UMass Extension
Vegetable Notes
For Vegetable Farmers in Massachusetts since 1975

Volume 31, Number 8 June 6, 2019

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A beautiful day for potatoes, in Norfolk Co., MA. Photo: C. Radon

Crop conditions

The planting-spree continues as folks continue putting in next successions of brassicas, cucurbits and greens, planting sweet potatoes, and getting tomatoes out into the field. Now added to the list of daily activities are cultivating, thanks to some drier weather and sunnier skies, and harvesting! A lot of CSAs had their first share days this week, or are getting ready to start distributions next week. In the mix are lots of greens, radishes, salad turnips, but also some of the early brassicas like bok choy and kohlrabi, and early bunching carrots, The very first of the summer squash is also starting to be picked.

We did see a bit of damage from cold night time temperatures, especially in cukes and summer squash planted out and transplants hardening off, but we've also have some much nicer days this week. The cool night temperatures can also lead to dew formation on crop leaves, especially on high tunnel crops, which can be enough to create conditions favorable for infection by leaf dieases such as tomato leaf mold, botrytis, or powdery mildew. Last year, squash, tomatoes and peppers were twice the size as they are now and growers are still behind with getting transplants in the ground. Crops that were under row cover are much farther ahead now than crops that were not. Strawberry season is getting underway, though the cool and wet spring has led to higher disease pressure in many areas.

Insect pests are starting to ramp up too, with many new reports coming in this week including the first Colorado potato beetles, a few striped cucumber beetles, onion thrips on the rise, and European corn borer adult flight starting. As fields are drying out we're starting to see a lot of cultivation going, in an effort to prevent weed problems before they get out of hand. Crops AND weeds will likely take off next week with the sun and increased temperatures in the forecast. This is definitely the time of the season when folks start putting there heads down and gearing up for the wild ride that is summer on a diversified vegetable farm!

There are two twilight meetings coming up this month: One on organic strawberry production at Red Fire Farm in Montague on June 20, and another with talks on brown marmorated stink bug, spotted wing drosophila, and high tunnel production at Indian Head Farm in Berlin on June 25. See the events section for more info—hope to see lots of you there!

Pest alerts

Alliums:

Onion thrips were found in Hampshire Co. this week but were well below threshold. Overwintered onions in Norfolk Co., which were well below threshold two weeks ago, now have 20-25 thrips per plant. Continue scouting plantings that are below threshold, as populations can increase quickly as the weather warms up, and treat when the threshold of one thrip per leaf is reached.

Chenopods:

Leafminer adult flies are active now – scout any uncovered beet, chard, or spinach plantings for small white eggs laid in rows on undersides of leaves and treat when eggs are present throughout a field. We have only found a very small number of leafminer eggs laid on spinach only. No hatched larvae have been seen yet in MA.

Cucurbits:

Squash vine borer traps went out this week. Adult flight usually starts in mid-June but growers should put out traps now to be sure to catch the start of the flight.

Striped cucumber beetle is emerging throughout New England and is being seen in early cucurbit plantings in MA and NH now. A field in Hampshire Co. reached the threshold of 1 beetle per plant 2 weeks ago. See article in this issue for management recommendations.

Solanaceous:

Colorado potato beetle: The first adults are emerging from overwintering sites in field edges now, as potatoes have sprouted and are getting to be 1 foot tall. Potato fields scouted in Hampshire and Norfolk Cos. this week were well below threshold. Continue scouting as adults emerge, mate, and lay eggs, and treat potatoes at a threshold of 0.5 adults, 4 small larvae, or 1.5 large larvae per plant. When larvae reach the top of the plant, this is a good time to spray because they are easy to access. **Note:** Due to formulation issues, Trident, the Bt product that was developed for CPB control, is no longer available.

Sweet Corn:

European corn borer: The first flight has begun in the state (see trap captures on the map) and farmers should get their traps out now if they have not already. Egg laying will likely begin in the next week. Growing degree days (GDD) with a base temperature of 50°F may be used to predict the beginning of moth flight (374 GDD), first eggs (450 GDD), and peak flight (631 GDD). One hot-spot in Hollis, NH reported 30 ECB in their traps this week! Treatment is rarely needed for this first generation. Spraying when tassels emerge is also the best time to target this pest because that is when they are most vulnerable and exposed at the top of the plant. While the tallest corn in MA is only about 1 ft., some fields in CT and Long Island are further along—they expect to harvest by the end of June and tassel is just pushing whorl stage there.

