UMASS EXTENSION

VEGETABLE NOTES

For Vegetable Farmers in Massachusetts

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This issue of **Vegetable Notes** *gives information on growing sweet corn. As some of you know, extensive research has been conducted using the* ***Zea-Later™,*** *an instrument which delivers corn oil directly to the silks and is very effective against corn earworm.*

Weeds are another menace in the corn field and Rich Bonanno covers the new and modified registrations of chemicals used in corn weed control.

A new feature in Vegetable Notes *is* **Field Notes,** *articles written by our growers. This month Ed Person shares his techniques for growing corn transplants.*

Two important additions to this newsletter are the ***Calendar of Upcoming Events*** *and information and registration for the* ***March 6th Potato School.***

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Caterpillar Control in Organic Sweet Corn

Ruth Hazzard and Pam Westgate, Department of Entomology, University of Massachusetts Amherst

Every sweet corn grower knows the frustration of opening ears of succulent corn, ready to harvest, and finding them loaded with well-fed caterpillars and their nasty mess. "The fat ones that wave at you when you open the ear," one grower calls them — and they drive customers away in a hurry. Most often these are corn earworms, which enter the ear though the silk channel and feed in the tip (Figure 1). This pest has been the major obstacle to production of organic sweet corn throughout the US. Conventional control of this pest relies on repeated applications of synthetic insecticides, which are prohibited in organic standards. A method that uses small quantities of vegetable oil mixed with *Bacillus thuringiensis,* applied directly to the silks to create a barrier inside the silk channel, gives organic growers a means to control this corn pest throughout the season. The *Zea-Later* oil applicator, now commercially available, makes this method physically and economically feasible (available at Johnny's Selected Seeds, 1-207-437-4395).

Figure 1. Corn earworm

Corn earworm feeding in the tip of an ear of sweet corn

United States Department of Agriculture cooperating. UMass Extension offers equal opportunity in programs and employment.

Larval behavior on corn ears

Corn earworm *(Helicoverpa zea)* moths lay their single, globe-shaped white eggs on the silks, preferring fresh over dried silk. Newly hatched caterpillars move rapidly into the silk channel, which is enclosed by the top of the husk. They feed very little on the exposed silk, which explains why sprays of *Bacillus thuringiensis (Bt)* are not highly effective against this pest. Once inside the husk, larvae feed on silks and kernels, well-protected from predators and pesticides.

Two other species of caterpillars also infest corn ears. European corn borer *(Ostrinia nubilalis)* may move into ears from previous feeding sites up in the tassel, or from egg masses laid on the underside of leaves near the ear. Some will tunnel through the husk and feed on the side of the ear. Others crawl down the silk channel, similar to corn earworm. Likewise, fall armyworm *(Spodoptora frugiperda)* may tunnel through the side of the husk, or may move down the silk channel. Depending on the geographic location and the time of the season, corn may be infested with one, two, or all three of these "worms."

Direct silk applications of oil

Vegetable oil that is applied directly to the tip of each ear coats the silks down inside the silk channel and kills larvae as they enter. This technique was widely used by sweet corn growers in the 1940s, before the development of synthetic insecticides. Since 1992, when a group of sweet corn growers brought this to our attention, University of Massachusetts Extension researchers have been exploring how to make this method economical and effective. We have worked closely with farmers and with students and faculty from the UMass School of Engineering and Hampshire College to develop a hand-held oil applicator, and to improve on previous techniques. This has been accomplished through financial support from the UMass Integrated Pest Management Program, the Northeast Sustainable Agriculture Research and Education (SARE) program, and the Organic Farming Research Foundation. The following recommendations are based on this work.

Selecting the proper oil

It is important to use a vegetable oil that is exempt from both federal pesticide labeling and residue tolerance requirements, or to use an oil-based product that has a pesticide label for sweet corn. Corn and soybean oil have both exemptions and can be legally used for this purpose. Currently, corn and soy oils both meet organic standards according to the new Federal Organic Rules. Food-grade corn oil off of the grocery shelf has been used in most of our trials, and is being used by many growers. One soybean oil product with a pesticide label and organic certification is Golden Natural Pest Oil (Stoller Enterprises, Inc), which is soybean oil with an emulsifier. We will be conducting studies in 2002 to compare the efficacies of these different oils in controlling the corn earworm pest.

