

## Rutgers Cooperative Extension

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# LETTUCE, ENDIVE AND ESCAROLE IPM FIELD GUIDE

## Pre-planting Decisions:

1. Practice a minimum of 3 year crop rotation for control of most diseases; 4-5 year rotation for drop. (915)\*
2. Do not produce lettuce transplants with ornamental bedding plants, particularly Impatiens, to avoid tomato spotted wilt virus. (292)
3. Lime and fertilize according to soil test recommendations. (1584)
4. Use the information obtained from last year's scouting to select control options for those weeds. Match preplant incorporated and preemergence herbicide rates to soil type and percent organic matter. (292)
5. Plant on raised beds, select fields with good soil and air drainage and avoid fields with a history of bottom rot or drop. (915)

## Spring Seeded Lettuce, Endive or Escarole

Scout 30 plants/field for fields up to 10 acres; add an additional 10 plants for each additional 10 acres. (381)

Pest	Damaging Stage	Monitored Stage	Sampling		Threshold	Notes
			Method	Frequency		
<b>Cutworms</b>  (650, 381, 915)	larval	larval	Scout for missing or cut off plants next to weedy field edges, ditches, roads, woods, or in low lying areas of the field. Sift through soil to a depth of 3 in. for larva within a 1.5 in. radius of damaged plants. (18)		No threshold, but most growers are concerned if >3% of stand is affected. (381)	Most common in spring in low damp spots, trashy areas and areas with grassy weeds nearby. Cutworm larvae hide during the day.
<b>Aster Leaf-hopper</b>  (59, 145, 915)	adult nymph	adult nymph	Use 5-10 yellow sticky cards/acre for detection of first leafhopper activity. Replace weekly. Thereafter, use standard 15" sweep net, 25 sweeps in each quadrant of the field. (381)	Weekly	Thresholds dependent upon aster yellows infectivity of the leafhoppers. <b>Head Lettuce:</b> AYI = 20-25 <b>Leaf Lettuce:</b> AYI = 30-35 (425)	<b>Aster Yellows Index (AYI)</b> = % infectivity x (number of leafhoppers/100 sweeps) Aster leafhoppers transmit the viral disease, aster yellows. (381, 420, 425)
<b>Aphids</b> <b>Green Peach Aphid GPA)</b> <b>Potato Aphid</b>  (59, 145, 381)	all	all	Check along field edges. Since aphids tend to be clumped, check 25 plants per quadrant of a field.	<b>Seedling:</b> 2x/week <b>Est'd. Plants:</b> weekly	<b>Seedlings:</b> ≥ 1 aphid/plant. <b>Est'd. Plants:</b> ≥ 2 or resample in 3 days if any plants rated ≥ 4 aphids/ plant. (381) <b>7-10 days prior to harvest</b> = 1% infestation (425)	Overuse of pyrethroids kill predators/parasites that help keep aphid populations under control. Aphids are known to vector several viral diseases. If heavy rains are forecast or natural enemies are abundant, infestations that slightly exceed thresholds may be tolerated for a few days. (292, 381, 420)

Pest	Damaging Stage	Monitored Stage	Sampling		Threshold	Notes
			Method	Frequency		
<b>Tarnished Plant Bug (TPB)</b> (68)	adult nymph	adult nymph	Sample 5 plants in $\geq 6$ random locations, checking the center of each plant, especially for fast moving nymphs.	Weekly	No threshold established.	TPB tend to come up from the inner part of the plant when disturbed. Adults may fly short distances. (292, 425)

Disease	Sampling – what to look for	Frequency	Threshold	Notes
<b>Downy Mildew</b> (915, 1466)	Look for symptomatic plants when environmental conditions are favorable for disease while scouting for other pests. Look for light green to yellow angular spots on upper leaf surfaces, white fluffy growth on lower sides of these spots.	Weekly when environmental conditions are favorable for disease.	presence of disease	Most damaging on early spring or late fall crops. Environmental conditions favorable for disease development: high humidity, night temperatures 40-50°F, day temperatures 54-68°F, cloudy skies, film of moisture on leaves for 5-7 hours.
<b>Bottom Rot (BR)</b> (1466)	Look for wilted plants with dark brown discoloration particularly near the midrib, radiating out on under side of older leaves.	weekly	presence of disease.	No mycelium will be seen with BR. Controls are different for BR than drop making accurate identification of disease important.
<b>Drop</b> (915, 1466)	Scout for wilted plants, with outer leaves dropping to the ground while scouting for other pests. Look for white mycelium with black sclerotia on bottom of plant. Eventually entire plant collapses, especially near harvest.	weekly	presence of disease	Rogue and remove infected plants to reduce inoculum in field. Fungus has a wide host range and sclerotia live for many years in the soil. Soil fumigation reduces inoculum.
<b>Nematodes</b> (1466)	Scan field for uneven or poor growth. Check for galls or swelling on roots. Map these areas.	Threshold depends on species found.		Obtain soil & plant samples of affected areas. Keep samples out of direct sunlight, preferably in a cooler. Submit to lab for analysis.

