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INSECTS AFFECTING SWEETPOTATOES



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INSECTS AFFECTING SWEETPOTATOES

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At least 18 species of insects feed on the edible roots of sweetpotatoes. The crop grows during the summer and fall when populations of most insects are highest and development is most rapid. Therefore, the roots are often attacked from the time they begin to enlarge in June or July until harvest in October or November. Even when the best available control measures are used, few crops are produced that are entirely free of insect-feeding scars. Insect attacks lower the quality of sweetpotatoes by marring their appearance, providing entry points for decay organisms, causing waste when the roots are prepared for cooking, and sometimes by causing objectionable tastes. Roots that contain either insects or their excrement are usually unfit for human food.

The control of soil insects became difficult when some developed resistance to broad-spectrum chlorinated hydrocarbon insecticides and recommendations of other insecticides were withdrawn because of residue hazards. Injury by some insects became more prevalent when new varieties of sweetpotatoes were introduced that were more susceptible to attack than older varieties.

The large number of insects involved and their resistance to insecticides make their effective control by any one method unlikely. Therefore, the responsible species must be identified whenever possible. The purpose of this handbook is to provide growers and agricultural workers with descriptions of the insects, the injury they cause to sweetpotatoes, and pertinent information of their importance, distribution, seasonal history, and habits.

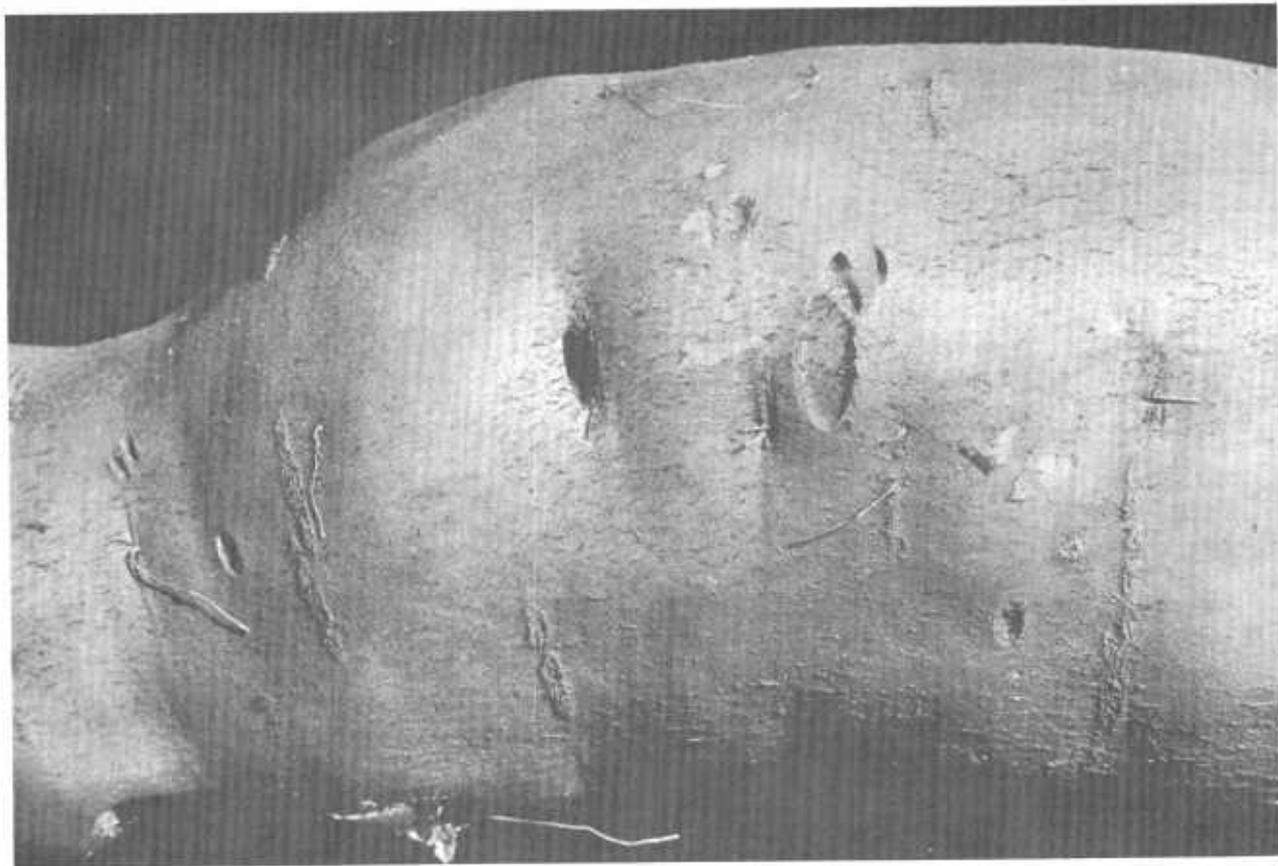
Most examples of plant injury illustrated in this publication were photographed from plants grown and infested with a specific insect species under controlled conditions, in order to accurately relate the type of injury to the insect causing it. In the laboratory, large numbers of the test insects were caged for a short time with sweetpotato plants to provide examples of damage to foliage and fresh injury to roots. In the field, individual sweetpotato plants were grown in sterilized soil within large concrete pipes buried in soil. The pipes were sealed on the bottom and caged at the

top to exclude contaminant insects. Specific insects were then introduced during the growing season, and the roots were harvested at the normal time to provide examples of root injury after the feeding scars had healed and had been altered in appearance by growth of the root.

Sometimes a grower is unaware of insects until harvesttime, when he discovers the crop damage they have caused. An attempt is then made to identify the insect responsible by the appearance of the feeding scars. A few of the insects produce characteristic scars that can be accurately identified. However, injury by many of the most harmful insects on harvested roots is so similar in appearance that an accurate identification cannot be made. Recent injury is easier to identify than old injury that has been altered by root growth, soil rots, or secondary insect attack.

A natural inclination of some growers is to consider the depth of insect holes an important characteristic and it sometimes is. However, the relative depth of the holes can be drastically altered by the growth of the root. Early-season feeding scars that do not penetrate the cortex flatten out and leave only unsightly blemishes on the root. A scar that penetrates the cortex becomes deeper, in almost direct proportion to the increase in diameter of the root through growth. Thus two scars that differed only slightly at the start may differ several inches in depth by harvest (fig. 1). When grown side by side, sweetpotato varieties with a thin cortex will have more deep holes from early season injury than varieties with a thick cortex. Injury by some insects may differ in appearance on different varieties of sweetpotatoes or on the same variety grown in soils of different types.

