diuron) or Sencor (metribuzin).

Stinger (clopyralid) is registered for use. It can be applied before, during, or after the cutting season but before fern growth. Stinger controls nightshade, ragweed, wild lettuce, dandelion, Canada thistle, clover, jimsonweed, pineappleweed, and galinsoga.

Beets

Stinger (clopyralid) is registered for use. Stinger controls nightshade, ragweed, wild lettuce, dandelion, Canada thistle, clover, jimsonweed, pineappleweed, and galinsoga. It can be used as a supplement to Ro-Neet (cycloate), Spin-Aid (phenmedipham) or Pyramin (pyrazon) to improve weed activity.

Cucurbits

Prefar (bensulide) has a new "low odor" formulation. It can be applied either preplant incorporated or preemergence in all cucurbits. It primarily control grasses but may suppress some broadleaf weeds. It has traditionally been applied in combination with Alanap (naptalam) but could be used with Sandea to improve grass activity.

Strategy is a formulated prepack of ethalfluralin (Curbit 3 EC) and clomazone (Command ME). It is applied to the soil surface after seeding and before crop emergence. It can also be applied between plastic. The crop on the plastic can be either direct seeded or transplanted. Irrigation is required to activate Strategy. Strategy is registered on all cucurbits.

Sandea received a label for all 6 New England States in 2003 after having a limited state label in Massachusetts in 2002. The new label covers cucumbers, melons, winter squash, summer squash, and pumpkins. Sandea provides both preemergence and postemergence control of many weeds including common ragweed and velvetleaf, preemergence control of common lambsquarters, and postemergence control of yellow nutsedge. In cucumbers it should be applied preemergence to the crop. Strategy or Alanap should also be used. In winter squash and pumpkins, it can be applied either premergence or postemergence to the crop. Consider using it postemergence after a premergence application of Strategy. Postemergence applications may result in some yellowing and crop stunting. Preemergence applications may result in crop stunting especially if heavy rain follows application. In melons and summer squash, it can only be applied between plastic. It can also be applied between plastic when growing cucumbers, winter squash, and pumpkins. Consider using both Strategy and Sandea between plastic in these crops. As long as the herbicides are banded between the plastic, there is no injury potential to the crop.

Lima and Snap Beans

Eptam (EPTC) continues to be registered in beans but from a different manufacturer. Gowan now owns this product which should improve its chances to remain available.

Sandea is registered in lima and snap beans. It is applied after seeding but before crop emergence. Compared to the common tank mixes of Dual (metolachlor)/Eptam (EPTC) or Dual/Treflan (trifluralin), Sandea will control jimsonweed, ragweed, smartweed, velvetleaf, and will suppress yellow nutsedge. Growers may consider using both Sandea and Dual preemergence or using Sandea following a preplant incorporated application of either Eptam or Treflan. Sandea may also be used postemergence in snap beans to control yellow nutsedge and other weeds mentioned above. Crop injury may occur with postemergence applications.

Pepper, Eggplant, Tomatillo

Sandea may be used between plastic in these crops. Contact with the crop will result in crop injury. It can be used preemergence to control many weeds mentioned above. A banded application after the plastic is laid but prior to planting the crop is preferred to avoid crop contact. If Sandea is used after the crop is transplanted, use of a shield is recommended to avoid crop contact. Consider using Sandea as a supplement to either Devrinol (napropamide) or Trilin (trifluralin) in pepper and eggplant.

Spinach

Stinger is registered for use. Stinger controls nightshade, ragweed, wild lettuce, dandelion, Canada thistle, clover, jimsonweed, pineappleweed, and galinsoga. It can be used as a supplement to either Ro-Neet or Spin-Aid to improve weed activity.

Sweet Corn

Amine 4 (2,4-D) is a new formulation of 2,4-D amine. It can be used postemergence in sweet corn.

Following is a brief summary of postemergence herbicides in sweet corn. Stinger (a new label) will control nightshade, ragweed, and jimsonweed. Permit (halosulfuron) will control pigweed, nutsedge, ragweed, smartweed, and velvetleaf. Amine 4 (2,4-D) will control all emerged broadleaf weeds. Basagran (bentazon) will control lambsquarters and yellow nutsedge.