Mixing a *Bt* product with the oil improves control

In trials we see about 15% more caterpillar-free, marketable ears when a *Bacillus thuringiensis* subspecies *kurstaki* product is mixed with the oil, compared to when oil is used alone. Preliminary data, from the 2001 growing season, on the concentration of *Bt* indicate that the best control is achieved at a rate of 1/2 pound per acre when using the product Dipel DF (Valent). *Bt* products labeled for sweet corn come in liquid or dry formulations; in either case, it is important to achieve a stable, fine suspension of the *Bt* crystals in the oil. Certified organic growers should note that the currently available liquid formulations DO NOT meet the new Federal Organic Rules standards. Most liquid products will form a suspension, but should be tested to be sure. For dry products an emulsifier is required to keep the *Bt* suspended in the oil. For organic growers only two options are available. One is a product called Golden Pest Spray Oil (Stoller Enterprises, Inc., 1-713-461-5580), which is soy oil with an emulsifier. Another option is to use a food-grade lecithin product that can be found at natural

food stores. Lecithin is extremely viscous and does not clean up well in water (but will mix with oil). We recommend adding lecithin directly to a premeasured amount of oil until a 5% lecithin in oil mix is achieved. Dry *Bt* should be mixed in water first and then combined with the oil/emulsifier blend. Mixing instructions are also included in the instruction manual provided with the *Zea-Later*. For all suspensions, regular agitation may be needed.

Timing

In the field, corn silks grow to their full length in about four days. The best time to apply oil is five to six days after silk growth starts on 50% of the plants. At this time most of the pollination has taken place and the exposed silks are wilting and beginning to turn brown (Figure 2). *Earlier* applications do not appear to give better control, but result in a higher rate of "cone" tips — poor kernel fill in the last one-half inch. This occurs when oil interferes with pollination of the silks produced at the tip, which are the last to grow out and be pollinated. Oil applied *later* than seven days after silk initiation can result in poorer control. This is especially true when corn earworm pressure or temperatures are high and larvae have entered the ears before oiling. One application to each ear in a block of corn is adequate, though in very uneven stands going through the corn a second time to treat later-maturing ears may produce better results.

Figure 2. Corn silks

Ears at the stage when oil treatment is made

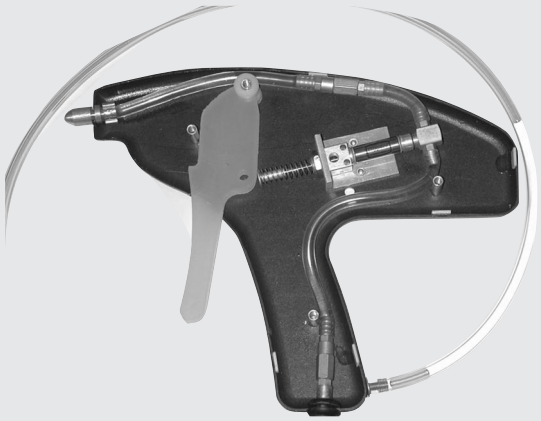
The *Zea-Later* oil applicator

The *Zea-Later* consists of a hand-held applicator, which is connected by a clear plastic tube to a two-liter waist-belt tank (Figure 3). The applicator has a shell of strong molded plastic, with an internal pumping mechanism of stainless steel and plastic components which have been selected for durability, repeated use, and tolerance to corn oil (surprisingly enough, corn oil corrodes many types of plastic and rubber) (Figure 4). The

Figure 3. *Zea-Later* and oil pack

Figure 4. *Zea-Later* exterior

Figure 5. *Zea-Later* interior



handle is molded to fit easily into the hand, and the hand stroke, which pulls the "trigger" to release a dose of oil, uses all the fingers together (Figure 5). Growers and workers who use it are surprised at the lack of hand fatigue, even after several hours of use. It delivers a dose of 0.5 ml with each stroke. The pointed tip is placed on the hollow at the center of the silks or pushed slightly into the silk channel, leaving the oil where gravity will pull it into the silk channel. It works best to walk down each row treating the top ear of each corn plant. One tank full treats about 1/4 acre. Soapy water is used for cleanup.

Know when corn earworm is active in your area

Corn earworm is active for only part of the season, but its activity is unpredictable. In New England, migratory flights arrive suddenly. Flights can be monitored with the Scentry *Heliothis* net trap, baited with Hercon™ luretapes for corn earworm, placed at about ear height in freshly silking corn. Trap captures of two moths or more per week indicate damaging numbers. Oil treatments are warranted when your potential losses from wormy corn exceed the cost of treatment.