Examine roots from several plants at frequent intervals during the growing season to learn what insects are damaging a crop of sweetpotatoes. If injury is found, search the surrounding soil for larvae or pupae and the soil or foliage for adult insects. Many of the adult beetles feed on sweetpotato foliage, and their presence can often be detected by the type of leaf injury.



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FIGURE 1.—Appearance at harvest of insect injury early in the season that: penetrated the cortex (deep hole left-center); did not penetrate the cortex (shallow scar right-center). ($\times 1$)

WIREWORMS

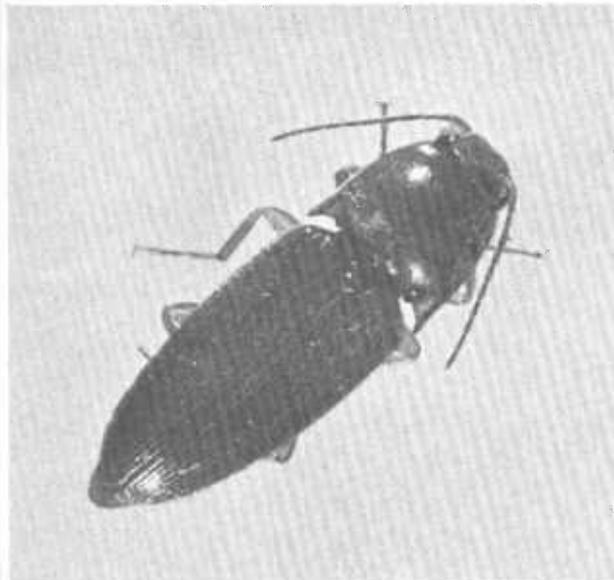
Several kinds of wireworms feed on sweetpotatoes. The southern potato wireworm, *Conoderus falli* Lane, is probably the most injurious one in the Southeastern States. Cuthbert and others (4)¹ discussed this species as a pest of white potatoes. The adult beetles are dark brown, about a quarter of an inch long (fig. 2), and are found near the soil surface under leaves and trash in sweetpotato plantings. The adults do not feed on sweetpotato plants.

The eggs (fig. 3) are laid in the soil from late spring to early fall. They are small and often concealed by particles of earth that adhere to them. The eggs hatch in 5 days during midsummer, but may take several weeks during cool weather in the spring or fall.

¹Italic numbers in parentheses refer to Literature Cited, p. 28.

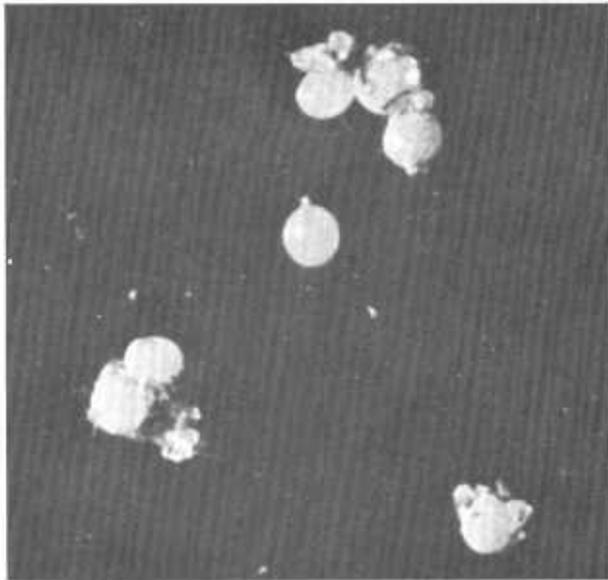
Sweetpotatoes are injured by the larvae, which hatch from eggs laid in the soil during the summer and early fall. The larvae (fig. 4) are white, cream, or yellowish gray with reddish-brown heads and tails. They are smooth, shiny, and relatively hard bodied. When full grown they are $\frac{1}{2}$ to $\frac{3}{4}$ inch long. In midsummer when temperatures are high and food plentiful the larval stage may last only 30 days. It may last as many as 340 days under less favorable conditions. When fully grown, the larvae change to pupae in earthen cells under the ground. The pupae (fig. 5), which are slightly larger than the adult beetles, are white when first formed but soon change to creamy yellow. The pupae become adults in 5 to 19 days. Usually two generations of this wireworm occur each year.

Injury by southern potato wireworm larvae usually consists of fairly small irregularly shaped



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FIGURE 2.—Adult of the southern potato wireworm (*Conoderus falli*). (× 11)



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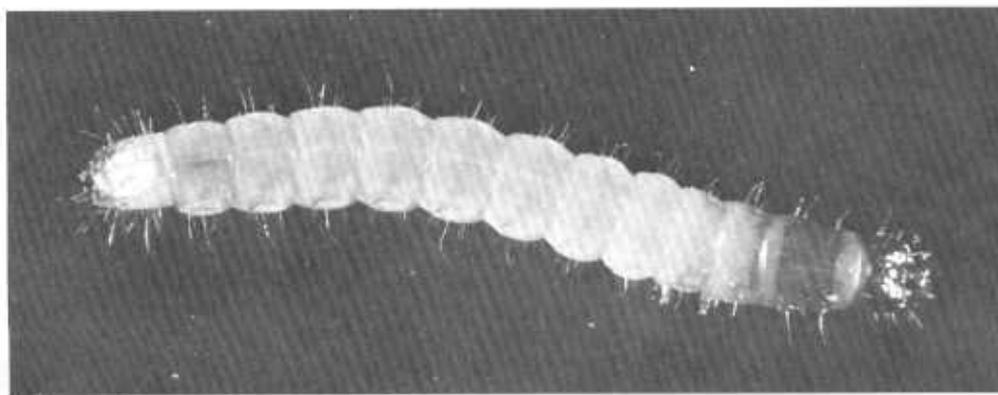
FIGURE 3.—Eggs of the southern potato wireworm (*Conoderus falli*). (× 15)

holes. If growth cracks or other breaks in the skin are present the holes may be concentrated in these, otherwise the holes are scattered at random over the surface of the root (fig. 6). The original holes are usually less than a quarter of an inch deep and seldom as much as a half of an inch but may be considerably deepened by later growth of the root. New feeding holes have ragged edges and usually contain chewed root fiber (fig. 7). This is a good diagnostic character.

Southern potato wireworms usually attack sweetpotatoes late in the season. Consequently, they produce less "healed-hole" injury (early sea-

son injury that has been healed over) than either *Diabrotica* (p. 5) or *Systema* (p. 10) larvae. The larvae frequently invade the feeding scars made by other insects. Wireworm holes are commonly found in the shallow tunnels produced by sweetpotato flea beetle larvae. Wireworm holes also provide an ideal environment for decay organisms and are frequently invaded by them.