Eradicane (EPTC + safener) continues to be registered in sweet corn but from a different manufacturer. Gowan now owns this product which should improve its chances to remain available. Eradicane is a viable alternative to Dual and Lasso for control of triazine-resistant lambsquarters.

Tomato

Sandea may be used under plastic mulch to suppress yellow nutsedge, over plants grown on bare ground, or between plastic. There is no real advantage of Sandea over Sencor in tomato except for preemergence yellow nutsedge suppression under plastic. Growers may choose to rotate between these two products.

Turnip Roots and Tops

Stinger is registered for use. Stinger controls nightshade, ragweed, wild lettuce, dandelion, Canada thistle, clover, jimsonweed, pineappleweed, and galinsoga. It can be used as a supplement to Prefar, Dacthal (DCPA), or Treflan to improve weed activity.

- Rich Bonanno, Univ. Massachusetts Extension Weed Management Specialist

Fungicide Update for 2004

Not much has changed since 2003 but several materials deserve to be discussed.

Strobilurins. These fungicides are quinine outside inhibitors which have low mammalian toxicity and are readily degraded in the soil. Crop phytotoxicity is low except for Quadris which will severely injure Macintosh apples. Activity on fungi is generally broad and, in most cases, the preharvest interval is zero days. Fungi may become resistant to this class of fungicide and there is cross resistance with other strobilurins. Members of this family are: Quadris (azoxystrobin) which is registered on a wide range of crops and diseases. Sovran (kresoxim-methyl) is registered on tree fruits. Flint (trifloxystrobin) is registered on cucurbits, tomato, and tree fruits. Cabrio (pyraclostrobin) is registered on cucurbits, tomato, pepper, onions, root crops, and berries. Headline (pyraclostrobin) is registered only on potato. The most common fungicide from this class that is used in vegetable crops is Quadris. It is registered on cucurbits, corn, 22 leafy vegetables, 20 root vegetables, 17 tuber vegetables, mint, onions, pepper, eggplant, potato, spinach, tomato, and watercress. Remember that Quadris is phytotoxic to Macintosh and related apples.

Miscellaneous Chemistry. There are no changes here since 2003. Three products are registered for potato late blight. They are Curzate (cymoxanil), Previcur (propamocarb), and Acrobat (dimethomorph). Switch (cyprodinil + fludioxonil) is registerd for Botrytis control on onions and strawberries.

Biologicals from AgraQuest. Three fungicides are registered. Trials published in "Biological and Cultural Controls" show favorable results against some bacterial diseases. Limited date is available for other diseases. Do not expect excellent control from these products. A summary of label information follows. Serenade (*Bacillus subtillis*) is formulated as a 10% wettable powder. It is registered on field or greenhouse-grown beans, broccoli, carrots, cucurbits, leafy vegetables (except brassicas), mint garlic, pepper, potato, and tomato. The preharvest interval is zero days. The Serenade label lists Botrytis, downy mildew, Cercospora, Xanthomonas, Alternaria, Phytophthora, and powdery mildew. Serenade is also registered on apple, pear, cherry, and grape. No ornamentals are listed on the label. Sonata (*Bacillus pumilus*) is a 2.7% liquid formulation. It is registered on Brassica vegetables, bulb vegetables, cucurbits, fruiting vegetables, leafy vegetables (except Brassica), beans, peas, mint, and root and tuber vegetables. The Sonata label lists downy mildew, powdery mildew, rust, *Sclerotinia*, and *Phytophthora ramorum*. It is also registered on pome fruits, stone fruits, and strawberries. Field roses are on the label but no other ornamentals are listed. There is no greenhouse label. Rhapsody (*Bacillus subtillis*) is a 1.3% liquid formulation containing the same strain as in Serenade. It is registered on most ornamentals (about 50 are listed on the label) for control of Anthracnose, Erwinia, Pseudomonas, Xanthomonas, Black spot, Bitrytis, leaf spots, and powdery mildew. It also lists the same greenhouse vegetables as does Serenade with a preharvest interval of zero days.

Actigard (acibenzolar-s-methyl). This is a synthetic analog of salicylic acid (aspirin). It imparts "systemic acquired resistance" to plants which means it increases resistance of plants to pathogens. It is currently labeled for bacterial spot and speck of tomato and for control of downy mildew and white rust of spinach. It is also registerd in cole crops and tobacco. There have been some reports of crop phytotoxicity in tobacco or it may increase its susceptibility to air pollution. The preharvest varies from 7 to 14 days and there is a 30-day plant-back restriction for crops not on the

label.

