UMASS EXTENSION

Vegetable Notes

For Vegetable Farmers in Massachusetts

Volume 23, Number 3 April 26, 2012

In this issue:

Crop conditions

The early, dry spring has made it possible to prepare fields that would normally (and especially last year) be too wet at this time of year. However, prepping fields well in advance of planting left them dust-dry and disappearing downwind, so many growers adopted very short start-to-finish field preparation and planting regimes to conserve moisture before planting. Early crops came up but were suffering from the drought, and records have been set for earliest-ever irrigation setup. The steady, long two + inches of rain last weekend was one of the most welcome and well-modulated rain events we've had in a long time. Early pests to watch out for include the root maggots (seedcorn, onion and cabbage), flea beetles, and wireworms. Watch out for seedcorn maggot after lush cover crops are tilled under. Put up ECB traps early, if you have corn that is also coming up early. When growing-degree-day accumulations are faster (or slower) than usual, you can expect the sequence of events for both plants and insect to be the same, even if the calendar date is far from 'normal'. For example, if cabbage maggot typically begins flight at the same time that yellow rocket blooms, both will still occur at the same, only earlier on the calendar. Along those lines, on the personal health side, take precautions against deer ticks which are now at the infective, difficult-to-see nymph stage in southern New England.

Fungicide update 2012

The most important issue regarding fungicides in 2012 is the current status of PCNB. PCNB is probably the best fungicide for soil-borne pathogens like *Rhizoctonia solani*, *Sclerotinia sclerotiorum* (White mold), *Sclerotium cepivorum* (White rot), *Sclerotium rolfsii* (Southern Blight), and Club Root of crucifers. There is uncertainty about when and if PCNB will lose its registration. A stop sale or use order issued by the EPA in August 2010 was challenged by American Vanguard Corporation; the order was vacated in August 2011. Currently, PCNB products registered in Massachusetts include Terrachlor 400, Terrachlor 75% WP, and PCNB 10% Granules Soil Fungicide. Amended labels may be issued. An alternative to PCNB is fluazinam (Omega 500 F) which is registered for Brassica leafy vegetables group, blueberries, legume vegetables (edible podded, succulent, and dry; except peas), onion bulb group, and potato. Important crops not covered by the Omega label include Brassica head crops, pepper, and tomatoes.

Many new active ingredients in Group 3 (Sterol Biosynthesis Inhibitors, or DMIs) are being registered. New active ingredients include difenoconazole, tebuconazole, metaconazole, and prothioconazole. Current Group 3 fungicides include Rally (myclobutanil), Procure (triflumizole), Tilt (propiconazole), and Inspire Plus (difenoconazole plus cyprodinil). Group 3 fungicides are systemic and subject to resistance development as demonstrated by the cucurbit powdery mildew fungus. They should never be rotated with one another. DMIs vary widely in their spectrum of activity, but resistance to one active ingredient results in resistance to the entire group of active ingredients. Inspire Plus which was first registered in 2011 circumvents the resistance problem by the addition of a second active ingredient (cyprodinil). This fungicide is registered for Brassica leafy vegetable group, cucurbits, onion bulb group, and tomatoes for numerous foliar and fruit diseases including powdery mildews, *Alternaria* species, *Septoria* species, Gummy stem blight (Black rot), and Plectosporium blight.

Due to loss of maneb, both chlorothalonil (Bravo) and mancozeb (Dithane) have expanded labels. Chlorothalonil is now registered on cabbage, Brassica leafy vegetable group, eggplant, and peppers. The leafy vegetable group is not included. Cucurbit crops with the exception of winter squash and pumpkins have been added to mancozeb labels. Crops petitioned and still awaiting registration on mancozeb labels include broccoli, cabbage, lettuce, and peppers. Quilt Excel (azoxystrobin plus propiconazole) is a new systemic fungicide registered on strawberries, blueberries, cane berries, bulb vegetables, carrots, and corn. It is a broad spectrum fungicide registered for many different diseases. Several new seed treatments are available.