The tobacco wireworm, *Conoderus vespertinus* (Fabricius), a widely distributed pest of tobacco, also damages sweetpotatoes in areas where it is abundant. Rabb (9) studied the biology of the tobacco wireworm in North Carolina. The adults



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FIGURE 4.—Larva of the southern potato wireworm (*Conoderus falli*). (× 10)



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FIGURE 5.—Pupae of the southern potato wireworm (*Conoderus falli*). ($\times 13$)

are similar in size and shape to those of the southern potato wireworm but distinctively marked with areas of light and dark brown. The immature stages are also very similar.

Only one generation of the tobacco wireworm occurs each year. The eggs, which are laid during the summer, hatch into larvae in 1 to 3 weeks. Pupation takes place during the late spring and summer of the following year. Most overwintered larvae have pupated before sweetpotato roots begin to enlarge; therefore injury is probably caused by larvae from eggs laid during the current year.

The gulf wireworm, *Conoderus amplicollis* (Gyllenhal), is an important pest of sweetpotatoes in the coastal plains of the South Atlantic and Gulf states. Cockerham and Deen (2) studied its biology in Alabama. All stages are very similar in appearance to the southern potato wireworm. The life cycle is approximately the same as that of the tobacco wireworm. Injury to sweetpotatoes by tobacco and gulf wireworms is almost identical to that caused by the southern potato wireworm.

Melanotus communis (Gyll.) a larger wireworm, is likely to be the most damaging species in the more northern sweetpotato growing areas. The injury it causes is similar to that caused by other wireworms, but holes are larger and deeper.



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FIGURE 6.—Injury to sweetpotatoes by larvae of the southern potato wireworm (*Conoderus falli*). ($\times 1$)



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FIGURE 7.—Southern potato wireworm (*Conoderus falli*) feeding scars on sweetpotato. Note ragged edges and chewed fiber in holes. ($\times 8$)

CUCUMBER BEETLES

Larvae of the banded cucumber beetle, *Diabrotica balteata* LeConte, and the spotted cucumber beetle, *Diabrotica undecimpunctata howardi* Barber, feed on the roots of sweetpotatoes. The spotted cucumber beetle occurs wherever sweetpotatoes are grown east of the Rocky Mountains. The banded cucumber beetle has become a major pest of sweetpotatoes in southern Louisiana. It is abundant from coastal South Carolina southward into Florida and westward along the gulf coast to Texas and also occurs in California. Pitre and Kantack (8) studied the biology of the banded cucumber beetle. The spotted cucumber beetle has been widely studied because it is a pest of corn and peanuts (12).

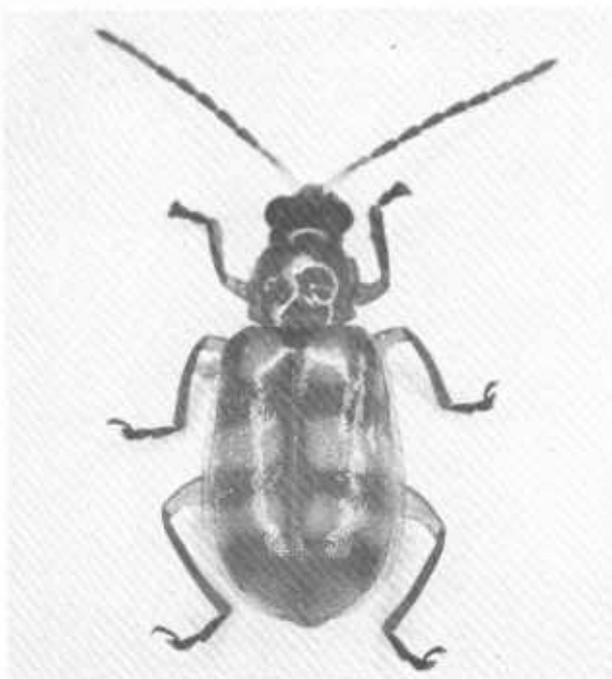
Adults of the banded cucumber beetle are about a quarter of an inch long and marked with alternating green and yellow bands (fig. 8). They eat irregular holes in the leaves of sweetpotatoes (fig. 9). Similar leaf injury by tortoise beetles,

Metritona spp., can be differentiated by holes that are more uniform in shape and size (fig. 10).

Eggs of the banded cucumber beetle (fig. 11) are laid in the soil from spring to early autumn. They hatch in 1 to 2 weeks, depending on the temperature. The larvae are slender and white to pale yellow. They have brown heads and a dark-brown spot on the last segment of the body (fig. 12). They are soft bodied and their skin, unlike that of wireworms, is not shiny. Full grown larvae are $\frac{1}{4}$ to $\frac{1}{2}$ inch long. The larval stage lasts from 8 to more than 30 days, depending on temperatures and the availability of food.

The pupae (fig. 13) are formed in cells just below the soil surface. They change to adults in approximately 1 week. Six or seven generations a year may occur.

Adult spotted cucumber beetles are usually larger than banded cucumber beetles. Spotted cucumber beetles have yellowish-green bodies and



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FIGURE 8.—Adult of banded cucumber beetle (*Diabrotica balteata*). (× 10)

black heads, legs, and antennae. The wing covers are marked with 11 black spots (fig. 14). The injury to sweetpotato leaves by banded and spotted cucumber beetles cannot be differentiated. Eggs, larvae, and pupae of the two species are also indistinguishable.