Corn earworm is already being captured in traps on Long Island as it migrates up the coast, but is not a threat to our corn in MA until silk begins to emerge, which is still a ways away. Put out heliothis traps when corn is tasseling and ears are beginning to form so that they are ready when the silk emerges.

Garden springtail continued to be a problem in MA this week. There were high populations of them in high tunnel cucumbers in Berkshire Co. and in field cucumbers in Hampshire Co. last week. From Caleb Goosen, Maine Organic Farming Association: "At a glance, garden springtails and their damage resemble very much that of flea beetles, but springtails lack wings and are not true insects. One defining feature of springtails is a tail-like appendage at the tip of their abdomen that they can use to launch themselves into the air... Because they can't actually fly, and because they favor tender young leaves, damage is typically restricted to cotyledons, and the first few true leaves low to the ground…. Though severe damage is rare, very large populations could set back young seedlings or even result in crop failure in extreme cases." Most materials used to control striped cucumber beetle will also control this pests, but as a last resort, some permethrin materials are labeled for use.

Heavy springtail infestation in cucumbers from Hampshire Co. this week. Photo: K Campbell-Nelson

TARNISHED PLANT BUGS

Tarnished plant bug adults and nymphs feed on several different vegetable and fruit crops, and in some fields they can cause significant damage. There are several species of tarnished plant bugs in the US, but the most common in central and eastern US is *Lygus lineolaris*.

Identification: The tarnished plant bug (TPB) is a small (1/4") bronze-colored insect with a triangular marking on its back. The adult form has long legs and long antennae and piercing and sucking mouthparts (like a mosquito). The imma-

ture stage, or nymph, is smaller and bright green, resembling an aphid, but much more active. Adults are about 6 mm long (1/4 inch), brown, tan, or greenish with darker markings on their wings and back. Nymphs progress through 5 molts (instars) from first hatch to the adult stage.

Tarnished plant bug adult. Photo: L. Tedders, USDA Ag Research Service, Bugwood.org

Life Cycle: Overwintered tarnished plant bug adults emerge in the spring, feeding on new buds and shoots of rapidly growing plants. They lay eggs on plant material once the daytime temperatures re in the mid 60s or higher. Depending on the temperature the nymphs will hatch in 7- 10 days. Nymphs generally emerge in mid May, feeding on developing strawberry blooms and fruit. Adults and nymphs can both be present in a crop at the same time as a result of overlapping generations, having between three to five generations per year. From fall to winter only adults are present as they prepare to overwinter in dead weeds, leaf litter and under tree bark. Adults emerge in the spring when the temperature reaches 46°F to start their life cycle over again.

Feeding: Adults and nymphs have piercing sucking mouthparts (stylets) which are used to penetrate plant tissues and suck up plant juices. TPB select succulent, nutritious tissues such as new green growth or developing flowers and fruit. While feeding, the bugs secrete a toxic substance from their salivary glands, which kills cells surrounding the feeding site causing distorted growth. Usually the first signs of damage are small brown spots on young leaves. As the tissue grows, healthy tissue expands while dead tissue does not, which results in holes and distorted, malformed leaves, buds or fruit. Terminal shoots and flowers may be killed.

Damage: Over half of the cultivated crops in the US are listed as hosts. In **strawberry**, the distorted growth of fruits is known as cat-facing and these fruit are generally unmarketable. While both adults and immatures (nymphs) can be present during strawberry bloom, nymphs cause more damage since they are present in larger numbers. **Raspberry** fruit is deformed and becomes crumbly and unmarketable after TPB feeding. In **apples**, adults feed on fruit buds and cause fruit dimpling and scabbing, or dropping off (abscission) of the buds. For these fruits, TPB is a key pest. Vegetables usually sustain minor damage, but in some years damage can be significant. In **lettuce**, leaf stems and ribs are injured, causing localized discolored scars and scabs. In **celery**, feeding on tender stalks produces large, brown colored and wilted spots and blacking of joints as the celery grows, known as "black-joint'. In **beans**, feeding on flowers causes them to drop prematurely, and feeding on young pods causes pitting and blemishing. In **tomatoes, eggplants and peppers**, feeding may occur on flowers and stems, causing flower drop. Fruits may also be attacked leading to indentations, bumps, or yellowing of the flesh where the fruit is "stung" by the piercing mouthparts of nymphs or adults. These spots could be confused with stink bug damage, but they lack the white pithiness beneath the skin that is typical of stink bug damage. It is not common to see this damage, but if the damage occurs it may help to determine the cause. In **pepper and in basil**, feeding in emerging leaves causes distortion and browning of leaves.