Messenger (harpin protein). This product "boosts overall production" of plants. It "aids in the management of diseases" such as CMV, TMV, *phytophthora capsici*, Pseudomonas, and Xanthomonas. The preharvest interval is zero days, the reentry interval is 4 hours. Do not use chlorinated water when mixing this product. There is limited trial data with this material but it does have some effectiveness against viruses.

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Update on Insecticides for Sweet Corn Pests -- 2004

Clean corn all season is every sweet corn grower's goal. Because the pests change from early, to mid, to late-season corn, the best way to achieve this changes too. For early season corn (July harvest), priorities are:

- Need excellent European corn borer (ECB) control (especially in corn started under plastic)
- Focus on pre-silk stages, when ECB is feeding in the tassel, easy to reach with insecticides, and before it does damage to the ear.
- Be ready to deal with corn earworm if it comes early

Goals and needs for mid season (late July to mid August harvest) are different:

- ECB pressure in pre-silk stage is usually lower during mid July (between ECB flights)
- Focus on silk stage for corn earworm control; watch for arrival of CEW

For late season corn (late August, September harvest) the needs are:

- Need both pre-silk and silk stage control
- Need good ECB control -- gets worse later in season
- Need serious CEW control – it is usually present most everywhere by this time
- May need to control fall armyworm at whorl stage
- Aphid outbreaks can be a problem

In recent years we have seen several new products labeled for sweet corn caterpillars. Many are in the **synthetic pyrethroid** class, including the following (*denotes restricted-use): bifenthrin (Capture* 2EC)(1 dh, REI 12h), use prohibited on corn in all coastal counties; cyfluthrin (Baythoid* 2)(0 dh, REI 12h); esfenvalerate (Asana* XL) (1 dh , REI 12h); lambda-cyhalothrin (Warrior*) (1 dh, REI 24h); permethrin (Ambush*) (1 dh, REI 12h); zeta-cypermethrin (Mustang*) (3 dh, REI 12h), only labeled for corn earworm

Products in the **carbamate** class include two that have been registered and widely used for many years: thiodicarb (Larvin* 3.2): (0 dh, REI 48h); and methomyl (Lannate* SP): (0 dh for ears;REI 48h).

The general category of **"bio-based or reduced risk insecticides"** (otherwise known as "soft" pesticides), all of which carry a 'CAUTION' label and are not restricted use, includes: spinosad (Entrust) (1 dh, REI 4h), certified organic; spinosad (SpinTor 2SC) (1 dh, REI 4h); indoxacarb (Avaunt) (3 dh; REI 12h), whorl (pre-silk) application only; *Bacillus thuringiensis kurstaki* (Deliver, Dipel, Lepinox, Javelin, Crymax, Biobit) *Bacillus thuringiensis aizawai* (XenTari), labeled for fall armyworm (not all Bt's are certified organic; check with certifier.)

Efficacy. To decide which material to use, growers try to balance three key factors: what works best; what costs least; what is safest for themselves to use. In preparation for this update, I surveyed the results of sweet corn pesticide trials that were published in the **1999-2002 Arthropod Management Tests**. These were conducted at universities in Georgia, Ohio, Virginia, New York, Arkansas, Maryland, and other states where pest pressure is high. The following is a summary of what I found in this source.

What works best for early season? (high ECB pressure) The highest levels of control were reported for Spintor, Warrior, Capture, and Baythroid; all of these were about equal, though Capture occasionally less effective. Spintor was reliable and consistent in controlling ECB. Pounce, when included in tests, was often just as good as these. One drawback of these tests was that Lannate, Asana and Larvin, which have been widely used here in MA, were rarely included in the tests. Thus it is impossible to make comparisons. The fact that they were not included does not necessarily mean they would not work; it may mean simply that the manufacturer was not providing funds to scientists to conduct tests on the product.

What works best at pre-silk (whorl, pretassel) stage for high fall armyworm pressure? Tests were generally conducted in Florida and typically included Avaunt, Lannate, sometimes Warrior or Capture. Avaunt worked as well or better than Lannate; and Avaunt worked as well or better than Warrior.