Controlling both side and tip damage

Caterpillars that tunnel through the side of the husk may not encounter oil or *Bt*. For an integrated organic strategy use foliar *Bt* sprays against European corn borer or fall armyworm that are feeding in the tassel before silking. If ECB moths are active during silking, a second foliar *Bt* spray is warranted. Use at least 2/3 the highest labeled rate, add a sticker, and design your sprayer for good coverage of tassels and silks.

Summary of Research Results

We have conducted many trials in late-season corn at the University of Massachusetts Research Farm and on cooperating commercial farms. In 1996 and 1997, we compared using the oil/*Bt* treatment of silks, by itself, with an integrated system that combined the oil treatment with foliar *Bt* sprays applied twice during tasseling. Results were measured in terms of the percent of ears with no damage or the number of corn earworm (CEW) or European corn borer (ECB) per 100 ears (Table 1). The oil treatment provided control of both CEW and ECB. In 1996 when many ECB were tunneling in the side of the ear, ear quality was greatly improved by the addition of foliar sprays. In 1997 when both ECB and CEW were entering through the tip, foliar sprays made very little difference.

We have been working with eight growers around New England to test the *Zea-Later* in commercial plantings. Each farm has several plantings, with oiled and non-oiled plots within each planting. The results from 2000, pooling data from 15 blocks, showed that the oil improved ear quality by an average of 24%, from 59% of ears without tip damage in the non-oiled to 83% in the oiled (Table 2). The gain in undamaged tips from using the oil ranged from 8% to 44%, with the best improvement occurring on farms with the highest corn earworm pressure. Some of the farmers used a foliar *Bt* spray in addition to the oil; it was these blocks that had some of the best results.

Oil treatments also had an impact on the percent of ears without corn earworm and without caterpillars of any type, supporting earlier data indicating that the treatments have an effect on European corn borer as

well as corn earworm. Interestingly, we also saw a slight increase in the number of ears of corn without side damage, from 89% to 93%, suggesting that the oil prevented some damage from larvae tunneling through the husk, as well as those entering through the tip.

Table 1. Results of sweet corn trials at UMass Research Farm, 1996 and 1997

TREATMENT	% of clean ears		# CEW/100 ears		# ECB/100 ears	
	1996	1997	1996	1997	1996	1997
oil on silks	57% b	89.5% b	1 b	8.0 b	44 b	2.9 b
oil+foliar *Bt*	100% c	93.3% b	0 b	5.0 b	0 c	1.0 b
no treatment	24% a	56.6% a	14 a	36.3 a	123 a	22.0 a

Note: Within each column, means followed by the same letters are statistically different (P<0.05, LSD).

Table 2. Results of on-farm trials in New England, 2000

	% ears without tip damage	% ears without corn earworm	% ears without CEW, ECB or FAW
oil treatment	83% a (range: 59%-93%)	85% a	76% a
no oil	59% b	66% b	47% b

Note: Within each column, means followed by the same letters are statistically different (P<0.05, Chi Sq.). Tip damage is feeding injury to any kernels near the tip of the ear. Results are the average of 15 blocks on seven farms.

A healthy stand of sweet corn produces the best results

You may find less than satisfactory results if there are tall weeds that get in the way of reaching each ear, if corn is very uneven in plant age (which means some ears are treated too early and some too late), or if plants are undernourished and have poor ear growth. Remember that sweet corn needs 100 to 130 pounds per acre of nitrogen, whether from organic or inorganic sources. Grow the healthiest, most weed-free, most even stand of corn that you can. Plant when soils are warm enough for rapid germination. Select a variety with good tip cover, since the oil only works when it is enclosed inside the silk channel. This is especially important in coastal areas that can count on heavy corn earworm infestations every year. In these areas, use varieties with a tightly enclosed silk channel, such as *Argent*.

Cost and benefits

At first glance, it hardly seems possible that treating every ear could be cost-effective. In fact, the cost is in the same range as conventional methods, that would require three to seven sprays per block in late-season corn. The one-time oil treatment usually takes eight to 10 hours per acre and can be done by any employee who is careful and reliable. Labor cost, therefore, ranges from $70 to $100 per acre. Materials include about two gallons of oil (at $6 per gallon) and one-half pound *Bt* ($5 to $7) per acre. For a grower with 15 acres of sweet corn or less, each successive block is typically less than an acre, so it can be treated in one day or less. This can be done in windy conditions, on two successive days if necessary, and does not have to be reapplied after a rainstorm. Some growers would prefer to use a crew of two or three because, as with many repetitive jobs on the farm, it's more pleasant to work in a group and get the job done faster. And at harvest, having clean corn keeps customers coming to the stand.

