

Insect Pest Management in Louisiana Sweet Potatoes

Soil insect pests can be extremely problematic in Louisiana sweet potato production. The majority of insect damage in sweet potato occurs on the root surface and consists of unattractive scars and holes. The market tolerance for this cosmetic injury is very low, and minimal insect damage can drastically affect the marketability of the crop.

Proper insect management requires using several management strategies, the goal of which is to protect the crop and ultimately insure economic sustainability. An integrated insect pest management program includes: cultural practices such as crop rotation, the use of scouting and treatment thresholds, and chemical control options. It is a challenge to a sweet potato producer to achieve the full potential of an insect pest management program, because many biological and environmental factors can influence the sweet potato plant and the insect pests. Knowledge and identification of key insect pests are critical first steps in sweet potato insect pest management.

Soil Insects

Sweetpotato Weevil

The sweetpotato weevil is the most destructive insect throughout tropical and subtropical sweet potato production areas. Sweetpotato weevils can attack sweet potatoes in the field and in storage. Larval tunneling causes terpene production in the storage roots, which imparts a bitter taste and leaves the sweet potatoes unsuitable for human consumption.

The adult sweetpotato weevil is a snout beetle that resembles an ant. The weevil has a narrow head and thorax. The head and abdomen are dark metallic blue, and the thorax and legs are reddish orange. The antennae are reddish brown and are clubbed on the end. The adult is about 0.25 inch long. The weevil eggs are white or pale yellow and broadly oval. The larvae are dirty white with a C-shaped body and a pale brown head.

Sweetpotato weevils do occur in South Louisiana, and all production fields in South Louisiana are currently under a mandatory spray program. All plant beds and commercial fields in South Louisiana must be treated with approved insecticides on a 10-day schedule, and all sweet potatoes entering storage facilities must be treated with 5 percent Imidan dust. Adequate coverage is essential when spraying foliar insecticides. A minimum of 15 gallons of water should be used to provide adequate coverage.

The majority of North Louisiana production areas are considered “weevil-free.” A statewide trapping and monitoring program conducted by the Louisiana Department of Agriculture and Forestry in conjunction with the mandatory spray program in South Louisiana is aimed at slowing the spread of the weevil into northern production areas. The weevils are monitored with pheromone traps, which are baited with a synthetic blend of the female pheromone, which is attractive to male weevils.

All life stages of the beetle (egg, larvae, pupa and adult) can develop within a sweet potato and can persist in commercial fields, plant/seed beds and storage



facilities. As such, cultural control is very important in reducing plant injury and controlling this pest. Seed potatoes should be collected from weevil-free fields and reserved for the following year. Storage areas should be cleaned and sprayed with a 1 percent malathion solution before storing new potatoes in the area. Transplants should not be pulled but rather cut 1 inch above the soil surface to reduce the chances of carrying eggs and larvae to commercial fields. All plant beds must be destroyed following transplanting. Crop rotation of production fields greatly reduces the possibility of overwintering weevils infesting sweet potatoes the following year.



Cucumber Beetles / Rootworms

Cucumber beetles can be serious pests of sweet potato. Larvae of both the banded cucumber beetle and the spotted cucumber beetle feed on the roots of sweet potato. The roots are fed upon throughout their development, resulting in unattractive scarring of the root surface.

Leaf-feeding females lay their eggs where they are feeding and the eggs hatch in one or two weeks. The larval stage will persist for eight days to 30 days, depending on food availability and temperature. Pupae are found in cells underground and emerge as adults within one week. Larvae of the two species are difficult to distinguish, but the adults are easily recognized. The larvae are yellow to white with three pair of brownish legs near the head and a single pair of prolegs near the abdomen. Fully grown larvae are about ¼ inch long.

Cucumber beetles are oblong-oval, have beaded antennae and are about 0.25 inch long. The *banded cucumber beetle* is marked with green and yellow bands and the *spotted cucumber beetle* has 11 spots on a yellow-green background. Numerous generations can develop and damage the sweet potato crop throughout the season.

Cucumber beetles are highly mobile, have several generations per year and feed on a variety of host plants. A preplant soil insecticide should be applied as close to transplant as possible in accordance with label directions. In addition, the adults of both species should be monitored weekly during the season beginning one to two weeks after transplant. Recent research has confirmed the treatment threshold for these insects as being two beetles per 100 sweeps. Several insecticides are labeled to control these insects in sweet potato. It is paramount that the adult stage be controlled throughout the season to prevent larvae from damaging the roots in the soil.