What works best for late season? (high ECB and CEW pressure). Warrior, Capture, and Baythroid were included in many tests and were equally effective most of the time. Capture was occasionally less effective. Under extremely high pressure, none of these products always gave >95% clean corn, even on a 3 day spray schedule. Pounce and Larvin, when tested, were usually just as good. Spintor sometimes was just as good in terms of % clean ears, some-

times was less effective on the CEW, but was just as good on the ECB when there was a mixed pest complex. Lannate when tested did not work as well under high CEW pressure. Asana was rarely included in tests.

What works best for sap beetle? Highest levels of control were found with Warrior and Baythroid which always had significantly fewer beetles than the untreated control. Spintor was sometimes tested, and was better than untreated but not as good as Warrior or Baythroid. Lannate and Asana were not effective.

Is it possible to use 'softer' products…without losing clean corn? I would say, yes without hesitation under high ECB pressure, but would be more cautious under high CEW pressure. Here's a suggested approach for conventional growers that would use low risk products when they can be most effective and beneficial:

Early season: use 'softer' insecticides vs ECB. Since spinosad is very effective vs. ECB; use it early and conserve your natural populations of aphid predators and parasites (which are plentiful in early corn) thereby reducing secondary outbreaks of aphids. **Late season: use synthetic pyrethroids in silking corn.** These are the most effective products effective against CEW; are less expensive when multiple sprays are needed. Larvin has also proved to be very effective against high CEW and would be another good choice. However, you could still use 'softer' products (eg Avaunt or Spintor) against fall armyworm & ECB pre-silking.

What about cost? Get out your calculator to convert price per gal to price per acre based on the rate you use. Cost per acre varies significantly depending on the material and the rate, ranging from $6 to $20 per acre.

Cost comparisons for 3 seasonal spray regimes on 10 acres, assuming a season average of 3.5 applications/ block and 2003 price quotes:

1.SpinTor 2SC @ 4.00 oz/A, $190 for 10 acres; $664 for 3.5 applications on 10 acres

2. Warrior @ $2.50 oz/A; $60 for 10 acres; $208 for 3.5 applications on 10 acre

3. early Spintor + late Warrior sprays $125 for 10 acres; $436 for 3.5 applications on 10 acres

What would be the benefits of using an early Spintor, late Warrior system? It mitigates the cost differences between products by targeting a higher cost product where it's most effective and useful, while providing other benefits such as: reduced risk product safer for handler and neighbors for part of the season; conserve aphid & ECB predators which is likely to result in fewer aphid outbreaks; delay development of resistance to pyrethroids; provide effective control all season.

What about beneficial insects? What is the mpact on natural populations of insect predators and parasites when you spray for caterpillars? Sweet corn is a nursery for beneficial insects, who flock there for the combination of insect eggs, aphids, and corn pollen which provide food for their offspring. Corn leaf aphids can build up quickly -- especially when their predators have been killed off. J.oe Kovach, C. Petzoldt & J. Tette of the New York State IPM Program have developed a method to compare the environmental impact of pesticides, called the Environmental Impact Quotient (EIQ). The total EIQ for each products includes ratings for many different factors. It is interesting to compare the ratings for impact on beneficials for key sweet corn materials. These ratings are based on experimental tests for toxicity against 20 species of beneficial insects, and also take into account how long the insecticide persists on the leaf (leaf half-life). A **high** rating means more **severe toxicity against beneficials.**

For more information on the EIQ visit the Cornell University IPM website, http://www.nysipm.cornell.edu/publications/EIQ.html#table2, or the 2004-2005 New England Vegetable Management Guide (available from UMass Extension Bookstore 413-545-5717 or

Insecticide	Toxicity to beneficial insects
Permethrin (Ambush, Pounce)	125.00
Esfenvalerate (Asana)	47.50
Lambda-cyhalothrin (Warrior)	45.60
Methomyl (Lannate)	25.00
Thiodicarb (Larvin)	25.00
Spinosad (Spintor, Entrust)	12.15
Bt (Dipel, Xentari, etc)	8.75

http://www.umassextension.org/Merchant2/merchant.mv)

- Ruth Hazzard, UMass Extension Vegetable Program

Vegetable Notes is a publication of the University of Massachusetts Extension Vegetable Program which provides research-based information on integrated management of soils, crops, pests, and marketing on Massachusetts farms. For more information visit our website at www.umassvegetable.org or call Ruth Hazzard at 413-545-3696.