FIELD NOTES

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First published in *Proceedings of the New England Vegetable and Berry Conference 2001*

Looking to Try Something New? Growing Corn from Transplants

The best part of farming is that you are in control of what crops you grow – and how. I have the tendency to get a little bored, so there is always something new and different on the farm. In an attempt to get earlier and more productive sweet corn over the last two years, I have tried transplanting seedlings.

First the results, and then the how. In 2000, a planting of *Seneca Arrowhead* that was transplanted and row covered, matured nine days earlier than a planting that was seeded and row covered. The difference in 2001 was 11 days with *Fleet* (three days earlier than *Arrowhead).* The stand of transplants had a yield of 98%, where the seeded results were only in the 50% range with maturity very erratic mostly due to uneven germination.

Now the how. The procedure is very straightforward and can be accomplished with ordinary equipment. The first step is to check germination rates by seeding a sample tray in the greenhouse and carefully counting the quality seedlings. The reason for this is to assure that the plugs will have high counts when they are transplanted. For example, the *Arrowhead* germination was in excess of 95%, *Tomahawk* was only about 80% with many plugs that had only one seedling. The plugs are 162s and two seeds were planted in each one. The time from seed to transplant was two weeks in my greenhouse with bottom heat and good humidity control. When testing, grow the seedlings long enough to determine at what age they will transplant easily, but not so large that they are stressed. During the last five days before planting, we withheld water to strengthen the stems and force good root development. Our middle transplanting was delayed until the transplants were three weeks old. The crop was almost a total failure due to stress because of a lack of growing space in the plugs.

Transplanting the seeds is simple. You can use a mechanical transplanter, but we found it faster to plant by hand – and a carousel-type planter might be even faster. The rows are 36" on center and I used a marking wheel on the three-point hitch set at 12". The plugs are placed in shallow water to loosen the soil from the tray. One person places the plugs, and another two plant. Two plants per plug allowed us to handle fewer plugs and still achieve a 6" on center plant spacing. The 36" rows and the 12" spacing yields about 28,000 plants per acre. Three of us were able to plant about 3,000 plugs per hour.

Last but not least. The last step was to give the plugs a drench of water with fish/seaweed fertilizer. I have a water tank mounted on the cultivating tractor and a hose that lines up over the row of plants.This step means that we don't have to set up irrigation. The 2001 season was a challenge in May and June because the lack of rainfall, so we irrigated twice to maintain growth. We also irrigated direct-seeded crops which is unheard of on my soils at that time of year when moisture levels are generally high.

I used a 35'-wide floating row cover and covered eight rows. I doubt transplanting without the row cover would have been successful. The best part of using the plugs is that it eliminated about two cultivations and the plants were ahead of the weed pressure.

Timing and Efficacy of Corn Oil and *Bt* as a Barrier to Corn Earworm

Rosalind Cook and Anne Carter, Department of Plant and Soil Sciences, University of Massachusetts Amherst

The historic use of oils as an organic pesticide for sweet corn dates back to the early 1930s when mineral oil was applied to corn silks using an eye dropper. Recently, a gun-shaped applicator was patented and is sold commercially as the *Zea-Later*. The *Zea-Later* is able to administer a 0.5 mL solution of oil directly into the silk channel. Previous work has shown that corn oil is effective against *Heliocopvera zea Boddie,* but the timing and efficacy of the treatment had not been established. This article is a report on research which determined how long the oil application was effective in controlling the corn earworm.

Treatments were 1) food grade corn oil; 2) *Bacillus thuringiensis* subspecies *kurstaki* (brand name Dipel DF); 3) corn oil and *Bt*; and 4) an untreated control. One-half ml of treatment solution was applied on day five from first silk. Laboratory-reared corn earworm were brought to the field on silk day three, six, nine, 12, 15, and 18. Two first instar larvae were placed on the silks of six randomly chosen ears in each plot on each treatment day. There were eight replications. The entire experiment was done in 2000 and 2001. Ears were harvested four days after each larval placement and evaluated for number of live, dead, or missing larvae, and the level of damage to each ear or silk.

Results of this study show that the effect of the oil and *Bt* treatments on the earworm larvae show significant differences between the control and the other three treatments. In year one, the mean number of dead or missing worms for the oil and *Bt* plots was significantly higher than the mean for the control plots. In the control, one live worm was found on five of six harvest dates. In year two, fewer worms were found overall in all treatments, yet the highest mean number of worms found again was in the control plots on all six of the harvest dates (Figure 1).

