UMASS EXTENSION

VEGETABLE IPM MESSAGE

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Crop conditions

Wet soils and risk of frost are the primary concern after three inches of rain (at least) and near-freezing nights. Given all the possibilities, somehow one needs to prepare for both a) wet conditions that favor Phytophthora blight and b) dry conditions that require irrigation. This week we saw raised beds lined with trenches of standing water, with the irrigation pipe sitting idle for the time being. That grower was ready for all contingencies.

How much nitrogen to add to rye?

As rye breaks down, microbes can tie up nitrogen and make it unavailable for crops. If the rye is green and soft and not too tall -- less than a foot, no extra N should be needed. If tall, and light green, plow down around 30-40 lb N with the rye. If the rye is some where in between these stages, go with 20 -30 lb. If the rye is starting to form seed-heads (which is true in a lot of fields right now) up to 50 lb may be appropriate. As rye becomes light green and begins to get woody, it has a higher carbon:nitrogen ratio and is more likely to tie up N. Any nitrogen that is tied up will later be released back to the crop and may be able to take the place of side-dressed N, depending on the timing of the N release. Using the pre-sidedress nitrate (PSNT) test will help determine whether side-dressing is necessary, to help avoid either over- or under-fertilizing.

Join us in honoring John Howell

John Howell, who has been with UMass Extension since 1973, will be retiring on June 15, 2002. In the 29 years since he arrived in western Massachusetts, there have been a lot of changes in the face of agriculture in this state, and John has been right in their pitching with growers as they have dealt with the wide range of problems and decisions on their farms. John has made a difference in the lives and businesses of at least two generations of farmers. Please join us in honoring John's contributions at a retirement party on Friday, June 14 at the Hickory Ridge Country Club in Amherst. The event will start at 6:00 and the cost is $ 22 for dinner. It will be a buffet with a choice of two entrees.

Please RSVP and send check a check (made out to Frank Mangan) by June 3 to: Frank Mangan, 59 Kendall Hill Rd, Sterling, Mass. 01564.

Growing and marketing cilantro in Massachusetts

Cilantro (*Coriandrum sativum*) is an annual herb that closely resembles parsley and is in the same family of plants (*Apiaceae*). This pungent herb is native of southern Europe and is commonly known as Coriander, Cilantro, or Chinese Parsley. For many growers that sell retail, cilantro is second to parsley among herb sales. It is very popular among several different ethnic groups, including Portuguese, Latinos and many Asian groups. Cilantro is very easy to grow in Massachusetts and the marketing potential is excellent!

Seeds are planted 1/4 to 1/2 inch deep in rows 12 inches apart. It is recommended to seed thickly (20 - 30 'seeds'/foot). The denser plant population competes more effectively with weeds in the row. In addition, the thicker planting makes harvesting easier since plants are bunched in the field. The "seed" of cilantro is actually the whole fruit with two embryos inside. This means that if you plant 10 "seeds" and get 100% germination you will have 20 cilantro plants. Have the soil tested and use the same fertility management used for leafy vegetables such as lettuce or spinach. Based on work implemented in Massachusetts last season, cilantro will go to seed (bolt) quicker if fertility is lacking.

Cilantro can be started in the greenhouse and transplanted into the field. This is done most often in the spring in order to get an earlier harvest; however, if the plants become stressed they will bolt quicker than if they were direct seeded. Cilantro grows best under cool conditions while hot weather encourages it to flower. Cilantro will withstand temperatures as low as 10 degrees, which makes it an excellent spring and fall crop. Plantings of cilantro are usually made every 7 to 10 days to ensure a steady supply.

Growers in Massachusetts have not reported any serious insect pests of cilantro. Bacterial leaf spot (*Pseudomonas syringae*) is the most important disease of cilantro. Symptoms consist of angular, vein-delimited leaf lesions that are at first water-soaked or translucent. Over time and with drying conditions, the leaf spots may turn black or brown. If infection is severe, leaf spots may coalesce and cause a blighting effect. Under experimental conditions the pathogen will also infect parsley.