Catfacing in strawberries, caused by TPB feeding. Photo: OMAFRA

Weeds and field crops are also host plants: TPB thrive on a large variety of weeds, flowers, forage crops, and orchard crops. Weed hosts include wild carrots and other umbelliferous plants, redroot pigweed (and other amaranths), lambsquarters, mustards, sheperd's-purse, rocket, goldenrod, and mullein. Alfalfa is a favored host, and harvesting alfalfa often stimulates major migrations of TPB. Other legume hosts include vetch, lupine, and fava beans. Where weedy areas or field crops surround vegetable fields, continuous re-infestation of vegetables is possible—especially when weeds mature, and vegetables have young and succulent tissue.

Management: Vegetation management on the whole farm is very important for these highly mobile pests. Focus on removing sources of infestation outside the crop: mow, disk or rototill weeds along field borders, and keep grassy areas on the farm mowed short. However, disturbing non-crop areas by mowing can encourage movement of TPB into your crop, so avoid critical periods when the crop is vulnerable or mow after insecticides have been applied to the crop. Control weeds in the crop as well—tender growth and young flowers and seeds are very attractive to TPB.

There are natural enemies of TPB, including a parasitic wasp (*Peristenus digoneutis*), which was released for control of

TPB in alfalfa. The wasp was released in New Jersey and has spread throughout the Northeast. It can cause up to 50% mortality, but currently does not reduce the numbers sufficiently to prevent damage in key crops. Common predators, such as ladybeetles, spined soldier bugs and insidious flower bugs prey on nymphs.

Scouting, monitoring, and spraying: Economic thresholds have been determined for some crops where TPB is a key pest, but not for most vegetable crops. Furthermore, it is difficult to observe TPB directly on plants because they are very mobile and like to hide. White sticky traps placed above the canopy are used in strawberry and can be used in vegetables to indicate when adults are present. These traps are used as an indication of when plant bugs become active in the spring and a relative indication of their abundance, but are not used to determine when to control this insect.

In strawberry, thresholds have been developed and are based on numbers of immatures (nymphs). Nymphs are sampled by shaking flower trusses over a flat white surface. Thirty flower clusters should be sampled evenly from across the field (typically 6 clusters at 5 locations or 5 clusters at 6 locations).

If 4 or more flower clusters are infested with nymphs (regardless of how many) a spray is recommended. A follow-up spray application may be made after bloom if TPB are still present in high numbers (check harvest interval before selecting material). A sequential sampling system can be used to save time. See https://ag.umass.edu/fact-sheets/strawberry-tarnished-plant-bug. If the threshold is exceeded, consider treating with one of the labeled materials in the table below. DO NOT SPRAY INSECTICIDES DURING BLOOM.

In vegetables, if damage is unacceptably high, insecticide applications may be warranted. Labeled products for TPB on lettuce are listed in the New England Vegetable Management Guide and include several synthetic pyrethroids and carbamates. Pyganic, insecticidal soaps, and oils are may be used by organic growers. Avoid applications during bloom periods to avoid injury to pollinators; use them pre-bloom and post-bloom. Insecticide labels often list "lygus bug" instead of specifically "tarnished plant bug".

--Written by Ruth Hazzard and Sonia Schloemann

STRIPED CUCUMBER BEETLE: FOCUS ON EARLY CONTROL

Striped cucumber beetle (SCB) adults spend the winter in plant debris in field edges and with the onset of warm days move rapidly into the crop. High tunnel and greenhouse cucumbers draw beetles first, followed by early field crops. We are just now seeing the first SCB in the earliest cucurbit plantings in MA. Densities can be very high, especially in non-rotated fields or fields close to last year's cucurbit crops. Adult feeding on cotyledons and young leaves can cause stand reduction, delayed plant growth, and reduced yield. Eggs are laid in soil near the stem, and a hidden but important impact of SCB is larval root feeding, which reduces plant vigor and yield. The striped cucumber beetle also vectors *Erwinia tracheiphila*, the causal agent of bacterial wilt – this disease can be more damaging than direct feeding injury. Focus on early, effective control to avoid yield impacts and to protect pollinators.