In terms of damage to ears in year one and year two, 91% to 100% of ears that received oil, *Bt*, or a combination of the two were graded as clean on the final harvest date. In the control plots, the percent of clean ears was much lower — 65% and 44% in years one and two, respectively. The rating was based on clear evidence of corn earworm damage to the ear or silks, noted when the ears were

Figure 1. Number of dead or missing corn earworm found in ears at harvest following treatments of oil, *Bt,* or oil and *Bt* in 2000 and 2001

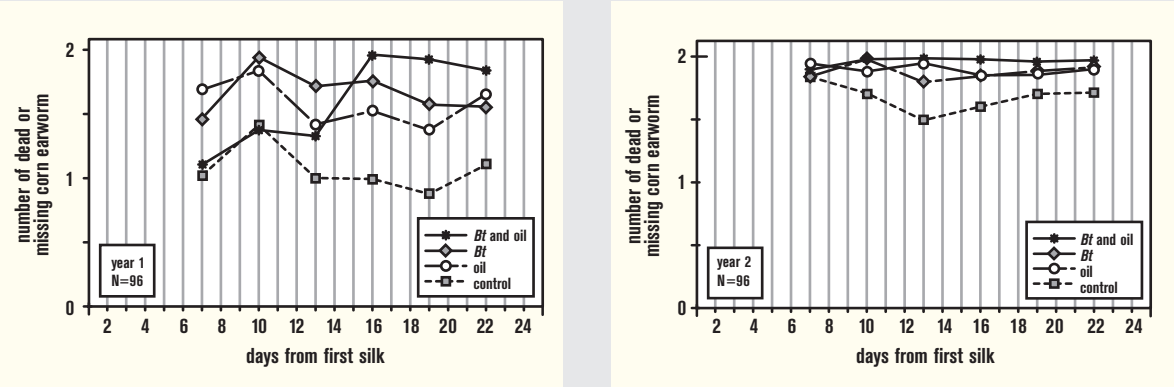
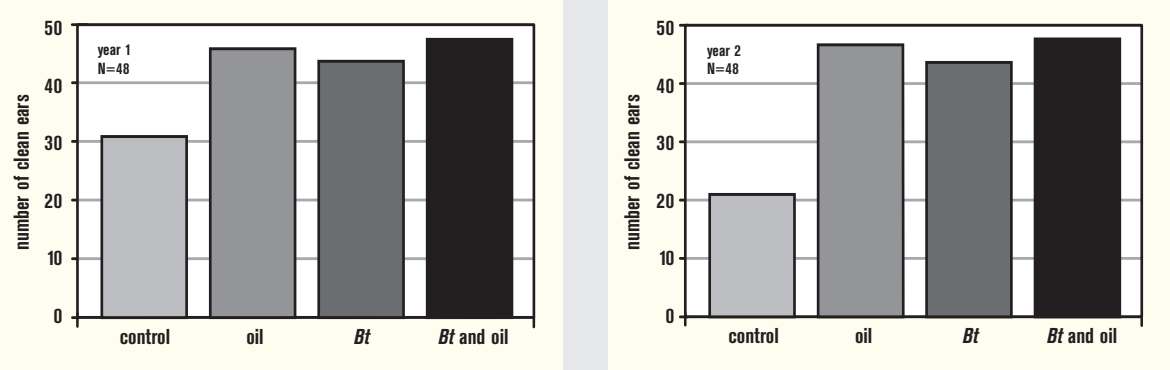


Figure 2. Number of damage-free ears found at harvest after sprays of oil, *Bt,* or oil and *Bt*



Note: Oil treatments were applied on day five of silking. Corn earworm larvae were placed directly onto silks.

husked (Figure 2).

The direct-silk application of corn oil provides an important means of corn earworm control for organic growers and an alternative method for conventional growers who need to apply pesticides after the larvae have entered the silks. More marketable ears were consistently found in the treated plots versus the control plots. A one-time spray of oil, *Bt*, or oil plus *Bt*, offers a promising alternative to toxic chemical sprays that must be applied every few days. These treatments were applied once, five days after first silk emergence, and still continued to be effective in killing earworm larvae all the way through the final harvest 17 days later.