Cilantro is ready to be harvested as soon as the plant is 4 - 6 inches tall, which can take 40 to 60 days after planting. It can take up to 120 days to produce mature seed (coriander). The plant can regrow for a second cutting; however, it does not regrow as efficiently as parsley. For that reason many growers just harvest it once. Cilantro can also be harvested by pulling out the whole plant. Some ethnic groups (e.g. Latinos and some Asians) prefer to buy the plant with the roots intact. The roots are used in making soups or as condiments.

Cilantro has a fairly high respiration rate, similar to that of other green leafy vegetables. Therefore, in order to maintain optimum post harvest quality, cilantro should be harvested at the coolest times of the day (either early morning or in the evening), and stored under low temperature, high humidity conditions. A high surface to volume ratio makes cilantro very susceptible to water loss. Placing cilantro roots or stems in water, or keeping the whole plant in plastic bags, will delay wilting.

-Frank Mangan

USING SANDEA HERBICIDE IN VINE CROPS

The following article is written by Dr. Doug Doohan at Ohio State University. It is a good overview of Sandea herbicide. Remember that Sandea is now registered for use in cucumbers, winter squash, and pumpkins grown in Massachusetts. I have made a few editorial changes to Doug's article.

--Rich Bonanno

More on Sandea herbicide, by Doug Doohan

I continue to get inquiries about Sandea. These range from the products price and alternative lower-cost products containing the same active ingredient to "how to use Sandea?".

The unit cost of Sandea is high, and this may be a problem for growers with very small plantings. However, when compared to hand weeding, Sandea is still a good bargain for vine crop producers with more than just a few acres.

Sandea contains the active ingredient halosulfuron. Halosulfuron is also the active ingredient found in the corn herbicide Permit(tm). Permit is priced into the corn market and for that reason it is sold for less money than Sandea. Should vine crop growers take advantage of this fact and use Permit instead of Sandea to save money? *Definitely not!*

Applying Permit to vine crops is a violation of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and is an illegal act. Secondly, it has taken years of research effort and

dollars to register Sandea on cucurbits. The registrant, Gowan Chemical Company has stated repeatedly that they will cancel their registration if they determine

that Permit is being used on registered crops rather than their product. This would mean that the tolerance for halosulfuron on vine crops would also be cancelled. A trace of halosulfuron detected on cucurbits would then point towards a violation. I hope it is clear that saving a few dollars by using Permit now would cost all growers dearly, down the road.

How to use Sandea? Start off with a label, and read it carefully. Gowan tells me that 1/2 oz/ A is a good rate for most situations. PRE treatments are going to be best for lambsquarters and purslane. PRE will give about 80% control of purslane, which means that you will still see it in the crop but should not be overrun by it. POST treatments will give no control of purslane and little control of lambsquarters. Morning glories can be controlled up to the early seedling stage according to Dr. Steve Weller from Purdue University. We plan to look at weed stage of growth and sensitivity to Sandea more closely this year in Ohio. Sandea does a good job on nutsedge, pigweeds, ragweed, velvetleaf, and cocklebur when applied POST. From a crop safety point of view consider that Dr. Brad Majek from Rutgers claims that Sandea is going to turn any crop it's applied to yellow. No chlorosis on the crop? Probably means you applied an insufficient rate of the herbicide. Generally, chlorosis should not translate into reduced yields. We have not seen yield reductions in three years of testing in Ohio. However, when PRE treatments are followed by heavy rainfall, severe injury can occur. Sandea can be used under plastic mulch, between beds covered with plastic, or over the top of plants growing in bare ground culture. Applications made over the top of plants on plastic mulch may lead to crop injury! Evidence suggests that Sandea may wash into the transplant hole from the surrounding plastic mulch and concentrate directly in the crop root zone.

Let's consider rate. One-half ounce per acre is a small quantity to measure - consider that 1 fluid ounce is approximately 2 tablespoons. You don't have to be under- or over- by too much in order to apply a rate that is too low or far too high. The crop you injure will be your own! The Sandea label clearly states that users assume all liability for crop damage. Make sure your sprayer is calibrated accurately, that the nozzles are not worn and use an accurate measuring device. Remember to use a non-ionic surfactant with POST applications.