White Grubs

Several species of white grubs are serious pests of sweet potato. Larvae are abundant in fallow fields and pastures and injury from these insects increases when sweet potatoes are planted following pasture. The larvae are the damaging stage, chewing wide gouges on the surface of sweet potato roots, which greatly reduces their marketability. The larvae overwinter in the soil, and the length of the life cycle depends on the species and lasts from one to three years. Our most common white grub pest, *Phyllophaga ephelida*, has an annual life cycle. Adults are active at night and feed on the leaves of deciduous trees. Peak emergence of adult beetles occurs in May and June.

Adult beetles, commonly referred to as May and June beetles, are shiny reddish brown to black and are 0.5 inch to 1 inch long. Eggs are pearly white and oval and turn dark just prior to larval emergence. The grubs (larvae) have a distinct brown head, C-shaped body and three pair of legs just behind the head.

As with other soil insects, white grubs can be present in the soil prior to planting. Frequent cultivation in the spring can expose the insects to predators such as birds.



Because the white grub can have an extended life cycle, their presence in one year might indicate problems for the next year as well. A preplant soil insecticide will provide some control of these insects. Peak activity for these insects occurs at night, and as such, the beetles cannot be sampled successfully with sweep nets during the day. Foliar insecticides used to control cucumber beetles and whitefringed beetles are toxic to May and June beetles if the insecticide contacts the insects during application.



Whitefringed Beetles

Whitefringed beetles feed on numerous plant species including sweet potato. Larvae of these insects have a host range exceeding 380 plant species, and damage is similar to that of other soil insects, particularly white grubs. Adults of this beetle are flightless, and females are parthenogenetic (reproduce without males). Each adult can lay 100 or more eggs in a lifetime. These insects most likely spread from field to field through movement of contaminated equipment.

Adult beetles are black with dark gray and brown scales. They have two longitudinal stripes and a marginal band of white hairs. They are approximately 0.5 inch long. Larvae are slightly curved, yellowish-white, legless and have light brown heads.

Whitefringed beetle larvae can be difficult to control because they remain deep in the soil where preplant insecticides may not reach them. The adult beetles will feed above ground and can be controlled with foliar applications of labeled insecticides. Beetles should be sampled with a sweep net beginning soon after transplant. The treatment threshold for this insect is one beetle per 100 sweeps. Whitefringed beetles are long-lived and can be present in production fields from May through September. Since these beetles can't fly, a severe infestation in one year may mean a return problem in that location the following year.



Wireworms

Several species of wireworms cause serious injury to sweet potato. Adults are known as click beetles. They do not feed on the crop but will lay eggs on the soil near the crop, weeds or other vegetation. Larvae of this insect produce small, round holes on the root surface. The original holes are shallow, less than 0.25 inch deep, but may be considerably deepened by later growth of the sweet potato. The life cycle of these insects can vary from two generations per year to two to three years.

Adults are reddish-brown to black and are elongate. A wireworm larva is cylindrical with three pairs of short legs near its head. The larvae are pale yellow to reddish-brown with a flattened head. They range in length from 0.5 inch to 1 inch when fully grown.

Wireworms have not been a serious problem in Louisiana in recent years. Research shows that a preplant application of bifenthrin or chlorpyrifos is effective against this pest.



Flea Beetles

Flea beetles, most commonly the sweetpotato flea beetle, are an occasional problem for sweet potato growers. Flea beetles feed on several species of plants. The adults chew narrow channels or grooves on the upper surface of leaves. Larvae feed on roots, leaving behind shallow, winding tunnels. Flea beetles more commonly feed on the fibrous root system, but in high numbers they may cause significant damage to the crop.

Flea beetles overwinter as adults in protected places such as under logs or leaves and along fence rows. Eggs are laid in the soil near plants in the spring when adults emerge from overwintering sites. Larvae emerge in approximately three weeks and pupate in the soil. The life cycle is completed in about 30 days during the summer months. Other flea beetle species such as the pale-striped flea beetle can also be found in sweet potato fields.

The adult sweetpotato flea beetle is oval, black with a bronze tinge and very small. The wing covers have deep ridges and the legs are reddish-yellow. The first segment of the hind pair of legs is greatly enlarged and allows flea beetles to jump like fleas. The larvae have three pair of true legs near the head but do not have prolegs. They are about 0.2 inch in length.

Flea beetles have several generations per year and as such they can feed on sweet potatoes throughout the growing season. Adult flea beetles can be monitored with sweet nets. A threshold of five beetles per 100 sweeps is recommended before treatment. Soil-applied preplant insecticides and timely applications of foliar insecticides should provide protection from flea beetles.



Sugarcane Beetles

Sugarcane beetle damage to sweet potato was reported for the first time in 2001, and several Louisiana sweet potato growers have suffered significant losses from this insect in recent years. Feeding damage from the beetles renders the roots unmarketable.