Corn Oil Can Cause Underdeveloped Kernels at the Tip of the Ear

Anne Carter and Rosalind Cook,
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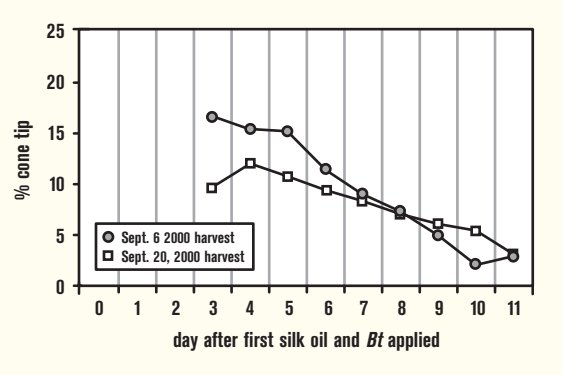
Figure 1. Cone tip disorder

Researchers and growers have noticed that ears treated with the oil sometimes exhibit a developmental disorder called cone tip (Figure 1). The last 1/2" to 3/4" of the ear does not develop and appears as a small, pointed tip at the end of the ear. Wholesale vendors have rejected corn because of this cone-tipped ear.

An experiment was conducted in 2000 and 2001 to look at the timing of the corn oil application compared to the degree of cone tip found on the ear. Oil plus *Bt* was applied on day three, four, five, six, seven, eight, nine, 10, and 11 days from first silk (day that 50% of the ears in the field had silk showing). Ears were harvested in each plot on day 25. The length of the entire ear and the length of the undeveloped ear were measured on 10 ears per plot with four replications, to get a calculated-percent cone tip.

Corn silks are covered with minute hairs, called trichomes. We believe that the oil treatment coats the trichomes, making it impossible for the silk to receive pollen. Silk from the tip is the latest to emerge from the ear, and the last to be pollinated, thus the later corn oil is applied, the less likely there is to be undeveloped kernels in the tip of the ear. When silks are not pollinated, the silks remain light green and somewhat shiny. Once fertilization has occurred, then the silks begin to change from light green to purple/red or the tips of the silks to begin to brown. This is approximately five days from the time that silks first appear (Figure 2). The percentage of cone tips declined after day five, and continued to drop with later oil treatments.

Figure 2. Oil timing and percent cone tip



The amount of cone tip varies somewhat with the year and variety. Growers at retail stands have still been able to sell the corn with this disorder, especially when they tell the customer that it is a result of an organic treatment that keeps worms out of the corn. Customers seem happy with this explanation. What a grower has to be careful of is not applying the oil too early so that enough of the kernels are fertilized.

However, it is also important not to apply the oil too late. Corn earworm eggs hatch in three to four days at summer field temperatures. Oil should be applied before larvae are present in the ear, not later than six to seven days after silking starts. Using pheromone traps to monitor moth flight is a good way of knowing when you need to use the oil treatment. Flights can be monitored with the Scentry *Heliothis* net trap, baited with Hercon™ luretapes for corn earworm, placed at about ear height in freshly silking corn. Trap captures of two moths per week or more, indicate damaging numbers. More information can be found on the UMass Vegetable Team's website at www.umassvegetable.org.

USDA announces open season for farm revenue insurance

Northampton, Massachusetts – Adjusted Gross Revenue (AGR) insurance for farmers is again being offered in Hampshire and Hampden counties for 2002, according to Ted C. Smiarowski Jr. of the Hampshire/Hampden County USDA Farm Service Agency. The deadline for application is January 31, 2002. Current AGR policyholders also have until January 31 to make changes to existing contracts. AGR provides farm income protection under an umbrella-type policy that covers income from practically all crops, plus a limited amount of income from livestock and livestock products. Unlike traditional crop insurance guarantees based on yields, AGR offers a guarantee against a significant decline in overall farm income from the average of the most recent five years. With premium subsidies now higher than ever, farmers are strongly urged to contact a local crop insurance agent as soon as possible for more information and premium quotes. For a list of crop insurance agents, farmers may contact the Hampshire/Hampden County Farm Service Agency at 1-413-585-1000x2 or log on to the following Risk Management Agency web site: http://www3.rma.usda.gov/tools/agents/

Weed Control: What's New and Effective?

Richard Bonanno, Department of Plant and Soil Sciences, University of Massachusetts Amherst

Sweet corn growers have several weed management options available to them. Because of the highly effective herbicide options, vegetable growers can take the opportunity to reduce weed-seed pressure by rotating their fields to sweet corn and maximizing control during the sweet corn year. In addition to the herbicides registered, many growers still combine timely cultivations with herbicides. Remember to always keep cultivation shallow, cultivate when weeds are small, and orient the rows to minimize soil erosion during times of heavy rainfall.

Over the past year, there have been new registrations and label changes which have occurred for weed management in sweet corn. This article will cover the basics. Please check both the herbicide labels as well as the current *New England Vegetable and Management Guide* for additional information. Remember the label is the final authority. As with all new registrations, growers should gain experience with these products before using them on a wide scale.