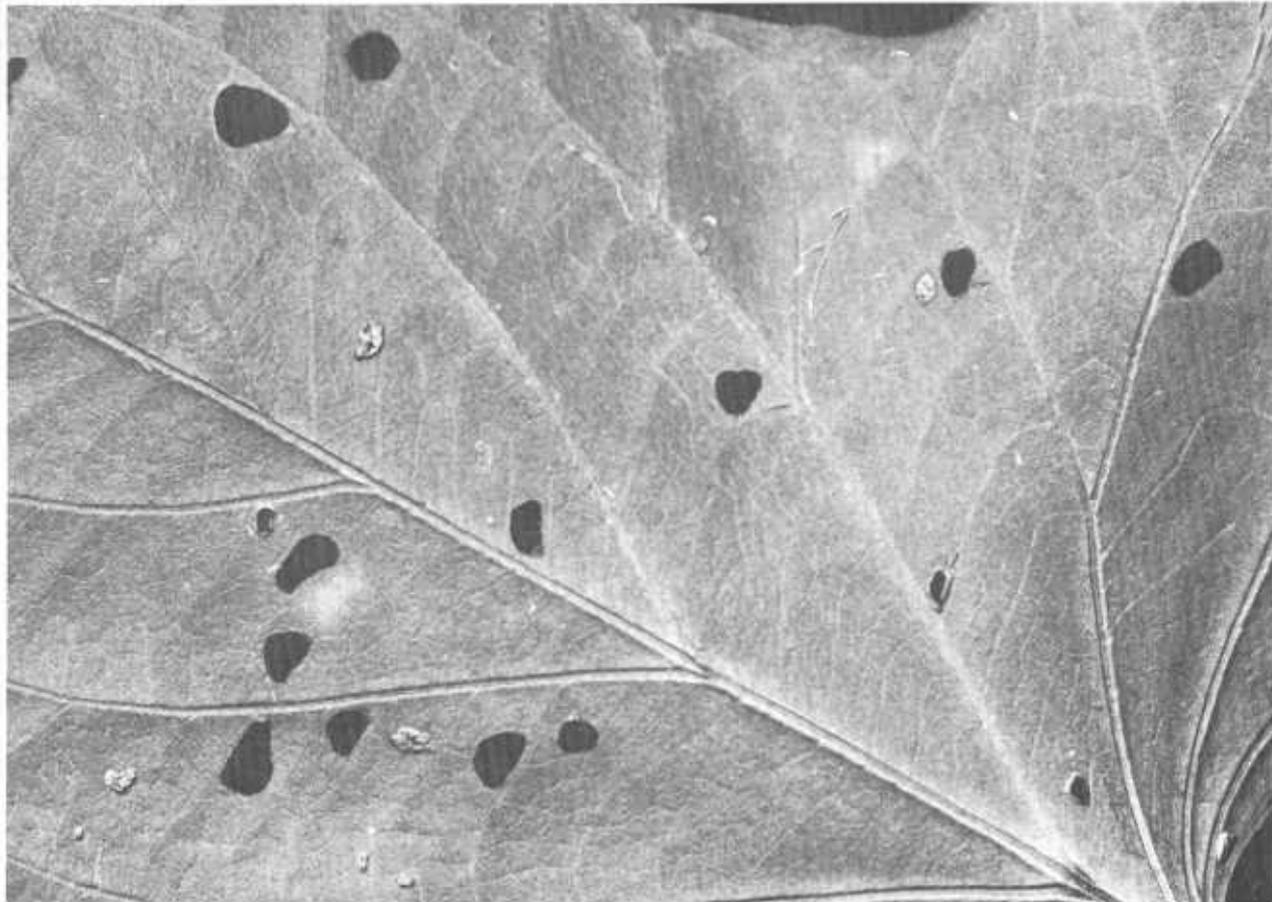
Overwintering females of the spotted cucumber beetle begin laying eggs as soon as the weather turns warm in the spring. The eggs hatch in 1 to 3 weeks, depending on the temperature. The larvae become full grown 2 to 4 weeks after hatching, at which time they make cells about 1 inch below the soil surface where they change to pupae. In a week or two the pupae change to beetles and work their way to the soil surface. Usually two to three generations occur a year.

Cucumber beetle larvae eat small round holes through the skin of sweetpotato roots, and form irregularly-shaped enlarged cavities just under the skin (fig. 15). The larvae seldom tunnel into the roots as do *Systema* (p. 10) larvae. The feeding scars are usually in groups rather than scattered randomly over the root. The original holes are usually shallow but may be deepened by later growth of the root. In contrast to wireworms, cucumber beetles often attack sweetpotatoes early in the season. This results in much healed-hole injury (fig. 16).



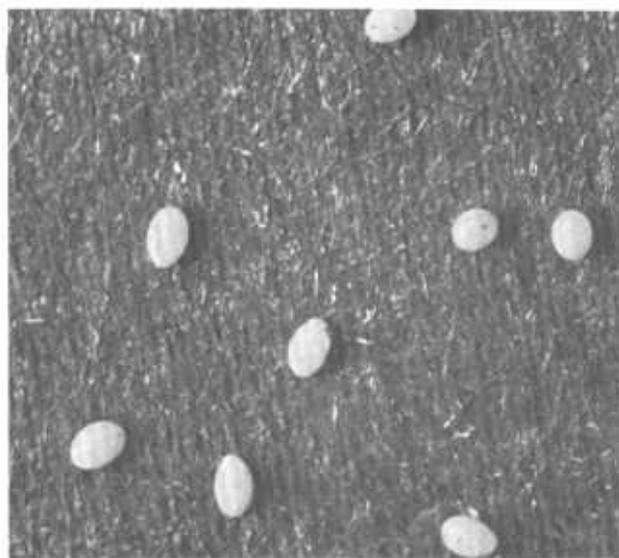
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FIGURE 9.—Injury to sweetpotato foliage by adults of banded cucumber beetle (*Diabrotica balteata*). (× 2)



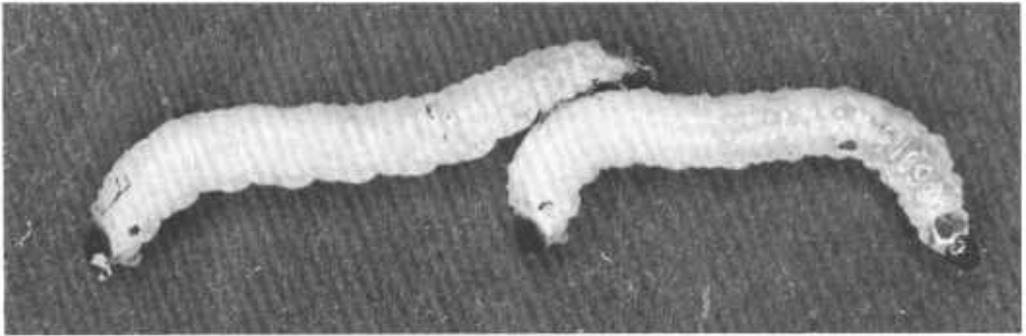
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FIGURE 10.—Injury to sweetpotato foliage by tortoise beetle (*Metriona* sp.). ($\times 2$)



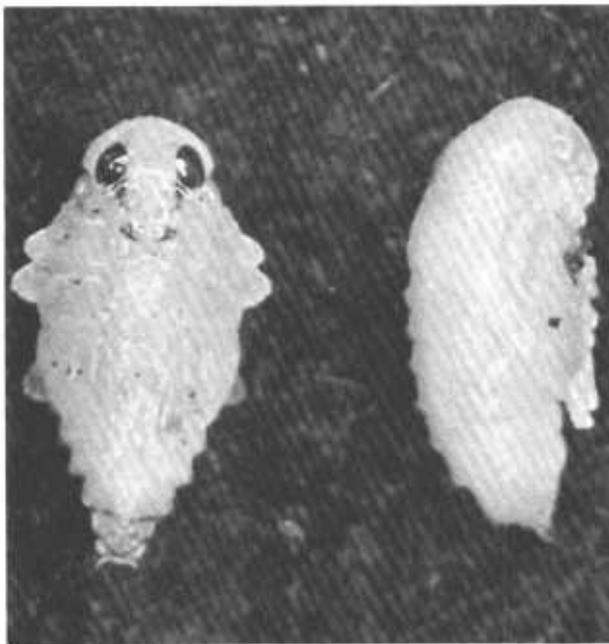
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FIGURE 11.—Eggs of banded cucumber beetle (*Diabrotica balteata*). ($\times 10$)