Mertect 340F (thiabendazole) is registered on carrots and potatoes for soil-borne diseases and as a seed treatment on sweet potatoes and peas. Apron Maxx RFC (mefenoxam plus fludioxonil) is labeled for legume crops as a seed treatment for damping-off and seedling rots. Maxim 4FS (fludioxonil) is registered for seed and seedling rots on a broad range of crops (Brassica leafy vegetable group, bulb vegetables, corn, cucurbit group, legume vegetables, fruiting vegetables, leafy vegetables, root and tuber group).

A brief recap of the latest University fungicide trials on some of the most troublesome diseases:

Phytophthora capsici: No significant differences between fungicide treated and non- treated plants were observed and no fungicide treatment resulted in commercially acceptable control in both peppers and cucumbers.

Phytophthora infestans (Late Blight): In two studies, chlorothalonil alone provided good control of foliar disease on potatoes. Reduction of foliar lesions can lead to reductions in tuber blight, but chlorothalonil may not be as effective as other fungicides against tuber blight. Gavel (mancozeb plus zoxamide) alone also gave good control of Late blight on potato. Successful fungicide programs for potato:

- Bravo WS (chlorothalonil) plus Revus Top (mandipropamid plus difenoconazole)
- Bravo WS plus Gavel
- Bravo WS alt Dithane (mancozeb) alt Super Tin (triphenyltin hydroxide)

Pseudoperonospora cubensis (Downy Mildew) on cucumber: Presidio (fluopicolide), Aliette (foestyl-Al), and mancozeb alone provided good control. Presidio continues to be the best fungicide against this disease, but it is susceptible to resistance development. The label requires tank mixing with a fungicide with a different mode of action and it is never recommended to apply sequential applications. Fungicide programs that performed well:

- Presidio plus mancozeb alt Ranman (cyazofamid) plus mancozeb
- Presidio plus Tanos (famoxadone plus cymoxanil) plus chlorothalonil
- Presidio plus chlorothalonil alt Ranman plus chlorothalonil

Podosphaera xanthii (Powdery mildew): University trials conducted on squash and pumpkins showed that Procure (triflumizole) and Quintec (quinoxyfen) applied alone were very effective, but this practice is never recommended as the powdery mildew fungus very quickly develops fungicide resistance. Better fungicide programs:

- Rally plus chlorothalonil alt Pristine (pyraclostrobin plus boscalid) plus chlorothalonil,
- Quintec alt Procure
- Pristine alt Quintec (also controlled Plectosporium blight)
- Quintec and Rally alt chlorothalonil was more effective than Inspire Plus (difenoconazole plus cyprodinil) alt chlorothalonil, Quadris Top (azoxystrobin plus difenoconazole) alt chlorothalonil, and Revus Top (mandipropamid plus difenoconazole) alt chlorothalonil

P. xanthii continues to develop resistance to fungicides at an alarming rate. The pathogen is resistant to two groups of fungicides, strobilurins and all but the highest rates of DMIs. Resistance to boscalid and quinoxyfen has been detected at low levels in powdery mildew populations emphasizing the need to carefully construct fungicide programs with appropriate active ingredient rotations and tank mixes. Effective programs prevent both disease control failure and the loss of effective chemicals.

- M. Bess Dicklow, UMass Extension

STOP THE ROT! USING CULTURAL PRACTICES TO REDUCE BACTERIAL BULB DECAY IN ONIONS

Editor's Note: Onion production is on the rise in New England, as more growers target fall and winter sales. Plasticulture is growing in popularity as it solves weed and irrigation issues and promotes faster growth. However, growers should be aware of possible negative effects of plastics, and how to avoid them.

The following article is based on work done by Christine Hoepting, Kathryn Klotzbach, Judson Reid and Beth Gugino from the Cornell Cooperative Extension Vegetable Program Dept. of Plant Pathology and Pennsylvania State University. Much thanks to Christine for providing the article and offering a talk on the research results at the 2011 New England Vegetable & Berry Growers conference. Minor adaptations have been made to format the article for Vegetable Notes. See www.http://extension.umass.edu/vegetable/sites/vegetable/files/related-materials/pdf/Stop-the-Rot-2011.unlocked.pdf for the full report with tables.