Striped cucumber beetles and damage on cucumber.

Crop rotation, transplants, and floating row cover are cultural controls that help reduce the impact of cucumber beetles. Row covers provide extra early-season heat and insect protection, but need to be removed when flowering begins.

Perimeter trap cropping has been shown to reduce or eliminate main crop sprays while providing effective control of beetles. Plant 1 or 2 rows of Blue Hubbard, buttercup squash, or another *Cucurbita maxima* variety in an unbroken perimeter around the field. Always use 2 rows near woods or last year's fields, and space plants no wider than the between-row spacing that is used in the main crop. These perimeter crops will concentrate incoming beetles in the border because they are generally more attractive to beetles than winter squash, summer squash, and pumpkin, which are *Cucurbita moschata* or *Cucurbita pepo* types. Note that some specialty pumpkin varieties are *Cucurbita maxima* types and are very attractive to beetles. Do not use a crop that is highly susceptible to bacterial wilt (e.g. 'Turks' Turban') in the border. Beetles should be killed in the border, either by applying foliar insecticide when beetles first arrive or using a systemic insecticide at planting. Scout both borders and main crop to assess beetle numbers. Repeat perimeter-sprays if needed to

prevent influx into the main crop, and spray the main field if thresholds are exceeded. Attractive crop types that are planted in rows within the main field also work as trap crops that draw beetles as they move around within the field. These trap crops can be selectively sprayed.

Bacterial wilt, caused by Erwinia tracheiphila*, which is transmitted by striped cucumber beetle. Photo: R.X. Latin*

Last year, we also worked with several farms to trap SCB out of cucurbit fields. While the ideal number of traps per acre has not yet been experimentally determined, these traps did successfully trap lots of SCB last year, and seemed especially helpful when crops were still small and most susceptible. Traps are set out around field perimeters. The traps are made of milk jugs that are painted yellow, with holes punched in the sides for air flow. A floral-based attractant is attached to the lid of the jug, and a stun pill containing the insecticide Sevin is placed inside the jug. Beetles are attracted to the lure, consume some of the stun pill, and are killed. For organic operations, the stun pill can be replaced with soapy water at the bottom of the jug – beetles will fall into the water and die. We will continue trialing these traps on farms this season. If you're interested in trying it on your farm, see this article from the University of Missouri for more information on how to build the traps and where to order lures and stun pills.


A yellow milk jug trap in a cucurbit field. Photo: University of Missouri

Thresholds and foliar controls. Cucurbit plants at the cotyledon and 1-2 leaf stage are more susceptible to infection with bacterial wilt than older plants. Thus, it is especially important to keep beetle numbers low before the 5-leaf stage. Scout frequently (at least twice per week up to emergence, and for two weeks after) and treat after beetles colonize the field. Scout at least 25 plants to monitor the number of beetles and damage. Use this UMass Cucurbit Scouting Form to help keep track of what you find. The economic threshold depends on the crop. To prevent bacterial wilt in highly susceptible crops such as cucumber, muskmelons, summer squash, and zucchini, we recommend that beetles should not be allowed to exceed 1 beetle for every 2 plants. Less wilt-susceptible crops (butternut, watermelon, most pumpkins) will tolerate 1 or 2 beetles per plant without yield losses. Spray within 24 hours after the threshold is reached. Proper timing is key.

Conventional foliar insecticides. There are a number of broad-spectrum conventional insecticides which can be used for foliar control, including carbamates, pyrethroids, and neonicotinoids. All are highly toxic to bees and should only be used before bloom. Avoid using neonicotinoid sprays (Actara [thiamethoxam] or Assail 30SG [acetameprid]) if systemics in the same class were used in seed treatments (see below). See the New England Vegetable Management Guide for more details.

Systemic insecticides. Two neonicotinoid products, imidacloprid and thiamethoxam are registered for use in cucurbits as an in-furrow, banded, drench, or drip irrigation application to the seed/seedling root zone during or after planting/transplanting operations. Note specific application methods and rates on label. Commercially applied seed treatments (e.g. thiamethoxam) are also available for early season control.