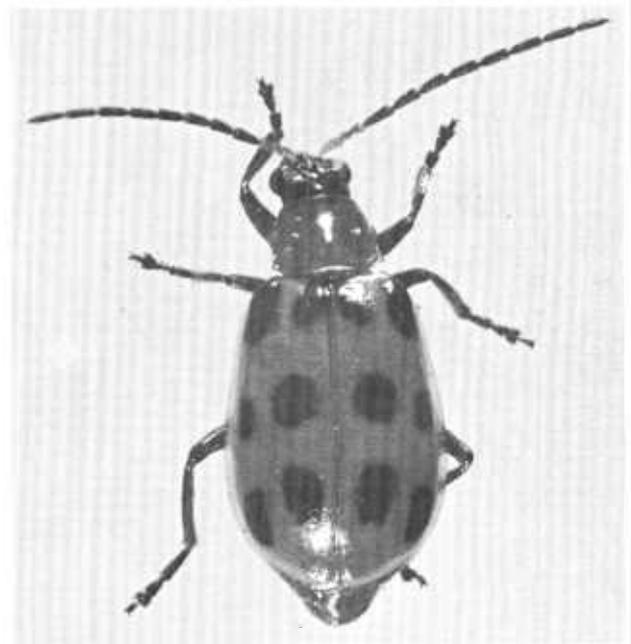
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FIGURE 12.—Larvae of banded cucumber beetle (*Diabrotica balteata*). (× 9)



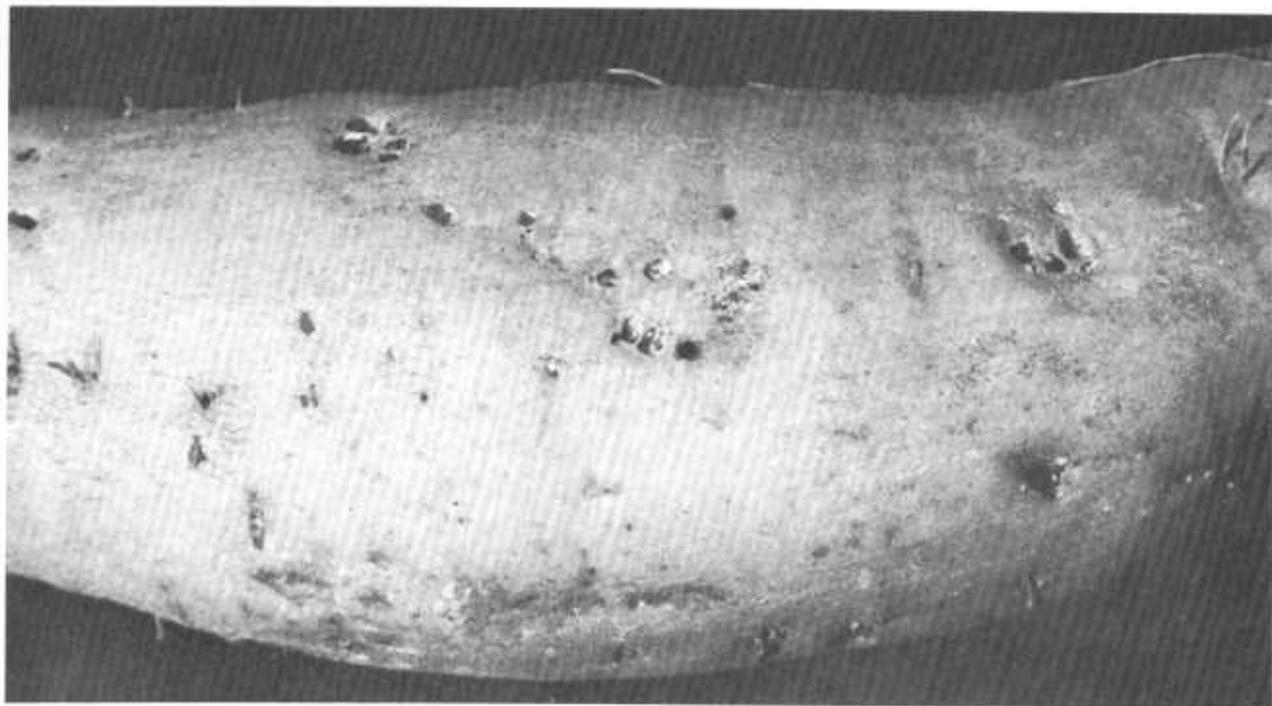
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FIGURE 13.—Pupae of banded cucumber beetle (*Diabrotica balteata*). (× 10)

