

WHAT'S IN THIS REPORT		
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<ul style="list-style-type: none"> • Determinate vs. Indeterminate Tomatoes 	<ul style="list-style-type: none"> • Spinach Leaf Miners • White Grubs • Allium Leaf Miners • Imported Cabbageworm adults • Overwintered Cabbage Whiteflies 	<ul style="list-style-type: none"> • Common asparagus beetle adults and eggs

GARDENS SCOUTED FOR THIS REPORT: *Madison Community Garden and ValleVue Preserve Community Garden in Morris Township.*

GENERAL OBSERVATIONS AND TIPS

Spring is smiling upon us all once again and gardening energy has returned with many community gardeners enthusiastically putting their winter planning into practice. This marks the fifth year of IPM Team reporting and we wish you an abundant growing season. Since tomatoes are the top crop found in the gardens, please read tomato tips as you consider what to plant this year.

DETERMINATE VS. INDETERMINATE TOMATOES

As gardeners, we love our tomatoes and wait eagerly for the juicy fruits to appear. There are so many different varieties from which to choose. How do you decide which to plant? One basic factor that can help you narrow down your selections is what you intend to do with your harvest. Do you want to enjoy delicious tomatoes over the entire season or would you prefer the majority of the crop concentrated over just a few weeks to allow for efficient canning, sauce-making or other forms of preserving?

It is helpful to understand the difference between the types of tomatoes in terms of their growth habit before making your selection. The two basic types are determinate and indeterminate with a few varieties that are semi-determinate. If you are wondering what the difference is, here is a breakdown of the major points to consider.

Determinate Tomato

- Bush-type growth - maximum height 4 feet or less
- Requires less space - good for container gardening
- Requires minimal staking
- Produces majority of crop over a 4 to 5 week period, after which production drops off
- Fruit often begins ripening earlier than indeterminate varieties
- Fruit can sometimes be less flavorful than indeterminate varieties

Indeterminate Tomato

- Vine-type growth - maximum height can be 6+ feet
- Requires more space
- Requires staking or caging for support
- Healthy plants produce a heavy crop throughout season until frost kills the plant
- Flavorful fruit based on variety

Semi-determinate Tomato

- In general, same as indeterminate tomato but does not grow as tall

With this knowledge in hand, you can select tomato varieties, whether seeds or nursery transplants, based on such factors as your available garden space and how you plan to use your harvest. Some seed companies and nurseries include tomato growth type on their seed packets and/or nursery transplants. Two good resources for more information are Rutgers Fact Sheet 678 which lists varieties of each type that have proven to grow well in New Jersey and the Rutgers NJAES Tomato Varieties website where you can view key information on numerous tomato varieties. Please check resources below for more information and enjoy your tomato plants!

References

- Rutgers University <https://njaes.rutgers.edu/fs678/>
- Rutgers NJAES Tomato Varieties <https://njaes.rutgers.edu/tomato-varieties/?fbclid=IwAR2ZAZIkq7C3a62BDShqEBwBPKkHKcDHHA8BJF5ddHkBE1BEgkPbvYLrEI#B>
- Piedmont Master Gardeners, <https://piedmontmastergardeners.org/determinate-or-indeterminate-tomatoes/>
- UCCE Master Gardeners of San Bernardino County <https://ucanr.edu/blogs/blogcore/postdetail.cfm?postnum=16937>

REPORTS ON NEW PROBLEMS

Leaf Miner eggs on spinach (*Pegomya hyoscyami* and *P. betae*)

Morris Township Community Garden 4/17/23

Description: The overwintering pupae have now emerged as adults and these small flies are laying eggs on spinach. These will hatch within a week and the larvae will burrow immediately into the leaf. While feeding on the leaf tissue for up to two weeks, translucent “mines” will form and, if you look closely at these blotches, the little larvae are nestled just under the surface. These then fall down to the soil and pupate three weeks later, with the next generation of flies hatching and continuing the cycle through summer. There can be several generations a year. Be on the lookout for other crops to soon be affected, as other favorites are Swiss chard, beets, and turnips.



Leaf miner larvae on Swiss chard and tunnel damage on leaf
M. Albright, NJAES



Leaf miner eggs on spinach will hatch and larvae will burrow into leaf, feeding for nearly two weeks.
S. Brighthouse, NJAES

Management:

- Scout leaves for eggs and handpick. It's tedious work, but worth it. Also scout leaves for telltale blotches and discard leaves. Catching them early in the spring will help decrease the impact of subsequent generations throughout summer.
- Practice crop rotation, as pupae of leafminers overwinter in soil, but especially if you're planning succession planting for summer. For example, if your spring spinach planting was struck or now finished, and you're replacing with Swiss chard or beets, switch up by moving new plants to another space in plot.
- Row covers can be effective as long as you rotate away from the area where pupae may still be in the soil.
- Practice good garden sanitation with thorough cleanup in fall.
- Spinosad (Captain Jack's Deadbug Brew) and Neem Oil may help prevent egg laying, but will not kill the larvae that are already in leaves.
- If you truly love spinach, try summer alternatives that are unrelated to *Chenopodiaceae* family, such as New Zealand spinach, *Tetragonia tetragonioides* (previously *T. expansa*) or Malabar spinach, *Basella alba*.