The adult sugarcane beetle is a pest of corn, sugarcane, rice, strawberries and sweet potato. The adult beetles burrow beneath the soil surface and feed on the sweet potato roots.

Sugarcane beetles have one complete generation each year. They overwinter as adults and emerge in the spring and early summer to mate and lay eggs in the soil. Larvae develop in June and July, and a new generation emerges from August through September. Recent research suggests that this newly emerged generation of adult beetles damages sweet potatoes prior to harvest.

The adult beetle is stout, dull black and ranges in length from 0.5 inch to 0.63 inch. The adult beetles, with the exception of color, resemble June beetles. Newly emerged beetles are glossy but become dull with age. The beetles have well-developed forelegs that allow them to burrow through the soil very quickly.

The larvae are white grubs with red head shields. Larvae undergo three successive instars for an average overall developmental time of two months. Larvae feed on rotting and decaying vegetation, such as cane trash, and grass roots. Newly formed pupae are white but quickly turn brown. Average duration of the pupal stage is 16 days. Total average time for development is about three months. The new generation of beetles emerges in August-September and will feed on available hosts until cold weather arrives.

Granular soil insecticides and some insecticide seed treatments have been shown to reduce sugarcane beetle infestations in corn. However, no insecticides are currently labeled to control this beetle in sweet potato. Research is ongoing to develop a management program for control of the sugarcane beetle in sweet potato.



Foliage-Feeding Insects

Several additional pests feed on the foliage of sweet potatoes. As a general rule, plant defoliation must exceed 45 percent to 50 percent before yields are reduced. Defoliation late in the season will have less impact on yield than defoliation in the earlier stages of growth. The most problematic foliage feeders are lepidopteran insect pests such as beet armyworms and soybean and cabbage loopers. The majority of damage from these insects occurs late in the season. Several insecticide management options are available to control the various caterpillar species.

Soybean and Cabbage Loopers

Loopers are annual pests of several agronomic crops in Louisiana, including sweet potato. Moths of both species are grayish to brownish and are larger than beet armyworm moths. Loopers have a unique bi-lobal metallic mark on the wing, which is a good spotting characteristic for field identification. Eggs are laid singly on the plant surface. Larvae of the two species are also similar and are pale green with two pairs of abdominal prolegs.

Looper larvae are aggressive feeders and usually feed on leaf margins. Scouting recommendations suggest that you check the underside of leaves because larvae often hide there.



Armyworm Complex

Several species of armyworms feed on sweet potato foliage, including the southern armyworm, yellowstriped armyworm and beet armyworm. These armyworms have a broad host range, feeding on many vegetable and field crops. Larvae feed on leaves and branch tips. Armyworms can often be found on foliage during the morning or evening hours or on an overcast day. Larvae will chew on exposed sweet potato roots, creating a deep circular scar.

Caterpillars emerge from eggs in four days to six days and spend three to four weeks as larvae feeding on the plant. Armyworms burrow into the soil and pupate toward the end of their development. The life cycle from egg to adult emergence requires approximately five weeks during the summer. They produce three to five generations per year depending on species.

Beet armyworms are the most common armyworm found in sweet potato fields late in the growing season. Adults are grayish to brownish. The forewings have a well-defined spot marked with ochre near the center of each wing. Eggs are laid on the surface of leaves in clusters. Newly hatched larvae have a dark-green head and a pale-green body.



Sweetpotato Hornworm

Sweetpotato hornworm moths are present from June to September. The moths are active at night. Eggs are laid singly on the lower surface of leaves. Larvae will feed on foliage for about three weeks and then burrow into the soil where they will pupate. The pupal period lasts approximately three weeks in the summer. There are two to three generations per year.

The adult moth is heavy-bodied and gray with a wingspan of about 4 inches. There are bright pink spots on the hind wings and abdomen. Larvae of this species are green to brown with slanted black lines on both sides of the body, and they have a black anal horn. The head is green or brown with three stripes on each side. Mature caterpillars reach a length of 3.5 inches.



Tortoise Beetles

Several species of tortoise beetles will feed on sweet potato foliage. Both adults and larvae can be found on the foliage. Tortoise beetles are brightly colored and usually gold with black and/or red markings. The beetles are oblong and slightly flattened. The body of a tortoise beetle has a shell like appearance, thus the reason they resemble tortoises. They vary in length from 0.2 inch to 0.33 inch.

Tortoise beetles do not damage sweet potato roots. They are considered a minor pest, and populations are usually managed indirectly through the management of other insects. (Photo credit: Clemson University-USDA Cooperative Extension Service, US, Bugwood.org.)