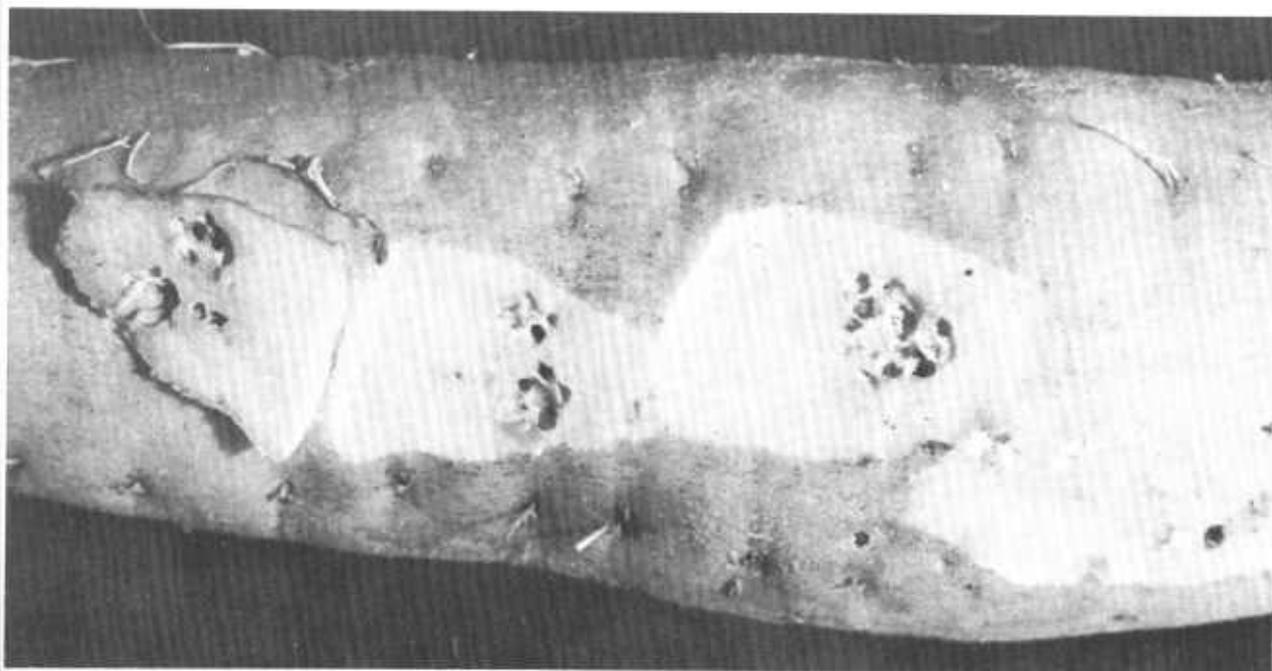


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FIGURE 14.—Adult of spotted cucumber beetle (*Diabrotica undecimpunctata howardi*). (× 11)

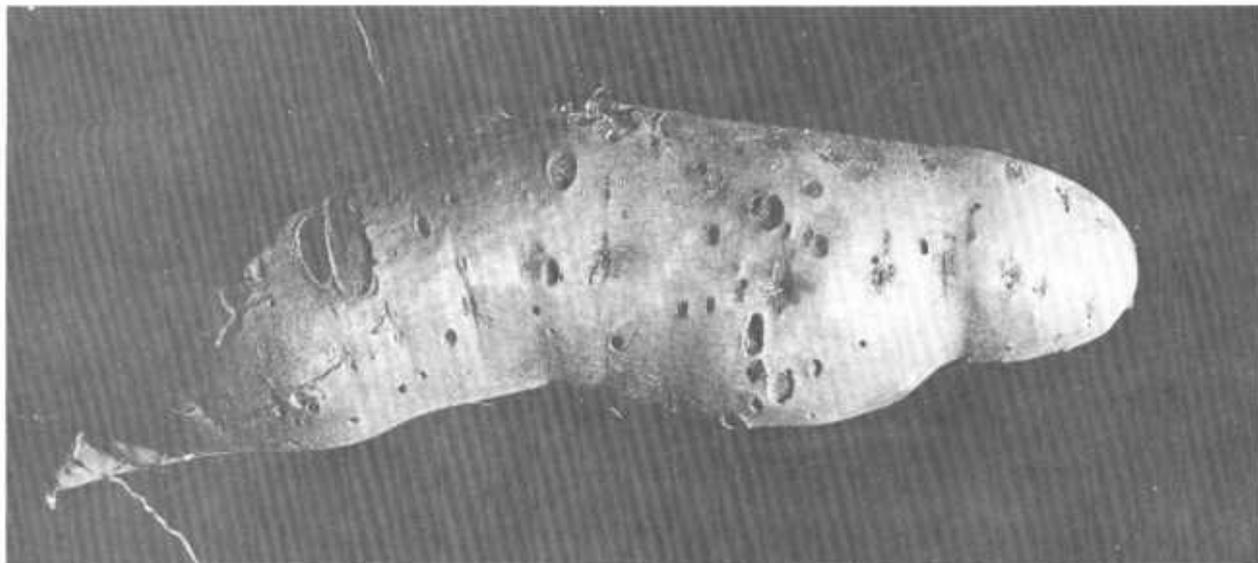


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FIGURE 15.—Injury to sweetpotatoes by larvae of banded cucumber beetle (*Diabrotica balteata*). ($\times 2$)



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FIGURE 16.—Healed-hole injury resulting from early season injury by banded cucumber beetle (*Diabrotica balteata*) larvae. ($\times \frac{1}{2}$)

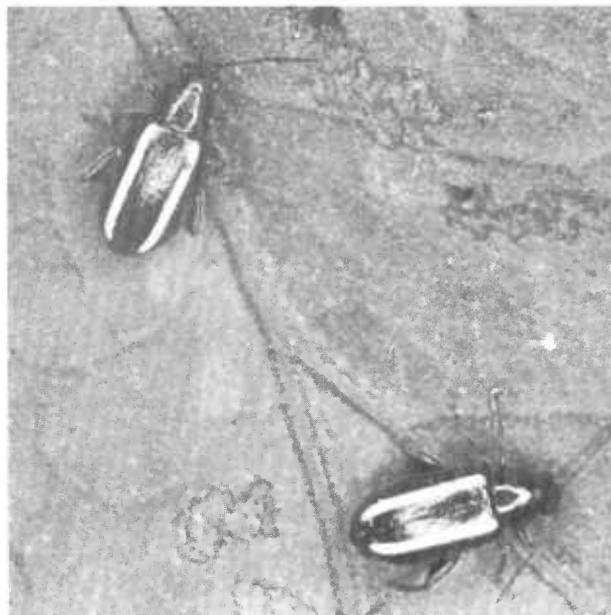
SYSTEMA

The elongate flea beetle, *Systema elongata* (Fabricius), the pale-striped flea beetle, *Systema blanda* Melsheimer, and *Systema frontalis* (Fabricius) feed on sweetpotatoes. Marcovitch (7) described injuries caused by the elongate flea beetle and mentioned reports of injury by the pale-striped flea beetle. Cuthbert and Reid (5) reported injury by *Systema frontalis*. One or more of these species probably occur wherever sweetpotatoes are grown.

Adults of the elongate flea beetle are about an eighth of an inch long and black with longitudinal white stripes on their backs. They produce characteristic feeding scars on the upper surface of sweetpotato leaves. Unlike the pale-striped flea beetle, they usually do not chew entirely through the leaf unless it is young and tender (fig. 17). Adults of the pale-striped flea beetle are very similar to adults of the elongate flea beetle except that the legs, head, and thorax of the pale-striped flea beetle are usually not quite as dark. They feed on sweetpotato leaves and make irregular holes (fig. 18), which are smaller than those made by cucumber beetles. *Systema frontalis* adults are usually a little larger than the other two beetles and have no white stripes on their back. They also eat small holes in the leaves (fig. 19).