References

1. Rutgers University, <https://njaes.rutgers.edu/pubs/publication.php?pid=FS276>
2. University of Maryland <https://extension.umd.edu/resource/beet-and-spinach-leafminers>

<p>White Grubs <i>(many species)</i></p>	<p>Morris Township Community Garden 4/12/23</p>
<p>Description: White grubs are the larvae of scarab beetles. As soil temps warm, they move up from overwintering soil depths, to begin pupating. These root feeders consume the roots of turfgrass and many vegetable plants, including corn, bean, beet, potato, spinach, turnip, and other root crops. Some of the species include May or June beetles, European Chafer beetles, the Asiatic garden beetle, the green June beetle, the Japanese beetle, and the Oriental beetle. European Chafer grubs can destroy turf, but adults don't feed. Japanese beetle grubs also attack turfgrass, with adults being top defoliators of many ornamentals, fruit and vegetables such as sweet corn, beans, rhubarb, asparagus and grapes.</p>	
	<p>White Grubs Rutgers University Fact Sheet</p>
<p>Management:</p> <ul style="list-style-type: none"> • In the plot setting, as soil is prepared for planting, hand collect and destroy the grubs. • Biological control method for Japanese Beetles only, could include use of products with the nematode <i>Paenibacillus papillae</i> (Milky Spore). Follow label instructions for application and be mindful that success rates vary. 	
<p>References:</p> <ol style="list-style-type: none"> 1. Rutgers University https://njaes.rutgers.edu/pubs/publication.php?pid=FS293 2. University of Maine https://extension.umaine.edu/home-and-garden-ipm/frequent-specimens/frequent-white-grubs/ 	

<p>Allium Leaf Miner (<i>Phytomyza gymnostoma</i>) found on garlic and chives</p>		<p>Morris Township Community Gardens 4/17/23 Denville home garden 4/10/23</p>	
<p>Description: Allium Leaf Miner (ALM) adults have arrived with first sighting in Cape May 3/9 and Hunterdon County 4/6. These small flies are active in Morris County from late March/early April to late May/early June, with a second generation occurring in September to October / November. Adults emerge from soil and debris in spring, mating begins and females lay eggs on allium leaves. The larvae mine the leaves and migrate into the bulb to pupate. The injury caused by the larvae leads to a rot in the bulb or neck of the plant, distorted leaves, stunted growth, but also opens the plants up to fungal diseases. Injury to leeks, onions and scallions can be severe. Large numbers of orange pupae may also be found in harvested alliums, especially leeks.</p>			
			
<p>Linear feeding marks from ALM adults on garlic leaf blade. M. Sample, NJAES</p>	<p>Linear feeding marks on chives. S. Brighthouse, NJAES</p>	<p>ALM adult Rutgers Plant and Pest Advisory</p>	<p>ALM pupae Pennsylvania Department of Agriculture</p>

Management:

- Row covers are effective at preventing egg laying during periods of adult activity. The spring row covers can be removed in early June after the adults quit flying. Row covers should be used again in the fall to prevent damage from the second generation of adults.
- Delay planting out chive transplants till early June.
- Spinosad (for example, Captain Jack’s Deadbug Brew) can be used for allium leaf miners. Follow label recommendations and please spray only allium foliage (not other plants) to protect beneficial insects and pollinators.
- Removal of all host debris in allium family prior to the end of the season can help prevent pupae of second generation from overwintering.

References:

1. Rutgers University Plant and Pest Advisory: <https://plant-pest-advisory.rutgers.edu/?s=allium+leaf+miner>
2. USDA Pest Alert: <http://www.nj.gov/agriculture/divisions/pi/pdf/AlliumLeafMinerAlert.pdf>

Imported Cabbage Worm Adults (*Pieris rapae*)

Morris Township Community Garden 4/4/23

Description: Imported Cabbage Worm butterflies were observed flying and they are now likely laying eggs on brassicas such as cabbage, broccoli, and cauliflower. This butterfly lays single white eggs on the underside of leaves, with eggs hatching 3-5 days later. The hatched green, somewhat fuzzy, caterpillars will begin feeding on the leaves for about 2 to 3 weeks before forming a chrysalis to pupate. This matures in about 2 weeks and the cycle begins anew. In our location, it is possible to have 2 to 3 overlapping generations in a season. The green color and small size of the larvae makes it difficult to detect them on the leaves of your plants, but soon you will know they are there as you discover holes in the leaves.