Organic insecticides. Kaolin clay (Surround WP), pyrethrin (Pyganic Crop Spray 5.0 EC), and Azera (mixture of pyrethrin and azadiractin) are labeled for SCB in cucurbits and can be tank mixed with an additive effect. Surround acts as a physical deterrent and is not a contact poison – it therefore needs to be applied before beetles arrive. With direct-seeded crops, apply as soon as seedlings emerge if beetles are active. Transplants can be sprayed or dunked before setting out in the field. As with other insecticides, Surround must be re-applied after heavy rain and on new growth. Pyganic provides a short term knock-down with no residual effect.

Reducing risk to pollinators. The New England Vegetable Management Guide describes many steps that growers can take to protect honeybees and native pollinators when using insecticides. The issue of neonicotinoids, in particular, has received a great deal of attention in recent years. This is a group of insecticides that have a chemical structure very similar to nicotine. They have been widely used in agriculture because they are effective against a wide range of insects, have lower mammalian toxicity compared to older classes of insecticides, and because they can be absorbed by roots and moved through the entire plant. This trait allows for applications to be made to soil or on seeds, with less exposure to hu-

mans and to natural enemies of insect pests. Neonicotinoids are highly toxic to bees, and label requirements prohibit use on blooming crops or where there are blooming weeds or borders. Additional concern about impact on bees arises because research has shown that detectable, low concentrations of neonicotinoids can move into pollen or nectar. These are present at sublethal concentrations, but may affect the foraging behavior of bees or suppress their immune system. The long-term or colony effects of sublethal concentrations of neonicotinoids are difficult to assess in the field, because bees from each colony travel long distances and forage in many different habitats and types of plants. In cucurbits, both native bees (e.g. squash bees and bumblebees) and honeybees visit flowers to gather both pollen and nectar, and are essential to crop pollination. Research in cucurbits has shown that higher levels of neonicotinoids were found after foliar treatments and chemigated insecticides during flowering. Lower levels were detected in treatment regimes that involved a single application at planting via seed treatment, a drench application to transplants trays, or transplant water treatment. Thus, growers should avoid high rates and multiple applications, especially through trickle irrigation as the crop approaches flowering.

Sources include:

D. Smitley. 2014. *Protecting Pollinators in the Yard and Garden*. Michigan State University.

G. Dively & A. Kamel. 2012. Insecticide Residues in Pollen and Nectar of a Cucurbit Crop and Their Potential Exposure to Pollinators. J. Agr. and Food Chem.

--Written by R. Hazzard. Reviewed by L. McKeag and G. Higgins

FERTIGATION RATES AND INJECTOR TIPS FOR THE FIELD

Want to fertigate your crops? Can't get the injector to work properly? Have no idea how much fertilizer to apply, or how often? Here is a list of useful resources, and some tips and tricks from some experienced folks—Extension educators, farmers, and equipment dealers.

Fertilizer Injectors: There are many types of injectors appropriate for greenhouse, high tunnel, plasticulture, and field drip irrigation. Here are some resources for calibrating and maintaining injectors:

'Fertilizer Injector Calibration', Geoffrey Njue, University of New Hampshire Extension, 2017.

'Fertilizer Injectors: Selection, Maintenance and Calibration', University of Georgia Extension, 2017.

Jason Lanier, UMass Extension Greenhouse and Floriculture Program, has this tip: "It is ideal to have multiple injectors dedicated to different uses rather than to have one injector that is constantly ferried around and used for different purposes or in different settings. I understand that injectors are expensive and it is often not practical for smaller operations to purchase and maintain multiple units. Regardless, using multiple injectors makes calibration, monitoring, and maintenance much more straightforward, and these devices often have 'personalities' that can only be learned with close observation and time."

Do not use a fertilizer injector with plastic parts if regularly injecting pesticides because many contain a hydrocarbon base (wettable powders and emulsions) which are harmful to PVC plastics.

Drop spreaders can be useful for applying lime or fertilizer to high tunnel beds. Photo: K. Campbell-Nelson

Fertigating: Pre-plant fertilizers should be broadcast, or if possible, applied in bands where beds will be, and incorporated. Pre-plant and total fertilizer rates are determined based on your soil test results and crop needs, which can be found for each vegetable crop in the New England Vegetable Management Guide. For many crops, some of the fertilizer can be applied through drip irrigation weekly through harvest, or prior to critical crop stages. Most soil test recommendations assume that fertilizers are spread evenly across the field, however, fertigating only the planted rows through drip can be more cost effective. See Tables 1 and 2 the end of this article from the Mid-Atlantic Commercial Vegetable Production Recommendations for sample cucumber and tomato fertigation schedules.