Narrow plant spacing reduced bacterial bulb decay by 53 to 64%

Do you know how easy this is? A simple modification to adjust your planting configuration is all it would take to drastically reduce losses from bacterial bulb decay. Our studies showed that when plant spacing was reduced from 6 or 8 inches to 4 inches with 3 or 4 rows per 3-foot plastic mulch bed (row spacing: 4 rows = 6 inch; 3 rows = 8 inch), this provided 53 to 64% control of bacterial bulb decay at harvest. Marketable yield also increased by 1.4 to 2.4 times, representing an increased net economic return of $43 to $258 per 100 feet of bed, due to increased weight of marketable jumbo-sized bulbs. We learned that wide plant spacing produces big bushy plants with more leaves, thicker necks, delayed maturity and bigger bulbs. Unfortunately, it was these bigger bulbs that rotted! By narrowing plant spacing, we got fewer colossal-

Narrow Plant Spacing 32 inch^2: 4" x 3 rows **Standard Plant Spacing 36 inch^2: 6" x 4 rows**

Figure 1. Compared to the standard plant spacing, narrow plant spacing with fewer rows per bed controlled bacterial bulb rot by 53 to 66%. New Holland, PA: July 20, 2010.

sized bulbs, which was more than made up for by having significantly more healthy jumbo-sized bulbs to market.

Alternatives to black plastic reduced bacterial bulb decay by 59 to 75%

This is also a very simple and easy modification for small-scale growers producing onions on plastic mulch, which could go a very long way towards reducing bacterial bulb decay. Our studies showed that reflective silver mulch, biodegradable black plastic and bare ground had 1.8 to 2.8 times higher marketable yield than black plastic. Reflective silver and biodegradable black plastics had 3.7 and 3.6 times higher jumbo weight, respectively, which resulted in an increased net return of $96 to $215 per 100 feet of bed compared to black plastic. All of the alternatives to black plastic had significantly lower soil temperatures compared to the black plastic; we suspect that the higher temperatures of the black plastic are more favorable for development of bacterial diseases.

Figure 2. Compared to black plastic, reflective silver mulch controlled bacterial bulb decay at harvest by 53%. New Holland, PA: July 20, 2010.

Bacterial bulb decay can be a serious problem in onion production

Small-scale diversified fresh market growers who grow onions intensively are frequently challenged by yield losses due to bacterial diseases, which greatly compromise profitability.

Bulbs with bacterial decay are not marketable, although sometimes they are sold unknowingly, since an infected internal scale may be undetectable if outer scales remain firm. Losses to bacterial bulb decay have increased steadily over the past decade, where onions are grown intensively on plastic mulch. It has become common for the incidence of bacterial bulb decay to be 35 to over 50% in parts of both PA and NY. In 2008 in PA, 34 growers lost a total of $140,000 to bacterial bulb decay. In NY, large scale onion producers report annual losses of 20 to 30% due to bacterial bulb decay.

It is very important to note that this simple technique of reducing plant spacing was equally effective at reducing bacterial bulb rot associated with different bacterial pathogens. In New York, Sour Skin caused by *Burholderia cepacia*, is the most common cause of bacterial bulb decay, although *Pantoea ananatis* and *Enterobacter cloacae* have also been identified, and several others are likely part of the complex. In Pennsylvania, the most frequently isolated bacterial pathogens include soft rot pathogens, *Pseudomonas marginalis* and *Pectobacterium caratovora*; and center rot pathogens, *Pantoea ananatis* and *P. agglomerans*; *Xanthomonas axonopodis* and *Pseudomonas viridiflava*.

Figure 3. Left and Middle – Above-ground symptoms of bacterial diseases of onions showing yellowing, bleaching and wilting of inner leaves. Right – Bacterial bulb decay (pathogen not identified).

How does plant spacing work to reduce bacterial bulb rot?