## Fall Seeded Lettuce, Endive, or Escarole

Scout 30 plants/field for fields up to 10 acres; add an additional 10 plants for each additional 10 acres. (381)

Pest	Damaging Stage	Monitored Stage	Sampling		Threshold	Notes
			Method	Frequency		
<b>Aphids Green Peach Aphid (GPA) Potato Aphid</b> (59, 145, 381)	all	all	Check along field edges. Since aphids tend to be clumped, check 25 plants per quadrant of a field.	<b>Seedling:</b> 2x/week <b>Est'd. Plants:</b> weekly	<b>Seedlings:</b> $\geq 1$ aphid/plant. <b>Est'd. Plants:</b> $\geq 2$ or resample in 3 days if any plants rated $\geq 4$ aphids/ plant. (381) <b>7-10 days prior to harvest =</b> 1% infestation (425)	Aphids are known to spread several viral diseases. If heavy rains are forecast or natural enemies are abundant, infestations that slightly exceed thresholds might be tolerated for a few days. (381, 420)

**Fall Seeded Lettuce, Endive, or Escarole, continued**  
**Scouting for Insect Pests**

Pest	Damaging Stage	Monitored Stage	Sampling		Threshold	Notes
			Method	Frequency		
<b>Aster Leafhopper</b>  (59, 145, 915)	adult nymph	adult nymph	Use standard 15" sweep net, 25 sweeps in four parts of the field <b>OR</b> 10 sweeps in 10 locations throughout the field.  (425)	Weekly	Thresholds dependent upon aster yellows infectivity of the leafhoppers. <b>Head Lettuce:</b> AYI = 20-25 <b>Leaf Lettuce:</b> AYI = 30-35  (425)	<b>Aster Yellows Index (AYI)</b> = % infectivity x (# of leafhoppers/100 sweeps). Aster leafhoppers transmit aster yellows, however treatment not required after 2 weeks prior to harvest because time is insufficient for disease expression.  (381, 420, 425)
<b>Tarnished Plant Bug (TPB)</b>  (68)	adult nymph	adult nymph	Scout 5 consecutive plants at 10 locations. TPB causes localized lesions between leaves, often deep into plant, along midrib.	Weekly	No thresholds established, but TPB can cause serious damage to the fall crop.	TPB numerous where weeds abound.  (292, 425)
<b>Cabbage Looper (CL)</b>  (31, 145, 1551)	larval	larval	Scout 5 consecutive plants at $\geq 6$ locations. Pay particular attention to areas near fields of cole crops.	weekly		<b>Treatment:</b> If using Bt's, it is critical to apply when larva are small (<third instar). Thorough coverage necessary.
<b>Beet Armyworm</b>  (145)	larval	adult larval	Pheromone Trap(PhT): place lure at canopy level. Scout 5 consecutive plants at $\geq 6$ random locations for egg masses & young larvae when adults are caught in PhT.	<b>PhT:</b> rap: 2x/week <b>Scout:</b> weekly	<b>Seedlings:</b> one second or third instar larva/10 plants. <b>Older Plants (before heading):</b> 1 larva/2 plants.	<b>Treatment:</b> If using Bt's, it is critical to apply when larva are small (<third instar). Thorough coverage necessary.
<b>Corn Earworm (CEW)</b>  (94, 145)	larval	adult larval	Scout 5 consecutive plants at $\geq 6$ random locations when blacklight traps (within 1 mile of field) capture 20 moths/night.	weekly	1 larva <b>Head Lettuce:</b> 11-15 leaf stage critical for control - must be achieved before leaves form a head.	<b>Head Lettuce:</b> 7-18 leaf stage is vulnerable to CEW damage. <b>Treatment:</b> If using Bt's, apply when larva are small (<third instar)**. Thorough coverage necessary.  (292)

**Fall Seeded Lettuce, Endive, or Escarole**  
**Scouting for Disease**

Disease	Sampling – what to look for	Frequency	Threshold	Notes
<b>Downy Mildew</b>  (1466)	Look for symptomatic plants when environmental conditions are favorable for disease while scouting for other pests. Look for light green to yellow angular spots on upper leaf surfaces, short white spore structure on lower sides of these spots.	Weekly when environmental conditions are favorable for disease.	presence of disease	Most damaging on early spring or late fall crops. Environmental conditions favorable for disease development: high humidity, night temperatures 40-50°F, day temperatures 54-68°F, cloudy skies, film of moisture on leaves for 5-7 hours.
<b>Bottom Rot</b> (1466)	Look for wilted plants with dark brown discoloration particularly near the midrib, radiating out.	weekly	presence of disease	No mycelium will be seen with BR. Controls are different for BR than drop making accurate identification of disease important.

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**Scouting for Diseases, continued**

<b>Disease</b>	<b>Sampling – what to look for</b>	<b>Frequency</b>	<b>Threshold</b>	<b>Notes</b>
<b>Drop</b> (1466)	While scouting for other pests, look for wilted plants, with outer leaves dropping to the ground, and white mycelium with black sclerotia on bottom of plant.	weekly	presence of disease	Rogue and remove infected plants to reduce inoculum in field. Fungus has a wide host range and sclerotia live for many years in the soil. Soil fumigation reduces inoculum.
<b>Nematodes</b> (1466)	Scan fields for uneven or poor growth. Check roots for swellings or galls. Map these locations.	Threshold is dependent upon nematode species found.		Obtain soil & plant samples of affected areas. Keep samples out of sun, preferably in a cooler. Submit to lab for analysis

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Scouting procedures, thresholds, and crop management recommendations have been compiled from a number of sources and may not be valid for all areas within the Mid-Atlantic Region. These field guides are meant to be used as guidelines. As such, they should be validated on a small acreage before relying on them. No guarantee of their validity, success, or failure to perform in the field is implied or expressed. Consult your local Cooperative Extension for additional information or assistance.

**\*Bolded numbers in parenthesis indicate sources of additional information found in the Mid-Atlantic IPM database by this special reference number.**