Agronomic Spotlight

Management of Japanese Beetle in Corn and Soybean

- Japanese beetle (Popillia japonica Newman) populations can become high in infested areas.
- Adult beetle feeding can be a serious problem in corn and soybean crops.
- Field scouting is important, especially during the reproductive growth stages of both crops.

Mild winters and early planting generally contribute to higher Japanese beetle populations.[1] Areas heavily infested with the larval stage white grub is not an indicator of severe injury from the adult beetles in the same area. Adults can reduce yield potential by interfering with pollination in corn and damaging leaf tissue and pods on soybean plants.

Life Cycle and Identification

Adult Japanese beetles are approximately a 1/2-inch long, have a metallic green head and neck region, reddish to bronze wing covers, a row of six white bristle bunches along each side of their abdomen, and live about 30 to 60 days (Figure 1).[1] The adults emerge from the soil starting in late May and early June, with peak emergence occurring 4 to 5 weeks later. Mating, which occurs soon after emergence, causes the females to burrow 2 to 4 inches into the soil and lay 1 to 4 eggs every 3 to 4 days for several weeks.[2]

Figure 1. Adult Japanese beetle.

The larval grubs emerge from the eggs in about 10 days, feed on the roots of living plants, quickly grow to their full size of about 1-inch long, and then overwinter. When spring soil temperatures climb above 50 °F, the grubs begin to move toward the soil surface to feed, pupate, and emerge as adults.[2]

Corn Scouting and Thresholds

The adults feed on leaves, tassels, silks, and pollen. Corn leaves may appear skeletonized or "lacy"; however, leaf feeding is rarely of economic importance. Economic damage can occur when beetles clip silks during pollination, which can result in partially pollinated ears (Figure 2). Silk clipping after pollination does not affect yield potential. When scouting corn for Japanese beetles, a representative portion of the entire field should be evaluated. Sampling field edges only where higher populations of Japanese beetles may be found could result in field populations being overestimated. An insecticidal treatment should be considered during corn silking stage if:

Figure 2. Kernels with attached silks have not been pollinated (left). Japanese beetles clipping silks (right).

- There are 3 or more Japanese beetle adults per ear and
- Silks have been clipped to less than a 1/2-inch, and
- Pollination is less than 50% complete, and
- Japanese beetles are present and actively feeding.[3,4]

Soybean Scouting and Thresholds

Although Japanese beetles can cause extensive defoliation, soybean plants can compensate for damage, and defoliation seldom affects yield potential. Flowering fields should be scouted for the presence of Japanese beetles and the amount of defoliation (Figure 3). Percent defoliation should be estimated on randomly selected leaves in at least 5 different areas of the field. Insecticide applications should be considered when:

Figure 3. Soybean leaf defoliation caused by Japanese beetles.

- 30% defoliation occurs prior to bloom or
- 20% defoliation occurs after bloom, and
- Japanese beetles are still present and actively feeding.[4]

Control

Individual state insecticide recommendations for the control of Japanese beetles can differ and must be followed. Thresholds and single active ingredient insecticide recommendations for controlling Japanese beetles in corn and soybean crops in Indiana can be found in Table 1. Combinations of these active ingredients are also available. Damage from Japanese beetles can add to other stresses the crop is experiencing, and economic thresholds may need to be adjusted if plants are under moisture stress.[1] This, along with commodity prices, should be taken into consideration when using thresholds to determine if insecticide treatment is needed. Insecticides may initially control or knock-down a population; however, poor residual activity and insect movement could lead to the need for another application if populations resurge later. With subsequent treatments, consider an insecticide with different modes of action (MOA). The first column in Table 1 lists the Group Number assigned by the Insecticide Resistance Action Committee which represents the MOA classification.[5] Sub-groups are assigned to insecticide compounds within

Management of Japanese Beetle in Corn and Soybean

an MOA when the structure differs and metabolism is believed to be by another enzyme. For example, Group 3 insecticides are sodium channel modulators, and the 3A Sub-group represents pyrethroids which have a specific structural component within the Group 3 MOA.

Table 1. Single active ingredient insecticides labeled for control of Japanese beetles in corn and soybean.[6,7,8]

MOA Group Number	Insecticide	Rate/acre in Corn	Rate/acre in Soybean
3	alpha-cypermethrin* (Fastac™ EC)	2.7 to 3.8 fl oz	2.8 to 3.8 fl oz
3	beta-cyfluthrin* (Baythroid® XL)	1.6 to 2.8 fl oz	1.6 to 2.8 fl oz
3	bifenthrin* (Capture® 2EC-CAL)	2.1 to 6.4 fl oz	2.1 to 6.4 fl oz
1A	carbaryl (Sevin® 4F, Carbaryl 4L)	1 to 2 qts	0.5 to 1 qt
3A	cyfluthrin* (Tombstone™)	1.6 to 2.8 fl oz	1.6 to 2.8 fl oz
3	deltamethrin* (Delta Gold® 1.5EC)	1.5 to 1.9 fl oz	1.5 to 2.4 fl oz
3	esfenvalerate* (Asana® XL)	5.8 to 8.6 fl oz	5.8 to 9.6 fl oz
3	gamma-cyhalothrin* (Declare®, Proaxis®)	1.02 to 1.54 fl oz (Declare) 2.56 to 3.84 fl oz (Proaxis)	1.28 to 1.54 fl oz (Declare) 3.20 to 3.84 fl oz (Proaxis)
4A	imidacloprid (Prey® 1.6)	_____**	3.75 fl oz
3	lambda-cyhalothrin* (Warrior II with Zeon Technology®)	1.28 to 1.92 fl oz	1.6 to 1.92 fl oz
3A	permethrin* (Ambush®, Pounce® 25WP	_____**	6.4 to 12.8 oz (Ambush) 3.2 to 6.4 oz (Pounce)
3	zeta-cypermethrin* (Mustang® Maxx, Respect®)	2.72 to 4.0 fl oz	2.8 to 4.0 fl oz

*Restricted Use Pesticide - use restricted to certified applicators.
**product is not labeled for use in this crop.

Sources

[1] Cook, K.A. and Gray, M.E. 2003. Japanese Beetle (Popillia japonica Newman). University of Illinois Integrated Pest Management. http://ipm.illinois.edu.

[2] Townsend, L. Japanese Beetles. University of Kentucky Cooperative Extension. ENTFACT-409 http://www.ca.uky.edu.

[3] Poster Version 2. 2009 Insecticide Resistance Action Committee. Based on the Mode of Action Classification - Version 6.3.

[4] Hodgson, E. 2009. Japanese beetles expanding range in Iowa. Integrated Crop Management. Iowa State University Extension. http:// www.extension.iastate.edu.

[5] Hodgson, E. 2014. Japanese beetles emerge in Iowa. Integrated Crop Management News. Iowa State University.

[6] Krupke, C.H., Obermeyer, J.L., and Bledsoe, L.W. 2016. Soybean insect control recommendations. E-77-W. Purdue University.

[7] Krupke, C.H., Obermeyer, J.L., and Bledsoe, L.W. 2016. Corn insect control recommendations. E-219-W. Purdue University.

[8] Product labels. Web sources verified 062716.

For additional agronomic information, please contact your local seed representative. For additional agronomic information, please contact your local seed representative. Developed in partnership with Technology Development & Agronomy by Monsanto.