We don't know for sure, but we suspect that narrow plant spacing produces plants that are less suitable hosts for bacterial diseases to become established, and to develop and spread. Our studies showed that wider plant spacing produces larger plants with more leaves, thicker necks and delayed maturity. Large bushy plants are more conducive to holding water in the leaf axils, which can favor bacteria entering into the plant. Thick necks take longer to dry and remain succulent and green for a longer time, which provides ideal conditions for bacterial diseases to spread from the leaves into the bulb. Delayed maturity interferes with proper lodging and curing of the neck and bulbs, allowing for increased risk for bacterial infections in the leaves to spread into the bulbs. Meanwhile, the smaller plants with thinner, tighter necks that mature earlier in narrow plant spacing configurations are less conducive to bacterial bulb decay.

Our results from small-scale production suggest that bacterial bulb decay decreases when planting density is higher than 36 inch^2 per bulb, and continues to decrease as planting density increases. This could explain why we often see higher incidence of bacterial bulb decay in transplanted onions than we do in direct seeded onions of the same variety. For example, direct seeded onions planted at 7 seeds per foot with 15 inch row spacing have a planting density of 26 inch^2 per bulb, which is 2.3 times denser than transplanted onions that are planted at 3 plants per foot with the same row spacing (60 inch^2 per bulb).

Our data, collected from Interlaken, NY in 2010, suggests that row spacing is a very important factor related to rot: when we increased row spacing from 6 inches (4 rows per bed) to 8 inches (3 rows per bed), incidence of bacterial bulb decay at harvest increased 2 to 4 fold for each plant spacing (4", 6" and 8"). Therefore, in direct seeded onions, onions planted with 12 inch row spacing (= 21 inch^2 per bulb) might have less bacterial rot than onions grown with 15 inch row spacing (= 26 inch^2 per bulb). Another unknown is whether row type (single vs. double) effects bacterial bulb decay.

Our results from small-scale production suggest that reducing planting density to 36 inch^2 per bulb or less greatly reduces incidence of bacterial bulb decay at harvest. Therefore, with respect to large-scale production of onions from transplants, our data suggests that by decreasing row spacing from 15 inches (= 60 inch^2 per bulb with 4 inch plant spacing) to 8 to 6 inches, and adjusting plant spacing to achieve a planting density of 36 inch^2 per bulb or less (e.g. 6 inch row spacing with 5 or 6 inch plant spacing = 30 to 30 inch^2 per bulb), growers could control 50% or more of bacterial bulb rot. It would be very interesting to see whether bulb size could still be met with these different planting configurations. We also do not know the effect that the number of plants per hole (1 vs. 2 vs. 3) has on incidence of bacterial diseases.

How does mulch type reduce bacterial bulb decay?

Growers' standard black plastic absorbs sunlight, thus increasing soil temperature, which in turn, promotes early crop

development of onions. However, during the heat of June and July, the warmer soil temperatures provided by the black plastic may actually be creating a more favorable environment for bacterial diseases to develop and spread. In contrast, reflective silver mulch keeps soil temperatures cooler, and black biodegradable mulch provides early season added heat, which gives way to cooler soil temperatures as it degrades during the heat of summer. The lower temperatures provided by these alternative mulches could be the difference between optimum and below optimum temperatures for bacteria to grow. Similarly, soil temperatures of bare ground would be cooler than under black plastic, but extra effort would be required to provide effective weed control.

Ultimately, an integrated approach is needed to manage bacterial disease of onions

We are not telling you that all you have to do is reduce your plant spacing and bacterial diseases will be a thing of the past. Ultimately, managing bacterial diseases of onions will involve an integrated approach for both small and large scale producers.

Funding for these projects was provided by NESARE Partnership and NE IPM Partnership grants.

- adapted from an article from Christine Hoepting, Kathryn Klotzbach, Judson Reid and Beth Gugino - Cornell Cooperative Extension Vegetable Program Dept. of Plant Pathology, Pennsylvania State University

NEWA: A GROWER-FRIENDLY WEATHER AND PEST RESOURCE FOR MASSACHUSETTS

UMass Extension Vegetable and Fruit programs are partnering with the Network for Environment and Weather Applications (NEWA), a web-based weather and pest reporting and forecasting system, to provide growers with ready access to useful weather and pest data. The NEWA website was developed by the New York State Integrated Pest Management program and relies on a network of on-the-ground weather monitoring stations. NEWA generates forecasts and alerts for insect and disease pests of both fruits and vegetables.