New registrations

Permit (halosulfuron) 75% WSG. 2/3 to 1.33 ounces per acre (0.032 to 0.063 pounds a.i. per acre). This herbicide provides postemergence control of many weed species which are not under drought stress. It is rainfast in four hours. Use a non-ionic surfactant at a rate of one to two quarts per 100 gallons spray or a crop oil concentrate at one gallon per 100 gallons spray. Control varies with type and size of weed. Species listed on the label include redroot pigweed, pokeweed, common ragweed, Pennsylvania smartweed, common sunflower, velvetleaf, wild mustard, yellow nutsedge, and wild radish. Do not cultivate for seven days after application. Most vegetables can be planted within 12 months of application except crucifers, carrots, leeks, onions, lettuce, beets, and spinach. Some sweet corn varieties may be injured by Permit and no reliable list of susceptible varieties has yet been developed. Regular sugary varieties do not appear to be more tolerant than se (sugar enhanced) types or sh2 (supersweet types). Initially, this herbicide should be used on a small scale to control problem weeds such as nutsedge, ragweed, and velvetleaf. Other postemergent options continue to exist. These include Aatrex (atrazine), Basagran (bentazon), Formula 40 (2, 4-D), Lorox (linuron), and Evik (ametryn). Atrazine, Basagran, and 2, 4-D have been the most commonly used.

Prowl (pendimethalin) 3.3 EC. 1.8 to 4.8 pints per acre (0.75 to 1.9 pounds a.i. per acre). Apply pre-emergence only after seeding. DO NOT incorporate into the soil. A broadleaf herbicide such as atrazine, Bladex, or simazine should also be used to control broadleaf weeds. If this herbicide is moved into the seed zone, there is potential for crop injury. Some basic suggestions for minimizing the potential for crop injury are to plant in a firm seedbed, plant corn at least 1.5" deep, plant into moisture rather than dry soil, do not mix Prowl with liquid fertilizers, and avoid sandy soils. If the soil is dry, consider irrigating or waiting for rainfall prior to application. If heavy rains follow an application of Prowl in dry soil, the herbicide can move to the seed zone and cause crop injury. Specific weeds for which this herbicide should be considered include triazine-resistant lambsquarters and velvet-leaf. Growers may consider a lower rate of Prowl in addition to using a broadleaf herbicide and another grass herbicide such as Dual Magnum, Lasso, Frontier, or Eradicane.

Frontier (dimethenamid) 6 EC. 16 to 32 ounces per acre (0.75 to one pound a.i. per acre). Apply preplant surface, PPI, PRE, or POST (corn can be up to 18" tall). A split application can be

used. Frontier will not control emerged weeds. Some sweet corn varieties may be injured by Frontier and no reliable list of susceptible varieties has yet to be developed. Frontier has activity which is similar to Dual Magnum and Lasso. It offers an alternative for rotational purposes. Growers should gain some experience before widespread use on the farm.

Modified registrations

Bladex (cyanazine) 4L. One quart per acre (one pound a.i. per acre) is a new maximum rate. Apply after seeding, but before crop emergence. Bladex is weak on most grasses but excellent on many broadleaf species. The last year for use is 2002. Observe all label precautions related to tractor cabs and applicator safety.

CyPro (atrazine + cyanazine) DF. This is a formulated prepack of atrazine and Bladex (cyanazine). This cannot be used postemergence in sweet corn because of the Bladex which can seriously injure or kill emerged sweet corn. It should be used in combination with a grass herbicide such a Dual Magnum, Lasso, Prowl, Eradicane or Frontier. The use rate for this product for 2001 and 2002 is 1.5 pound per acre (one pound a.i. per acre cyanazine and 0.32 pound a.i. per acre atrazine). Depending on the weed pressure, additional atrazine at planting, cultivation, or a postemergence application of atrazine, Basagran, 2, 4-D, Permit, Lorox, or Evik may be needed.

Dual Magnum and Dual II Magnum (metolachlor) 7.6 EC. 13 to 27 ounces per acre (0.77 to 1.6 pounds a.i. per acre). Can be applied at planting or up to 5" corn. Apply to weed free soil. Dual Magnum has excellent activity on grasses and is weak on lambsquarters. These formulations replace Dual and Dual II. The "II" is a safener which may lessen the potential for crop injury in cold soils. Basically, the activity of the Magnum formulation is the same as with the old Dual but the use rates are lower. When these products occur in prepacks with atrazine, they are called Bicep and Bicep II.