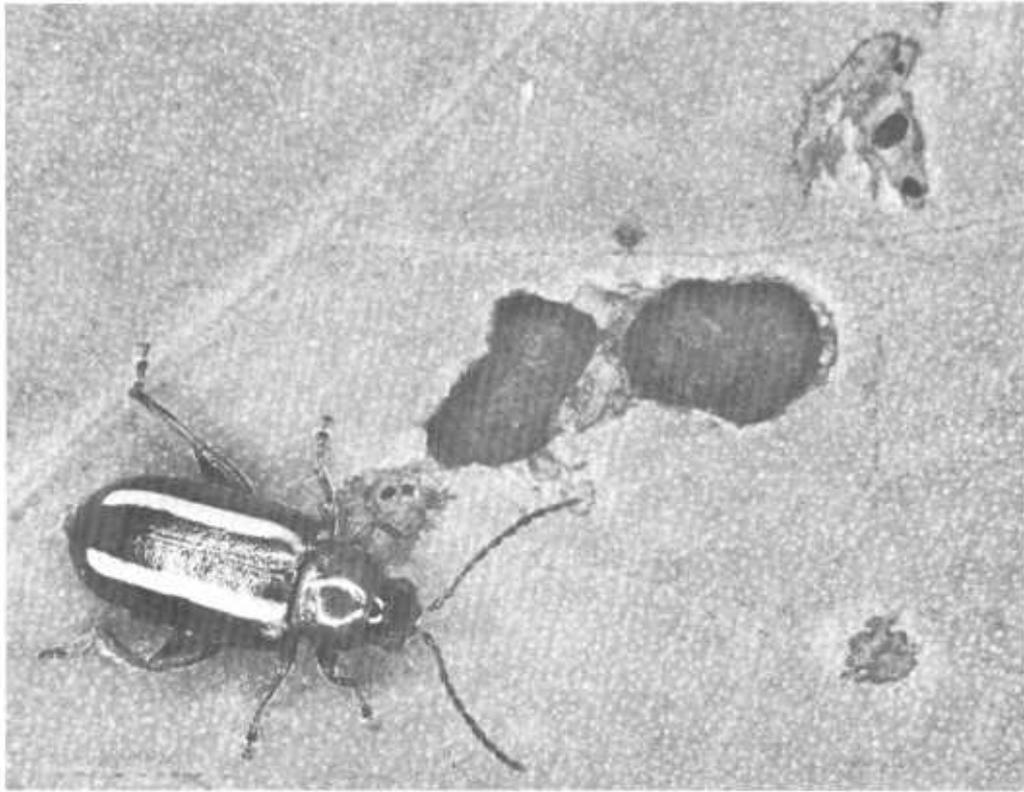
The habits and life histories of the three species are similar, and the immature stages look alike. These insects have a wide range of hosts including many weeds. Adults move into sweetpotato fields during the spring and summer and lay cream to yellow eggs (fig. 20) in the soil. After a week to

10 days these hatch into white larvae which later become pale yellow to pale salmon depending on their food. The larvae are soft bodied and about three-eighths of an inch long when full grown. They have brown heads and a fleshy pointed



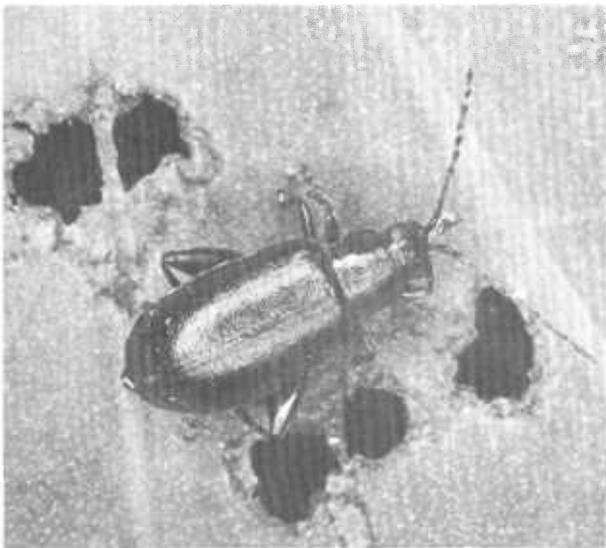
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FIGURE 17.—Adults of elongate flea beetle (*Systema elongata*) and injury to sweetpotato foliage. ($\times 10$)



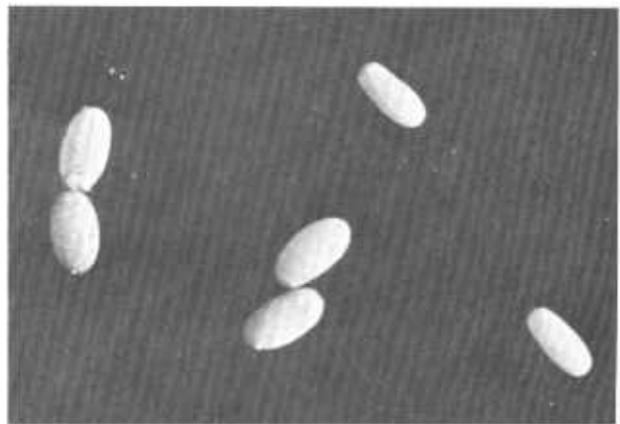
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FIGURE 18.—Adult of pale-striped flea beetle (*Systema blanda*) and injury to sweetpotato foliage. (× 15)



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FIGURE 19.—Adult of *Systema frontalis* and injury to sweetpotato foliage. (× 12)



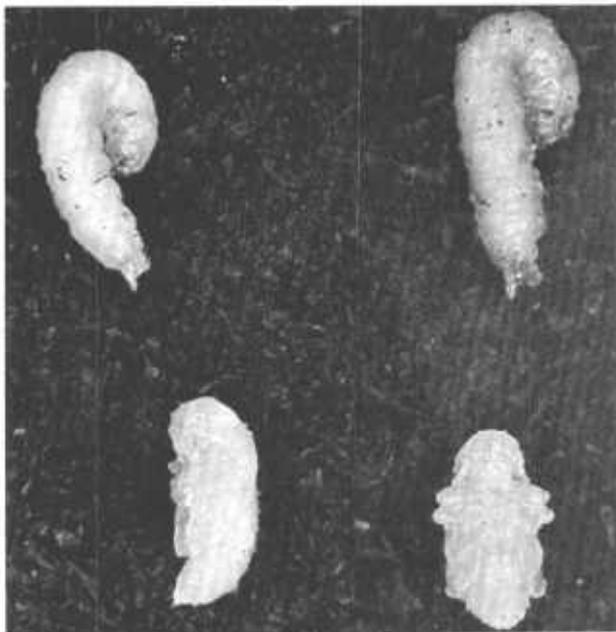
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FIGURE 20.—Eggs of the elongate flea beetle (*Systema elongata*). (× 15)



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FIGURE 21.—Larva of the elongate flea beetle (*Systema elongata*). ($\times 10$)



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FIGURE 22.—Prepupal larvae and pupae of the elongate flea beetle (*Systema elongata*). ($\times 10$)