In Massachusetts, over twenty locations are reporting data every hour into the NEWA network. Some of these are located at airports and report hourly temperatures, daily max and min temperatures, rainfall, windspeed, relative humidity and hours > 90% RH. Others have been set up on vegetable and fruit farms around the state, reporting directly from the field via the Internet to the NEWA website. These also report leaf wetness periods. Now, from your own computer or smartphone, you can access the kind of weather data and pest forecasts that you need to help make management decisions on your farm.

For each weather station, you can choose a range of output reports. One of the most useful is basic growing degree day (GDD) accumulation -- by day, month and season -- at various base temperatures. There are also GDD models for pest flights that can tell you when to expect activity. For example, the models for cabbage and onion maggot indicate the cumulative GDD milestones for the beginning, peak and end of each flight period, and how long each generation lasts. European corn borer emergence in spring (350 GDD, base 50 F) can be monitored using GDD – an excellent complement to our pheromone trap network.

In addition, hourly data can be run through models that describe or predict key disease events that are weather dependent. For example, the model for late blight of tomato and potato tells when the first outbreak might occur. The models for both late and early blight indicate the severity of recent conditions, and what ongoing spray schedule is recommended.

This is a terrific resource for farmers, easy to navigate and updated hourly and daily. It's great to just pick a weather station and get degree days, a whole weather report for the previous month, or a forecast for a specific pest. There are also forecasts for the next 7-10 days for GDD and other parameters.

To find the growing degree days accumulated at the weather station nearest your farm, go to http://newa.cornell.edu/, hover your cursor over 'Weather Data' on the menu along the top, and choose 'Degree Days' from the drop down menu. That will bring you to a page where you can select your nearest weather station (NOTE: Mass stations may be grouped together or listed alphabetically). Select your base temperature, the month and the year, and click 'Get Report'. Voila!

To find the forecasts for a specific pest or disease, go to http://newa.cornell.edu/, hover your cursor over 'Pest Forecasts' on the menu along the top, and choose whichever pest model you're interested in from the drop down menu. That will

bring you to a page where you can select your nearest weather station. Click 'Get Report' and it will bring you to the most current model report for your selected pest. For pests not listed on NEWA, a good resource for degree day information on vegetable and fruit insects can be found at University of Wisconsin Extension, http://hort.uwex.edu/articles/degree-days-common-fruit-vegetable-insect-pests.

In Vegetable Notes this season we'll be putting out articles with specific information about how to use these models to inform your pest management programs as the season progresses.

-Andrew Cavanagh and Ruth Hazzard for the Vegetable and Fruit IPM Team

BIOLOGICAL CONTROL OF ECB WITH TRICHOGRAMMA OSTRINIAE IN SWEET CORN: BE READY FOR EARLY RELEASES!

A tiny wasp that will search out and kill the egg masses of one of our major sweet corn pests – can this really work? A number of sweet corn growers around the state have been testing *Trichogramma ostriniae** parasitic wasps and have found that they do help to control European corn borer (ECB) in both corn and peppers. The use of these wasps in commercial sweet corn fields in Massachusetts has resulted in the reduction or elimination of foliar insecticide sprays, saving time, labor, pesticides, and fuel, reducing soil compaction, and maintaining and improving ear quality. This method is an ideal IPM practice because it prevents the emergence and feeding of caterpillars in the first place, as opposed to rescuing the corn with sprays after the caterpillars have become a problem. Using *Trichogramma* to control ECB in early corn (corn to be harvested in July) is especially useful because timing sprays in the early corn can be tricky. Also, most of the caterpillar damage in early sweet corn is from ECB - thus, wasp release control measures are not complicated by the need to control other major caterpillar pests. *Trichogramma* can also be used for second generation ECB, which attacks both peppers and corn. Even though corn earworm can become the major pest in late season corn, ECB also causes a lot of ear damage and corn is cleaner when ECB is controlled. In pepper, *Trichogramma* reduces fruit infestation, resulting in fewer culls and greater success with high-quality, high value, ripe red peppers. It also reduces culls in ornamental corn.

