Rutgers Cooperative Extension
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Prepared with support from Northeast Region SARE Program Project ENE95-7

CABBAGE IPM FIELD GUIDE

Pre-planting Decisions:

1. Use hot water seed treatment and resistant varieties for disease control. Select Fusarium resistant varieties to avoid problems with yellows. **(292)***
2. Practice 3 year crop rotation from cole crops for black rot, Alternaria leaf spot, white rust, downy mildew and sugar beet cyst nematode control; 4 year crop rotation from cole crops for blackleg control and 7 years for clubroot control. **(292, 26)**
3. Adjust soil pH with hydrated lime to as close to 7 as possible, for clubroot control . Improve drainage by making ditches and growing crop on raised beds. **(292, 421)**.
4. Fertilize according to soil test recommendations. **(1584)**
5. Use the information obtained from the previous season's weed scouting to select appropriate control strategies for those weeds. Match preplant incorporated and preemergence herbicides to soil type and percent organic matter in each field. **(292)**

Plant Emergence or Transplanting to Cupping (Pre-heading)

Examine a minimum of 5 plants in 6 randomly selected locations for fields ≤ 5 acres. Larger fields will require more sampling sites: 5-25 acres – 40 sites; >25 acres – add 1 site for each 5 acres and sample 4 plants per site instead of 5. Scout in an "M", "V" or zigzag pattern. **(434, 421, 601)**

Disease	What to Look For	Sampling		Threshold	Notes
		Method	**Frequency**		
Black Rot **(29, 601)**	Symptoms appear as v or wedge shaped area, yellow turning brown on the leaf margins, often affecting one side of plant. **(29)**	Look for affected plants while scouting the field for other pests.	weekly	Presence	Avoid entry into fields with black rot when leaves are wet. Fixed copper with Maneb tank mixes at first indication of disease help to limit spread. **(292)**

Pest	Damaging Stage	Sampling		Threshold	Notes
		Method	**Frequency**		
Flea Beetles **(138, 601, 711)**	Adults	Random sample 5 plants in 6 locations, especially along field margins. Count the beetles on plants several feet away as beetles will jump as you approach. Avoid allowing your shadow to fall on plants being scouted.	**first two weeks**:2x/wk. weekly there after	1 beetle/plant throughout field **OR** 3-5 beetles/plant on 10% of stand **OR** >50% of plants are infested and shothole injury present **(526, 601)**	Spot treat if flea beetles are concentrated on plants near field margins. Once cabbage has 6 - 8 leaves, flea beetles no longer cause economic injury by their feeding activity alone, however they are vectors of Alternaria leaf spot. **(526)**

Emergence/Transplanting to Precupping, continued

Pest	Damaging Stage	Sampling Method	Sampling Frequency	Threshold	Notes
Aphids, Cabbage Aphids **(138, 711)**	All	Check field borders, especially those upwind from other cole crops or mustard weeds. Look for "hot spots". Cabbage aphids have a waxy, gray, cigarette ash appearance. **(526)**	weekly	2% of plants with ≥ 5 aphids/plant **(526)**	Treat only infested areas of a field, if population is localized. Overuse of pesticides, especially, pyrethroids kill predators/parasites that help keep aphid populations under control. (292)
Diamondback Moth (DBM) Imported Cabbageworm (ICW) Cabbage Looper (CL) **(31, 32, 33, 601)**	Larval	Scout as outlined above. As soon as a larva of any species is found, count plant as "infested". Noting which species is present aids in selecting an appropriate control. Compute % infested by dividing the number of plants infested by the total number of plants sampled.	weekly	≥20% plants infested with any species	ICW often found lying along the mid-rib of a leaf. CL is primarily a pest after late July. **Treatment**: Immediately plow down harvested cole crop fields to eliminate the buildup of DBM in crop residues. Bt's – essential to control before third instar when larvae are small. **(292, 434)**

Head Formation to Harvest

Pest	Damaging Stage	Sampling Method	Sampling Frequency	Threshold	Notes
Aphids including Cabbage Aphids **(138, 711)**	all	Check field borders, especially those upwind from other cole crops or mustard weeds. Look for "hot spots". Cabbage aphids have a waxy gray, cigarette ash appearance. **(526)**	Weekly	2% of plants with ≥ 5 aphids **(526)**	Treat only infested areas of a field, if population is localized. Overuse of pyrethroids kill predators/parasites that help keep aphid populations under control. (292)
Thrips **(34)**	adult nymph	Scout as outlined above looking on the undersides of leaves for thrips. Feeding signs often are more evident and should be used as an indicator. **(526)**	weekly	>20% of plants infested with thrips **(526)**	Increase sampling efforts when small grains are ripening and alfalfa is being cut. Check field edges next to these crops, hedgerows or woods. Highly susceptible fresh market varieties include: Charmont (Solid Blue 960), Market Prize, Protector (Quisto, Safekeeper) and Super Green. **(290)**
Diamondback Moth (DBM) Imported Cabbageworm (ICW) Cabbage Looper (CL) **(31, 32, 33, 601)**	Larval	Scout as outlined above. As soon as a larva of any species is found, count plant as "infested". Noting which species is present aids in selecting an appropriate control. Compute % infested by dividing the number of plants infested by the total number of plants sampled.	weekly	5% of plants infested with any species **(292)**	ICW often found lying along the mid-rib of a leaf. CL is primarily a pest after late July. Immediately plow down harvested cole crop fields to eliminate the buildup of DBM in crop residues. Bt's – essential to control before third instar when larvae are small. **(292, 434)**

Head Formation to Harvest, continued

Pest	Damaging Stage	Sampling Method	Sampling Frequency	Threshold	Notes
Flea Beetles **(138, 601, 711)**	adult immature	Check field edges for movement of flea beetles into the crop.	Weekly	No threshold established.	While direct feeding does not pose a problem after the 8 leaf stage, flea beetles are important in vectoring Alternaria leaf spot. Lack of control of this disease with fungicides may be due to the high incidence of flea beetle feeding.

Be alert for disease while walking from random site to random site.

Disease	Sampling	Frequency	Threshold	Notes
Black Rot **(29, 601)**	Symptoms appear as a "V" or wedge shaped area, yellow at first, turning brown on the leaf margins.	weekly	Presence	Avoid entry into fields with black rot when leaves are wet. Fixed copper with Maneb tank mixes at first indication of disease help to limit spread. **(292)**
Fusarium Yellows **(25, 601)**	First symptoms appear as a yellowing of the oldest leaves, advancing from the leaf margins inwards, often occurring on one side of the midrib only. Seen as unilateral wilting of the plant (one sided) with vascular discoloration.	weekly	Presence	No control available once disease is present. Use information in planning future rotations. See "Preplanting Decisions" above.
Alternaria Leaf Spot **(915, 601)**	Symptoms appear as target shaped brown lesions on older leaves, spreading up the plant.	weekly	Presence	Shows up late in the season on older leaves first. Flea beetles vector the disease and maybe important in late season disease development. Season long weed control in and around the field helps to control flea beetle populations. Optimum temperature for disease development is 77^{o} F but infection occurs $\geq 50^{o}$ F. Infection favored by wet conditions.

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