Cultural Control

Cultural control involves several practices including soil cultivation, sanitation and crop rotation. Cultural control is very important in reducing injury from the sweetpotato weevil. Weeds can serve as hosts for other insect pests, such as cucumber beetles, wireworms,

white grubs and whitefringed beetles. Cultivation of production fields in the spring will help destroy alternate host plants and reduce the attraction of insects to production fields. Cultivation can also expose overwintering insects to predators and parasites.

Sampling Methods & Insect Thresholds

Proper sampling techniques and the use of insect treatment thresholds can reduce the number of insecticide applications. Sampling methods depend on the pest and include sweep nets and pheromone traps. Refer to individual insect sections for specific sampling and threshold information. Sampling for adult insect

pests should begin within two weeks of planting. Sweep nets can be used to sample adult cucumber beetles, whitefringed beetles, flea beetles, sweetpotato weevils and various foliage-feeding insects. Pheromone traps can be used to monitor sweetpotato weevils.

Labeled Insecticides: Read and consult all label directions prior to use.

Insect	Insecticide*	Amt. Concentrate Per Acre	LB Active Ingredient Per Acre	Acres treated per gallon/lb	Timing and method of application
Cucumber beetles White Grubs Whitefringed beetles Wireworms	bifenthrin**	19.2 fl oz	0.30	6.5	preplant
		3.2-9.6 fl oz	0.05-0.15	40-13	lay by
					<i>Note application times on product labels</i>
	Mocap EC	5.1-6.9 fl oz. per 1000 row feet or	3-4	2-1.5	preplant 12-15 band on row
	Mocap 15G	20-26 lbs	3-4		preplant
Wireworms Flea beetles	Lorsban 4E	0.5 gal broadcast	2	2	preplant
	Lorsban 15G	13.5 lb broadcast	2		preplant
Cucumber beetles Whitefringed beetle Flea beetles	bifenthrin**	2.1-6.4 fl oz	0.033-0.10	61-20	foliar
	PennCap M	2-3 pints	0.5-0.75	4-2.5	foliar (FIFRA 24C)
	Imidan 70-W	1.3 lbs (ph 5.5)	0.91		foliar
	Sevin XLR- Plus	1-2 quarts	1-2	4-2	foliar
	Thionex 3EC	0.66 quarts	0.5	6	foliar
	Assail 30 SG	1.5-4 oz	0.028-0.075	10.5-4	foliar
	Baythroid XL	1.6-2.8 fl oz	0.013-0.022	80-46	foliar
	Mustang Max	1.76-4 fl oz	0.011-0.025	72-32	foliar
Sweetpotato Weevil	PennCap M	2-3 pints	0.5-0.75	4-2.5	foliar (FIFRA 24C)
	bifenthrin**	2.1-6.4 fl oz	0.033-0.10	61-20	foliar
	Imidan 70-W	1.3 lbs (ph 5.5)	0.91		foliar
	Sevin XLR- Plus	1-2 quarts	1-2	4-2	foliar
	Thionex 3EC	0.66 quarts	0.5	6	foliar
	Baythroid XL	1.6-2.8 fl oz	0.013-0.022	80-46	foliar
	<i>Imidan Dust 5%</i>	<i>2-4 oz/bushel</i>			<i>Dust after harvest</i>
Beet armyworm	Intrepid 2F	6-10 fl oz	0.09-0.16	21-12.8	foliar
	Spin Tor 2SC	4-6 fl oz	0.07-0.09	32-21	foliar
	Rimon 0.83 EC	9-12 fl oz	7.5-9.96	14-10.6	foliar
	Mustang Max	3.2-4 fl oz	0.02-0.025	40-32	foliar
Cabbage Looper Soybean Looper	Intrepid 2F	6-10 fl oz	0.09-0.16	21-12.8	foliar FIFRA 24C
	Spin Tor 2SC	4.5-6 fl oz	0.06-0.09	32-21	foliar
	Rimon 0.83 EC	9-12 fl oz	0.06-0.08	14-10.6	foliar
Cabbage Looper	Avaunt	2.5-6.0 fl oz	0.045-0.11	51-21	foliar
	Mustang Max	1.76-4 fl oz	0.011-0.025	72-32	foliar
	Baythroid XL	1.6-2.8 fl oz	0.013-0.022	80-46	foliar
Aphids/Whiteflies	Admire 2F	10-24 fl oz	0.16-0.35	12.8-5	foliar
Aphids	Platinum 2F	5-8 fl oz	0.078-0.125	25-16	foliar
	Assail 30 SG	1.5-4 oz	0.028-0.075	10.5-4	foliar

*Note incorporation instructions and methods of application for preplant insecticides.

*Apply preplant insecticides as close to transplant as possible in accordance with label directions.

*Do not exceed 0.5 lb active ingredient bifenthrin per acre/per season.

** Bifenthrin is labeled as Capture 2EC, Brigade 2EC, Bifenture and Sniper.

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