Biology

Trichogramma species are tiny parasitic wasps, smaller than the period at the end of this sentence. Female wasps lay their eggs in the egg masses of host insects. *Trichogramma* larvae feed and pupate inside the egg, killing the egg and preventing hatch. *Trichogramma ostriniae* lays its eggs in ECB egg masses. As they mature, unparasitized ECB egg masses turn from a cream color to white, to white with a black head mass in the center of each egg. When parasitized by *Trichogramma*, the entire egg turns black. *T. ostriniae* have excellent dispersal and ability to search for egg masses in the field. They do not overwinter but they will reproduce and contribute to the control of ECB throughout the season.

Release timing

While some native species of *Trichogramma* persist in the wild, *T. ostriniae* need to be reared at an insectary, shipped to the farm and released each season. Since *Trichogramma* control ECB by parasitizing egg masses, knowing when to release the wasps requires knowing when the ECB moths are laying eggs. Thus, knowing when ECB flight begins, reaches a peak, and ends in a given field is key to the proper timing of *Trichogramma* releases. You can use regional information about flight activity; however, to get the best coordination of timing on your farm, we recommend that you monitor ECB flight in your own fields.

ECB moths have two generations per growing season in Massachusetts; the first one emerges in late May or early June, while the second generation begins to emerge in late July and early August. Time the first release of *T. ostriniae* to the beginning of ECB egg laying, which will begin within a week after the first ECB moths are caught in traps. If the corn is less than 6 inches high, you may want to wait a few days. For corn maturing in the middle of moth flight, target releases to corn that is in the 4-6 leaf stage (12-16 inches tall).

To help align the concentrated presence of *T. ostriniae* with ECB host egg laying we recommend three releases, each approximately 7 days apart. Our current recommended release rates in early corn are 60,000 wasps per acre per release. Another approach which costs a bit less is to release 30,000 on the first week (when flight begins) and 60,000 for the second and third release.

*(pronounced ah-STRIN-ee-ay)

Degree days (DD) can help with timing. Using a base temperature of 50 degrees F, the first spring moths will emerge at 375 DD (Farenheit, base 50 (this coincides with the time when Bridal Wreath Spriraea is in full bloom), and the first eggs are laid at 450 DD50 (when Pagoda dogwood is in late bloom). Eggs require 100 degree days to hatch. (See below for these miletones in Celsius growing degree days CDD Releases should be made when eggs are in the field, but before eggs hatch. Degree day information for many locations in MA can be obtained through the NEWA website (see related article). To be conservative, we prefer to release the same week that flight begins as the additional GDD for egg laying will very likely accumulate within that week.

Comparison of FDD and CDD		
ECB first generation development		
	F (base 50)	C (base 10)
emergence	375	208.33
first eggs	450	250.00
egg hatch	550	305.56
FDD= growing degree days in Farenheit		
CDD= growing degree days in Celsius		

Handling *Trichogramma*

Trichogramma are shipped from the insectary as pupae inside protective cards. They are ready to emerge upon arrival, although there will be a range of pupal age so they will emerge gradually, over 1-7 days, depending on temperature. It's best to put the cards out in the field the same day as they arrive. If you cannot release them upon their arrival, keep the cards in their shipping box in a cool location at about 50°F – not in the refrigerator! The insects are alive: avoid exposing them to extreme temperatures (below 40°F or above 90°F) so they will still be alive and in good shape when you put them in the field.

Releasing *Trichogramma*

Place the proper number of cards to provide the desired release rate in the center of the field, or at regular intervals through the field, away from the field edges. *Trichogramma* wasps will disperse well throughout the field - one to four release sites per acre is adequate. Tie cards securely to corn leaves or on a stake. Do not put them on the ground. Leave the packet stapled shut so that other insect predators do not consume them.