If you would like to make your own fertigation schedule instead of using the tables, here are some calculations to help. In order to fertilize in this way, one must calculate the **linear bed feet per acre** using this formula: **43,560 ft^2 per acre ÷ feet between bed centers**. For

Table 1. Fertigation schedule example for cucumbers.

Fertigation recommendations for 125 lb N and 125 lb K_2O[1,2] For soils with organic matter content less than 2% or coarse texture and low to medium or deficient K								
			Nitrogen			**Potash**		
Preplant (lb/A)[3]			**25**			**50**		
			N	**N**	**N**	**K_2O**	**K_2O**	**K_2O**
Stage and Description	Weeks	Days	lb/day	lb/week	lb/stage	lb/day	lb/week	lb/stage
1 Early vegetative	1	1-7	0.5	3.5	3.5	0.4	2.8	2.8
2 Late vegetative	2-3	8-14	0.9	6.3	12.6	0.7	4.9	9.8
3 Fruiting and harvest	4-7	15-42	1.4	9.8	39.2	0.9	6.3	25.2
4 Later harvest[4]	8-10	43-70	0.9	6.3	18.9	0.6	4.2	12.6
Fertigation recommendations for 75 lb N and 50 lb K_20[1,2] For soils with organic matter content greater than 2% or fine texture and high or optimum K								
			Nitrogen			**Potash**		
Preplant (lb/A)[3]			**50**			**50**		
			N	**N**	**N**	**K_2O**	**K_2O**	**K_2O**
Stage and Description	Weeks	Days	lb/day	lb/week	lb/stage	lb/day	lb/week	lb/stage
1 Early vegetative	1	1-7	1	7	7	1	7	7
2 Late vegetative	2-3	8-14	1.5	10.5	21	1.6	11.2	22.4
3 Fruiting and harvest	4-7	15-42	2.2	15.4	61.6	2.2	15.4	61.6
4 Later harvest[4]	8-10	43-70	1.7	11.9	35.7	1.6	11.2	33.6

Table 2. Fertigation schedule example for tomatoes.

Fertigation recommendations for 150 lb N and 150 lb K_2O[1,2] For soils with organic matter content less than 2% or coarse texture and low to medium or deficient K								
			Nitrogen			**Potash**		
Preplant (lb/A)[3]			**50**			**125**		
			N	**N**	**N**	**K_2O**	**K_2O**	**K_2O**
Stage and Description	Weeks	Days	lb/day	lb/week	lb/stage	lb/day	lb/week	lb/stage
1 Early vegetative	1-2	1-14	0.5	3.5	7	0.5	3.5	7
2 Late vegetative	3-4	15-28	0.7	4.9	9.8	0.7	4.9	9.8
3 Early flowering	5-6	29-42	1.0	7	14	1	7	14
4 Flowering and fruiting	7-8	43-56	1.5	10.5	21	1.5	10.5	21
5 Early harvest	9-11	57-77	2.2	15.4	46.2	2.2	15.4	46.2
6 Later harvest[4]	12-14	78-98	2.5	17.5	52.5	2.5	17.5	52.5
Fertigation recommendations for 75 lb N and 75 lb K_20[1,2] For soils with organic matter content greater than 2% or fine texture and high or optimum K								
			Nitrogen			**Potash**		
Preplant (lb/A)[3]			**50**			**50**		
			N	**N**	**N**	**K_2O**	**K_2O**	**K_2O**
Stage and Description	Weeks	Days	lb/day	lb/week	lb/stage	lb/day	lb/week	lb/stage
1 Early vegetative	1-2	1-14	0.25	1.75	3.5	0.25	1.75	3.5
2 Late vegetative	3-4	15-28	0.35	2.45	4.9	0.35	2.45	4.9
3 Early flowering	5-6	29-42	0.5	3.5	7	0.5	3.5	7
4 Flowering and fruiting	7-8	43-56	0.75	5.25	10.5	0.75	5.25	10.5
5 Early harvest	9-11	57-77	1.1	7.7	23.1	1.1	7.7	23.1
6 Later harvest[4]	12-14	78-98	1.25	8.75	26.25	1.25	8.75	26.25