Finally, remember that Sandea is persistent in the soil. Rotational crop guidelines are provided on the label and must be strictly adhered to.

CRUCIFERS

The **all-black crucifer flea beetle**, *Phyllotreta cruciferae*, and the **striped flea beetle**, *Phyllotreta striolata*, which is black with two light tan stripes on its back, are the primary flea beetles that attack brassicas in the Northeast. The adult beetles spend the winter in field edges, in leaf litter or in soil, and rapidly colonize new plantings of brassicas. They feed on cotyledons and leaves, causing shot-hole damage, which can delay growth, reduce yield, or kill whole plants. Eggs are laid in the soil and larvae develop underground, feeding on roots. Beetles are long-lived, and may be present until the summer generation of beetles has completed its development in the soil and emerges as new adults.

Flea beetles show differences in preference among the brassica species, tending to prefer the other species of *Brassica* (*B. juncea, B. rapa, B. napus*) to *Brassica oleracea*. Generally, the standard European vegetable crops (cabbage, broccoli, collards, kale, kohlrabi) belong to *B. oleracea*, while the leafy greens and Asian crops belong to other species of Brassica. The *Brassica oleracae* can generally tolerate and outgrow more feeding damage than Chinese cabbage, bok choi, mustards, mizuna, or other leafy greens. This preference can be exploited as a control strategy by planting a preferred crop as a trap crop on the perimeter of the field. This works best as a complete barrier surrounding the field, and with some means for controlling the beetles in the trap crop. At UMass we are investigating some options for doing this on several farms this

summer. Beetles have also been shown to prefer plants that are wilted, grown on compacted soils, or are poorly nourished.

Scout crops to assess beetle numbers, damage and plant stress. Beetles can be counted if the leaves are not disturbed. Threshold studies conducted by M. A. Al-Doghairi at Colorado State tested thresholds of 0.2, 5, and 10 beetles per plant in broccoli and cabbage, where sprays were applied when the average number of flea beetles per plant reached the desired threshold. This study concluded that **a threshold of 2 to 5 beetles per plant** would provide control without yield loss. When controls were applied at 10 beetles per plant or no controls were applied, significant yield reductions and reduced head diameter occurred.

See the *New England Vegetable Management Guide* for foliar insecticides that can be used against this pest in brassicas. Pyrethroids and carbamates are generally quite effective. For non-chemical control, **floating row covers** provide a barrier that prevents beetles from reaching the crop. Covers must be put in place at seeding and sealed around the edges with soil. For weeding or harvesting, remove and replace the cover as quickly as possible. Last year, we tested several organic materials for efficacy against flea beetles. Pyrethrin and neem did not reduce numbers or damage. Suction was effective on small seedlings but had no residual effect and caused leaf damage to larger leaves. Spinosad (Spintor 2SC) suppressed beetles and has good potential for organic farmers if a new organic formulation receives approval. We will be repeating these trials this spring.

STRIPED CUCUMBER BEETLE AND BACTERIAL WILT MANAGEMENT IN VINE CROPS.

Most vine crops will be planted within the next 3-4 weeks, and preparing for control of striped cucumber beetle is on everyone's mind. These beetles overwinter in plant debris in field edges and with the onset of warm days and emergence of cucurbit crops will move rapidly into the field. Densities can be very high especially in non-rotated fields or close to last year's cucurbit crops. Adult feeding on cotyledons and young leaves can cause stand reduction and delayed plant growth. More importantly, the striped cucumber beetle vectors *Erwinia tracheiphila*, the causal agent of bacterial wilt. This disease overwinters within the beetle and is transmitted by contact of beetle feces with the open wounds in leaf tissue caused by beetle feeding. Bacteria multiply and block the vascular system of the plant, causing vines to wilt. This disease can be effectively managed only by preventing feeding by the beetle.

Which vine crops are susceptible to wilt? We now know that most vine crops are, to varying degrees, susceptible to this disease. The major exception in watermelons – they do not show any symptoms.