Scouting release fields

Where *Trichogramma* has been released, you can scout as usual. Eggs that were parasitized and did not hatch will never reach the larval stage, resulting in a lower rate of infestation with caterpillars. Use the standard ECB threshold (15% infestation in caterpillars or fresh damage) to decide whether to spray.

Spraying release fields

T. ostriniae will suppress ECB, but will not always provide complete control. In addition, an early corn earworm flight may arrive during silking. Thus, insecticide applications may still be needed to achieve high levels of clean corn. Use selective insecticides with low impact on natural enemies (aka beneficials). *Trichogramma* that are inside host eggs are somewhat protected from the spray and many will survive, but adult wasps may be killed by insecticides that are harsh on beneficial organisms.

Ordering *Trichogramma*: PLACE YOUR ORDER NOW!

Trichogramma ostriniae may be ordered from IPM Laboratories in Locke, New York.

PH: 315-497-2063 | FAX: 315-497-3129 | Email: ipminfo@ipmlabs.com .

To ensure that you will be able to receive *Trichogramma* this year you must call IPM labs as soon as possible. *T. ostriniae* are custom-reared based on pre-orders, so let IPM labs know your needs well in advance. When placing your order, have

the number of acres you wish to release in and the size and number of plantings you have for early corn. You need to estimate your release dates based on past experience; these can be fine-tuned, to some extent, closer to the release date.

- By Amanda Brown & Ruth Hazzard, Extension Vegetable Program, University of Massachusetts-Amherst. For more information about Sweet Corn IPM, see Using IPM In the Field: Sweet Corn Insect Management available online at: http://www.umassvegetable.org

DON'T FORGET TO GET YOUR COPY OF THE 2012-2013 NEW ENGLAND VEGETABLE MANAGEMENT GUIDE!

When vegetable growers across New England are asked what resources they rely on most for information about producing vegetables, the New England Vegetable Management Guide is always high on their list. Updated every two years by vegetable specialists from the Universities of Maine, New Hampshire, Vermont, Connecticut, Rhode Island, and Massachusetts, it consists of 250 information-packed pages with the latest on cultural practices, nutrients and soil fertility, and pest management. Now is the time to throw away your old Guide and get a new one with up-to-date information!

The Introductory Section covers:

- General cultural practices for vegetables, including soil fertility and nutrients, soil management, cover crops, organic production, raised beds, irrigation, and much more.
- General pest management topics including weed, insect and disease management, IPM, efficacy tables, biological controls, organic and lower-risk pesticides, and pesticide safety.
- A comprehensive guide to vegetable transplant production.

In the Crops Section you will find recommended cultural practices, varieties and nutrient recommendations for each crop, along with specific information on management of weeds, insects and diseases for that crop or crop group. The specific production practices for each crop were extensively revised and updated for the 2012 edition.

Our audience includes a wide range of types of farms -- large and small, organic and conventional, growing many or just a few crops -- and the information reflects that diversity. If you are looking to find out about newly registered pesticides, or new label changes, you will find it here. If you want to know which pesticides are least toxic or are allowed for organic production, this is the place to find it. Trying to identify your pests? You will find a color photo of nearly every weed, disease or insect found on vegetable farms in the Pest Identification Guide bound together with the text.

Most vegetable growers want a hard copy to carry in their truck or have handy in their office. The New England Vegetable Management Guide may be ordered online from the UMass Extension Bookstore among the Books and Resources, at

http://www.umassextensionbookstore.com/store.php?crn=238

Other New England State Extension offices also carry the Guide.

For quick reference from your computer, the full Guide may also be found online at www.nevegetable.org.

Vegetable Notes. Ruth Hazzard, Amanda Brown and Andrew Cavanagh, co-editors. Vegetable Notes is published weekly from May to September and at intervals during the off-season, and includes contributions from the faculty and staff of the UMass Extension Vegetable Program, other universities and USDA agencies, growers, and private IPM consultants. Authors of articles are noted.