These tables provide examples of fertigation schedules based on two common scenarios - sandy coastal plain soils and heavier upland soils. It should be modified according to specific soil tests and base fertility. [1]Rates are based on 7,260 linear bed ft/A (6 ft bed spacing). If beds are closer or wider, fertilizer rates should be adjusted proportionally. Drive rows should not be used in acreage calculations (see the Fertigation section in the Irrigation Management chapter). [2]Base overall application rate on soil test recommendations. [3]Applied under plastic mulch to effective bed area using modified broadcast method. 4For extended harvest after 10 weeks continue fertigation at this rate.

*Tables from '*Mid-Atlantic Commercial Vegetable Production Recommendations*', Virginia Tech Cooperative Extension Publication # 456-420 (SPES-103P). Accessed: 6/6/2019*

example, if you have 5 foot centers in your field, 43,560 ft^2/5 ft = 8,712 linear bed feet per acre. Or, if you have 6 foot centers in your field, 43,560 ft^2/6 ft = 7,260 linear bed feet per acre.

1. The **fertilizer rate to apply per linear bed foot** can then be calculated as: **fertilizer rate per acre ÷ linear bed feet per acre**.
2. You can then multiply your per bed foot rate by the number of bed feet you have planted, to get the **total amount of N you need to apply**.

So, if you have 500 feet of crop on 6 foot centers, and you need 80 lbs of N/A after the pre-plant application, the calculations would be:

1. 43,560 ft^2 ÷ 6 ft = **7,260 linear bed feet per acre**
2. 80 lbs N per acre ÷ 7,260 linear bed feet per acre = **0.011 lbs N per linear bed foot**
3. 0.011 lbs N per linear bed foot x 500 feet = **5.5 lbs N to apply**

Now, if you would like to split that application over a period of 4 weeks, then:

4. 5.5 lbs N ÷ 4 weeks = **1.375 lbs N applied to this crop once per week**

If you are using a product like calcium nitrate with 15.5% N, then:

1.375 lbs N ÷ 0.155 = **8.9 lbs of calcium nitrate fertilizer each week**

If you are using a liquid fertilizer, like 30% UAN:

Liquid fertilizers have pounds per gallon listed on the label. UAN weighs 10.86 pounds per gallon and contains 30% N by weight.

10.86 lb/gal x 0.30 lb N/lb of fertilizer = **3.26 lb N/gallon of fertilizer**

1.375 lb N/wk (from steps 1-4 above) ÷ 3.26 lb N/gal = **0.342 gallons of 30% UAN each week**

Before mixing multiple soluble fertilizers, conduct a compatibility test by mixing the same concentration that will be fertigated in warm water. Let it sit overnight, then check the next day to see if any precipitate has formed and settled out. If so, don't mix these fertilizers in one watering; Rather, alternate them. Here are some common incompatible fertilizers:

- sulfates and calcium (the result is calcium sulfate, gypsum)
- phosphates and calcium (the result is calcium phosphate)
- phosphates and iron (the result is iron phosphate)
- potassium bicarbonate and other fertilizers (the bicarbonate may raise the pH high enough to cause precipitation of other fertilizer ingredients)

--Compiled by K. Campbell-Nelson, UMass Extension Vegetable Program, 2019

NEWS: REMINDER TO REPORT CROP DAMAGES PROMPTLY

2019 has presented farmers with challenging weather conditions and producers covered by a Federal Crop Insurance Policy are reminded to monitor their crops for insurable damage throughout the growing season. If you notice damage contact your crop insurance agent within 72 hours of discovery, 15 days before harvesting begins and within 15 days after harvesting is completed on the insurance unit. Three other important reminders:

1. Check with your crop insurance agents to review any prevented planting options.
2. Direct marketed crops must have a yield appraisal before they are harvested, if loss is anticipated.
3. Do not destroy crop evidence that is needed to support your claim without clear direction, in writing, from the insurance adjuster.

Producers having coverage under the Noninsured Crop Disaster Assistance Program (NAP) administered by the USDA

- Farm Service Agency have similar loss reporting requirements. NAP producers should contact the FSA Office that serves their farming operation to report losses and to review prevented planting options.