If you see this...



Adult female Imported Cabbageworm butterfly with black tips and two dots on center forewings.

The larvae won't be far behind



Larvae on cabbage. P. Nitzsche, NJAES

Damage on cabbage plants



Damage from cabbageworm feeding. P. Nitzsche NJAES



Left side kale leaf shows single Imported cabbageworm egg versus right side leaf with flat mass of Cross striped cabbageworm eggs. J. Basile, NJAES



Close up of larvae P. Nitzsche, NJAES



Pupae on underside of kale leaf. J. Basile, NJAES

Management:

- Handpick eggs and caterpillars and dispose of them by crushing or dumping in a jar of soapy water.
- Experiment planting red/purple varieties, which may be easier to see the caterpillars. Try Purple Express or Red Acre cabbage, Burgundy broccoli, Purple Moon kale or Purple Crush cauliflower.
- Row covers placed immediately after planting seedlings will keep the butterflies from laying eggs.
- Apply *Bacillus thuringiensis var. kurstaki* when caterpillars are small and actively feeding. The *BT* must be ingested to be effective.
- For plants that form heads, harvest affected plants early to minimize tunneling by larger caterpillars into the head.

References

1. Rutgers University <https://njaes.rutgers.edu/pubs/publication.php?pid=FS286>
2. University of Maryland <https://extension.umd.edu/resource/imported-cabbageworm-vegetables>

Overwintered Cabbage Whiteflies
(*Aleyrodes proletella*)
Morris Township (overwintered) 2/20/23

Description: Overwintered Cabbage whiteflies were observed on most of the overwintered Brassica plants in the Morris Township Community Garden. The grey spots on the whiteflies indicate that they are cabbage whiteflies (*Aleyrodes proletella*). Cabbage whiteflies are native to Europe and found worldwide, but have remained a pest in the Northeast since first finding in 1993, and can now be found in Orgeon and California. They even overwinter in Canada. Brassica crop preferences include kale, brussels sprouts, broccoli and cauliflower.

These small piercing sap suckers damage foliage and plants quickly become overrun, due to adults and nymphs equally feeding on plant sap. Their feeding then leaves honeydew behind, with sooty mold fungus to follow. With favored host plants available throughout winter, in addition to rapid reproduction, an infestation will survive and linger if not controlled swiftly.



Whiteflies on the underside of a kale leaf. M. Albright, NJAES



A heavily infested kale leaf, that when disturbed sends whiteflies swarming to another plant. It really looks like snow! M. Albright, NJAES



Cabbage whiteflies close up showing their distinguishing grey spots. The small white ovals are other stages of the whitefly lifecycle. P. Nietzsche, NJAES

Management:

- Inspect top and bottom leaves of overwintered *Brassica* plants and remove plants early in the season when the weather is cool, since whiteflies are inactive then. They are difficult to remove after the weather warms up, as once disturbed they disperse quickly. Preventing new populations from migrating to neighboring plots is key to inhibit breeding.
- For heavy infestations, insecticidal soap can be sprayed on leaf undersides and repeated as necessary. Avoid spraying in very hot weather or on very stressed plants. Read label carefully.

References:

1. Rutgers University <https://njaes.rutgers.edu/pubs/publication.php?pid=FS240>
2. University of Maryland <https://extension.umd.edu/resource/whiteflies-vegetables>

LIKELY TO BE SEEN SOON

Common Asparagus beetle (*Crioceris asparagi*)

Beetle adults will be flying, mating and laying eggs. Scout spears for eggs and destroy!



Common Asparagus beetle adult
J. Basile, NJAES



Asparagus beetle eggs on spear
will hatch in a week and feed for
two. J. Basile NJAES



Asparagus beetles can be found feeding within
spears, disfiguring and destroying crop. Fast
removal of eggs will help prevent damage and
additional generations. J. Basile NJAES

ADDITIONAL RESOURCES

All Rutgers Gardening and Landscaping Fact Sheets & Bulletins

<https://njaes.rutgers.edu/pubs/subcategory.php?cat=5&sub=1001>

Rutgers Master Gardener Program <https://njaes.rutgers.edu/master-gardeners/>

Rutgers Soil Testing Laboratory <https://njaes.rutgers.edu/soil-testing-lab/>

Community Gardening Series <https://njaes.rutgers.edu/community-garden/>

Office of the New Jersey State Climatologist <https://climate.rutgers.edu/stateclim/>

Rutgers New Jersey Weather Network <https://www.njweather.org/>

Ticks and Tick-borne Disease <https://njaes.rutgers.edu/tick/>

Rutgers NJAES You Tube Channel <https://www.youtube.com/user/RutgersNJAES>

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