Trials by Meg MacGrath (Cornell University, Long Island) compared beetle numbers and wilt severity among many different vine crops. One finding was that attractiveness to beetles was not always related to wilt susceptibility. For example, although fewer beetles per plant were observed in cucumber than in most other cucurbit crop types, and little feeding injury was observed, a higher percentage of cucumber plants developed wilt. Muskmelon had similarly low beetle densities but less wilt than cucumber. Compared to cucumber, zucchini was more attractive to beetles and less susceptible to wilt.

Meg McGrath also found that the gourd Turk's Turban (*Cucurbita maxima*) was very attractive to beetles and was severely affected by wilt, differing substantially from Pear Bicolored (*Cucurbita pepo*). In the absence of insecticide treatment, all Turk's Turban plants died before producing fruit while about 25% of the Pear Bicolored plants died by late August.

Among pumpkins, two powdery-mildew resistant varieties Merlin and Magic Lantern were highly susceptible, while other varieties such as Howden and Harvest Moon were more tolerant. Among winter squashes, buttercup, hubbard and acorn appear to be moderately susceptible, while butternut is the most tolerant (but not immune). Cucumbers are highly susceptible, except for a new wilt-resistant pickling variety called County Fair. Summer squash, zucchini, and melons are

susceptible. Different vine crops also vary in the attractiveness to beetles, but this is not necessarily correlated with their susceptibility to bacterial wilt.

Early season infection. Pumpkins at the cotyledon and first 1-2 leaf stage are more susceptible than older plants, and disease transmission is low after about the 4-leaf stage. Not all overwintering beetles carry the *Erwinia* pathogen. Studies in by Shelby Fleischer in Pennsylvania found from 7% to 10% of overwintered beetles tested positive for the *Erwinia* bacteria. An even lower percentage of beetles were able to transmit wilt when caged individually on muskmelon plants.

Wilt development is strongly influenced by the dose of the pathogen that the plants receive. This in turn is determined by the number of beetles, how long they feed, and what proportion of them were infected. The higher beetle density during early plant growth, the more severe the incidence of wilt. Beetles that find a host plant release an aggregation pheromone that calls others to their spot. Groups of beetles feeding, wounding and defecating on a single plant are more likely to transmit disease, and to acquire the pathogen and transmit it to other plants.

Thresholds and foliar controls. Beetle numbers should be kept low, especially before the 5-leaf stage. Crop rotation -- to a field at a distance from last year's cucurbits -- reduces beetle numbers significantly (and has many other benefits, also). Floating row covers are a very effective barrier to beetle colonization and can be kept on until flowering.

Control with other foliar insecticides can be accomplished by scouting frequently (at least twice per week in June) and treating after beetles colonize the field. To prevent bacterial wilt in susceptible crops, beetles should not be allowed to exceed one beetle for every 2 plants. Many states recommend 1 beetle per plant threshold, but I have also seen studies which showed a significant amount of wilt at that threshold. It should be noted that this is a lower threshold than is needed to prevent significant foliar damage. Less wilt-susceptible crops (such as butternut) will tolerate two beetles per plant without yield losses. A widely used material that gives effective control is carbaryl (Sevin XLR Plus). See *New England Vegetable Management Guide* for other choices. If possible, use a banded spray to avoid wasting material by spraying bare ground.

If **kaolin clay** (Surround WP) is used, it should be applied before beetles arrive. This material is allowed in organic production and gives organic growers a new tool for a difficult pest. It can be applied to transplants before setting them out, or as soon as seedlings emerge. Ensure good coverage of the foliage (it will look like it was sprayed with white latex paint) and reapply after a heavy rain. It acts as is a repellent and protectant -- beetles do not "recognize" the plant and so do not feed -- not a contact poison. Be sure to mix a slurry in a bucket and then add the slurry to the tank, as the dry powder could cake if added directly to the tank mix. Continuous agitation is needed. Given these precautions, it should not cause clogging of nozzles or pumps. In our pumpkin trials last summer, weekly applications of kaolin were as effective in preventing feeding damage and bacterial wilt as an Admire drench.