UMass Extension works in partnership with the USDA Risk Management Agency (RMA) and various agricultural organizations to educate and inform Massachusetts producers about Federal Crop Insurance and Risk Management Programs. For more information, please visit www.rma.usda.gov or contact UMass Extension Risk Management Educators, Paul Russell at pmrrussell@umass.edu or Tom Smiarowski at tsmiarowski@umass.edu or check out our website: https://ag.umass.edu/risk-management.

Events

Vermont Vegetable & Berry Growers Association On-Farm 2019 Workshop Series

The Vermont Vegetable & Berry Growers Association is holding a series of nine on-farm workshops from June through November this year. For more information on all workshops in this series, please click the linked event title above.

The first on-farm workshop will be held at Sam Mazza's Farm Market & Greenhouses.

When: Monday, June 10, 4:00-7:00pm

Where: Sam Mazza's Farm Market and Greenhouses, 277 Lavigne Rd., Colchester, VT 05446

This farm has one of the largest vegetable and ornamental greenhouse operations in the state. Join farm managers Gary and Laurie Bombard and greenhouse manager Neil Comstock for a tour of multiple greenhouses growing tomatoes, bedding plants and other ornamentals. Margaret Skinner and Cheryl Frank Sullivan of the UVM Entomology Lab will be on hand to describe monitoring, use of biocontrols and other IPM strategies for greenhouse pest control. Ann Hazelrigg will cover greenhouse diseases, Vern Grubinger will lead discussion of tunnel tomato production.

Attendance at these events is free for members of the Vermont Vegetable & Berry Growers Association. The cost is $10 per-person for non-members, payable on-site. Refreshments will be served. Membership in the VVBGA costs $55 per farm, per calendar year. The VVBGA works with University of Vermont Extension to deliver education and applied research for its growers.

Questions? Contact Vern Grubinger, 802-257-7967 x303. To request a disability-related accommodation, contact Dana Rupert, 802-257-7967, three weeks prior to an event so we may assist you.

UMass/SARE Organic Strawberry Twilight Meeting

When: Thursday, June 20, 2019 – 5:30 to 8pm

Where: Red Fire Farm - Montague location, 184 Meadow Rd., Montague, MA

Join the UMass Fruit Team and Red Fire Farm to learn about some novel organic weed management strategies in straweberries. Tour Red Fire's trials and stay for light refreshments. For more information on the trials that will be presented at this meeting, see the event page, linked to in the title.

REGISTRATION: This event is free, but please RSVP for planning purposes by emailing the UMass Fruit Team at umassfruit@umass.edu.

Fruit and Vegetable Program Twilight Meeting at Indian Head Farm

When: Tuesday, June 25, 2019 – 4:30pm to 7:00pm

Where: Indian Head Farm, 232 Pleasant St., Berlin, MA 01503

Come hear from Extension Educators about research and management updates for brown marmorated stink bug, spotted wing drosophila, and high tunnel production issues, which we have worked on with Indian Head Farm over the last few years.

Indian Head Farm has also recently updated their irrigation system with Harris Irrigation, converting overhead to drip, through grant support from the Massachusetts Department for Agricultural Resources (MDAR), conservation support from the Natural Resources Conservation Service (NRCS). They are also in the process of a farm transfer to the seventh generation, with support from Land For Good. Come learn how they do it all, socialize, and stay for a light supper.

**1 pesticide recertification credit is available for this workshop.*

REGISTRATION: This event is free, but please register by June 21 so that we can plan accordingly. Click here to register for this workshop online. Or, contact us at (413) 577-3976 to register by phone.

- 4:30 Introductions
- 4:45 Brown marmorated stink bug and spotted wing drosophila research and management updates – Liz Garofalo, UMass Extension Fruit Program
- 5:15 Automating drip irrigation – James Wheeler, Jim Peeler of Harris Irrigation, Gerry Pulano (MDAR Grants for farmers)
- 5:45 Management lessons from 20 New England high tunnels – Katie Campbell-Nelson, UMass Vegetable Program and Jon Sardell, Indian Head Farm Field Manager
- 6:15 Farm Succession Planning – Farmers Tim and Janet, and Kathy Ruff from Land for Good
- 7:00 Meeting adjourned.

THANK YOU TO OUR SPONSORS:

Vegetable Notes. Katie Campbell-Nelson, Genevieve Higgins, Lisa McKeag, Susan Scheufele, co-editors.

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