Disclaimer

The information in this material is for educational purposes. The recommendations contained are based on the best available knowledge at the time of printing. Where trade names or commercial products are used, no company or product endorsement is implied or intended. Always read the label before using any pesticide. The label is the legal document for product use. Disregard any information in this newsletter if it is in conflict with the label.

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.

Subscriptions to **Vegetable Notes** include the **IPM Newsletter,** published weekly during the growing season.

For subscription information, call Marilyn Kuzmeskus, 413-577-0712 or visit our website at www.umassvegetable.org.

For more information about the Vegetable Team's research and UMass Extension programs, call Ruth Hazzard at 413-545-3696.

THE HARTFORD FOOD SYSTEM

509 Wethersfield Avenue, Hartford, CT 06114-1907

1-860-296-9325 Fax 1-860-296-8326 www.hartfordfood.org

Mark Winne, Executive Director

CSA Farm Manager Job Description

The Holcomb Farm Community Supported Agriculture project (CSA) in West Granby, Connecticut is a 16-acre, community-based, food growing project established in 1994 and operated by the Hartford Food System, a private, nonprofit organization established in 1978 (www.hartfordfood.org).

The farm manager is responsible for meeting the CSA's marketing and production goals, crop planning and production, and staff hiring and firing. As practible, the farm manager will support the CSA's member outreach and recruitment, education programs for members and youth, and coordination with programs operated by the Holcomb Farm Learning Centers.

Compensation: Salary range $29,000-$35,000, medical benefits and pension plan.

Farmers and their Ecological Sweet Corn Production Practices

An educational video on innovative production practices for sweet corn

Video offers "kernels of wisdom" for growing sweet corn

In this 42-minute video produced by Vern Grubinger, University of Vermont Extension, and Ruth Hazzard, University of Massachusetts Extension, with funding from SARE, the Northeast Sustainable Agriculture and Research and Education Program of the USDA, 10 farmers from around the Northeast explain in their own words a variety of innovative approaches that help them grow top-quality sweet corn using a minimum of pesticides and fertilizers.

The practices include the use of hairy vetch as a cover crop, the pre-sidedress nitrate test, mechanical weed control methods, scouting and trapping corn insect pests to determine thresholds for spraying, the use of *Bt* to control European corn borer, and the *Zea-Later* applicator for applying vegetable oil to corn silks to control earworm. Farmers describe how to get good spray coverage, reduce conventional herbicide use by half, and how beneficial wasps may become part of their insect management strategy.

Video Content

MacLennan Farm, Windsor, Vt.
Hairy Vetch Cover Crop

Kestrel Farm, Westminster, Vt.
Organic Soil Fertility

Anderson Farms, Wethersfield, Conn.
Soil Heat Monitor
June (or Pre-Sidedress) Nitrate Test

Blossoming Acres Farm, Southwick, Mass.
Floating Row Cover

Williams Farm, Deerfield, Mass.
Scouting for European Corn Borer
Getting Good Spray Coverage

Hutchins Farm, Concord, Mass.
Mechanical Cultivation for Weed Control
Spraying *Bt* for European Corn Borer

Ward's Berry Farm, Sharon, Mass.
Banded Herbicide Application

Brookdale Farm, Hollis, N.H.
Mapping Fields for P and K Fertilization
Pesticide Mixing and Loading Facility

Moses Farm, Eagle Bridge, N.Y.
Crop Consultant
Trichogramma ostriniae for Corn Borer

Walker Farm, Dummerston, Vt.
Zea-Later Oil Applicator for Corn Earworm

Ordering Information

Each video costs $15 mailed within the continental US; $20 to Canada or Mexico; $25 outside North America. All orders must be prepaid by check or money order payable to ***UVM*** in US funds. The prices above include shipping and handling. Please allow three to five weeks for delivery. A discount of 10% off the total price applies for orders of 10 or more videos at one time. Complete this form and send with payment to: **Center for Sustainable Agriculture, University of Vermont, 590 Main Street, Burlington, VT 05405-0059.** Please call or e-mail us for rush order rates (1-802-656-5459, susagctr@zoo.uvm.edu)

Please send me _____ copy(ies) of:

Farmers and their Ecological Sweet Corn Production Practices

I have enclosed a check or money order in the amount of $ _____ payable to **UVM.**
(This price includes postage.)

Name _____ **Daytime Phone** _____

Address _____ **E-mail** _____

City, State, Zip _____

What is your main profession?
❑ **Extension** ❑ **NRCS or FSA** ❑ **Farmer** ❑ **Teacher** ❑ **Other** _____