Systemic controls. Imidacloprid (Admire 2F) has the potential to improve and simplify early season control of cucumber beetles and thus wilt. In contrast with other insecticides labeled for this pest, Admire can be applied to soil before or after seeding or transplanting which enables product to be in leaf tissue when an early invasion of beetles occurs. Admire is a systemic which it is taken up by the roots, translocates to new leaf tissue and persists through the critical early plant stages. Additionally, it has a relatively safe toxicological profile. There are several ways that Admire can be applied.

Using imdacloprid in direct seeded crops. Admire 2 F can be applied in a narrow band within 2 weeks before planting, as an in-furrow spray or narrow surface band during planting, or as a post-seeding drench. It is important to get Admire into the soil to avoid photochemical breakdown; this can be accomplished by placing it in the furrow or irrigating it in. The best system for an in-furrow treatment is to attach an injector to the planter for placement at the seed level. Studies

conducted by Meg McGrath on Long Island showed slightly better control with an in-furrow treatment compared to a band over the top.

The label gives a range of 16 - 24 oz per acre or 0.9 to 1.3 oz per 1000 feet of row. Studies have found a rate of 1.1 oz per 1,000 feet to be sufficient for controlling cucumber beetle in the critical early weeks. Given the wide range in row spacing with these crops and the fact that it is a banded application, the best way to calculate rates is based on the number of row feet per acre. For example, for 9 foot row spacing, divide 43,560 sq ft/acre by 9 feet, which equals 4,840 linear feet. Divide that by 1,000, then multiply by the Admire rate per 1,000 feet. For a rate of 1.1 oz per 1000 feet of row, that would mean 5.3 oz per acre.

Using imdacloprid on transplants: The best time to treat is about 1 day prior to planting in the field. The rate used per transplant is very low: 0.02 ml/plant. To treat a flat of 200 transplants with Admire at this rate, a grower would need to dilute 4 ml (0.135 oz) of Admire in a volume of water sufficient to soak to soil mix evenly. Accurate measuring of small amounts is very important! A plastic syringe, available from the local drug store, can help ensure that these small measurements are accurate! To help make other conversions: multiply 0.02 ml per plant times the number of plants in your flat. For example, use 20 ml to treat 1000 transplants. You can convert ml to oz by dividing by 29.6 (there are 29.6 ml in one fluid oz).

Be careful of phytotoxicity (burning the plants) at higher rates. In Pennsylvania, burning of leaf margins was observed at 0.04 ml/melon plant at the 2-leaf stage, although these plants did grow out of this in about 2 weeks. The transplant treatment should be sufficient to carry the plants through the early crop stages. Scouting can determine if any foliar applications are needed. One concern is whether this treatment will last long enough on transplants set out in early May. It is possible that slightly higher rates would last longer, but there is also the risk of phytotoxicity at higher rates. Remember that the older the plants are when beetles arrive, the less serious is the damage that beetles cause.

This method of application is, obviously, less expensive than a furrow drench. Admire can also be used for Colorado potato beetle or flea beetle control on tomato, pepper and eggplant transplants. Again, be cautious not to use too high a rate, as phytoxicity can result. The suggested rate for tomato transplants is 15 ml - or 0.5 ounce - per 1000 transplants.

Drip application: A drip system can be used for Admire applications to either direct seeded or transplanted crops. Apply early enough to allow root systems to take up the material before beetles arrive (which is typically between June 10 and 17, depending on the weather). The system should be primed with water first, and imidacloprid injected slowly. More emitters provide a more even distribution of product. Make sure to use enough water to soak the area between emitters. Calculate Admire rates based on 100 ft of row. For a 16 oz/acre rate, use 0.110 oz/100 ft bed (assumes a 3-ft bed, either one row or multiple rows.). If you have a drip system for transplants that go out in May, applying Admire through the drip may have an advantage a pre-plant drench, because you can wait until just before beetles arrive to make the application.

Note: The foliar form of imidacloprid, Provado 1.6F, is **not** labeled on vine crops. Imidicloprid is highly toxic to bees. Translocation into flowers from soil applications of Admire is reported to be below levels that would cause toxicity to bees.

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