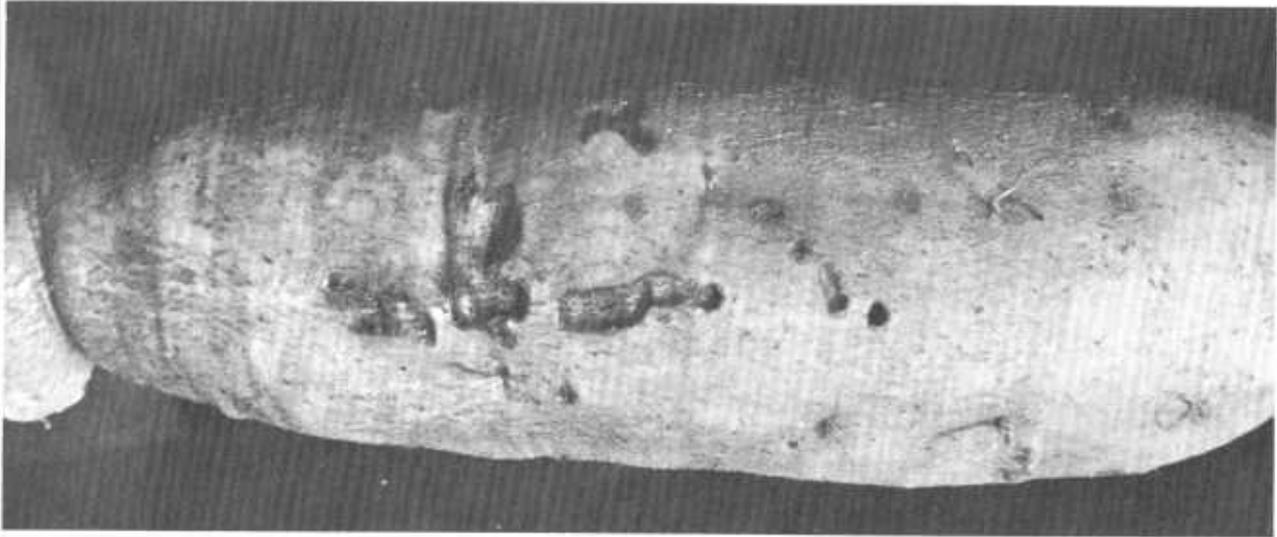
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FIGURE 23.—Injury to sweetpotatoes by larvae of the elongate flea beetle (*Systema elongata*). ($\times \frac{1}{2}$)

tubercle on the tail end (fig. 21). The larvae mature in 20 to 30 days, then curl up in a cell made in the soil and transform into pupae (fig. 22). The adults emerge in about 1 week. Probably at least two generations occur a year in the South.

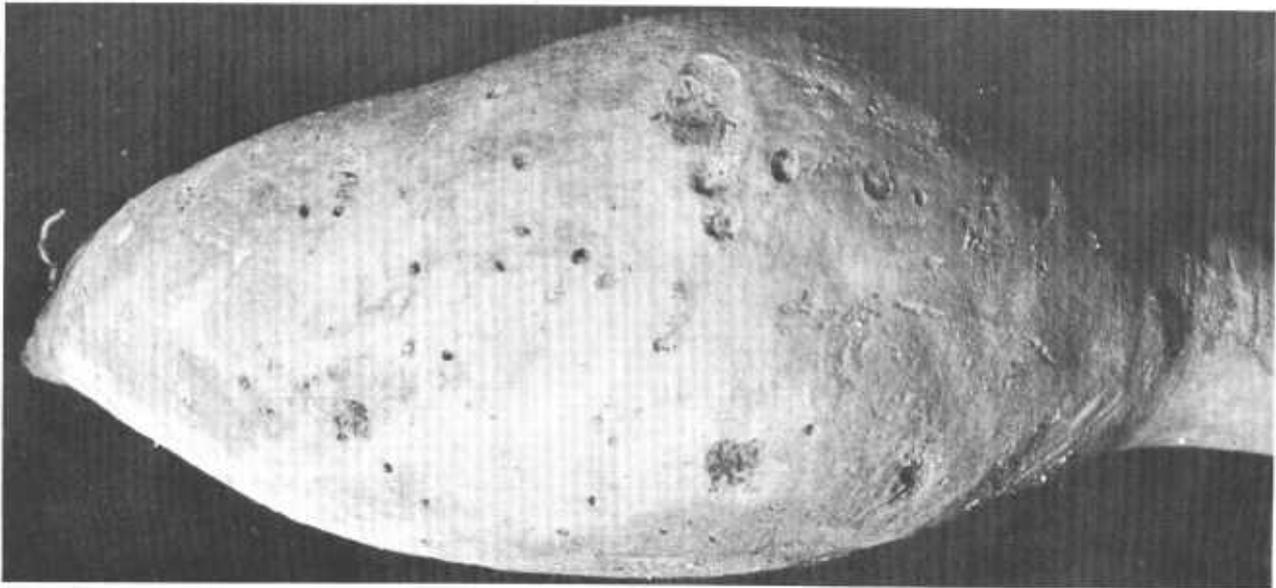
Systema larvae eat small holes through the skin of sweetpotatoes and make enlarged cavities and short tunnels just under the skin (fig. 23). Except for these tunnels *Systema* injury is very similar to that of cucumber beetle larvae, which sel-

dom tunnel into the roots. At harvesttime early season *Systema* injury usually appears as shallow healed scars which tend to be elongate or irregularly shaped (fig. 24) in contrast with those of cucumber beetle larvae, which are usually round. In some soils, late-season *Systema* feeding results in a large number of small shallow holes in the roots (fig. 25). This is sometimes referred to as "pinhole" injury.



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FIGURE 24.—Healed-hole injury resulting from early season feeding by elongate flea beetle (*Systema elongata*) larvae. ($\times 1$)



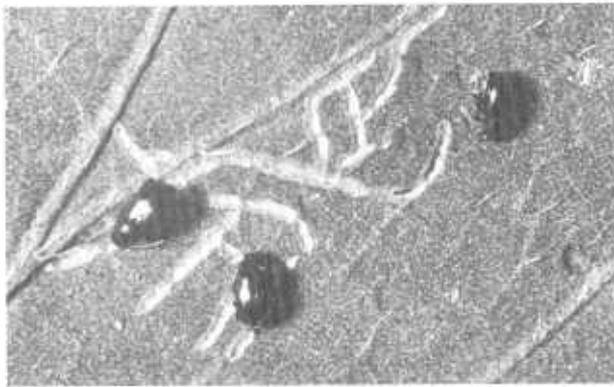
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FIGURE 25.—Pinhole injury resulting from late-season feeding by elongate flea beetle (*Systema elongata*) larvae. ($\times 1$)

SWEETPOTATO FLEA BEETLE

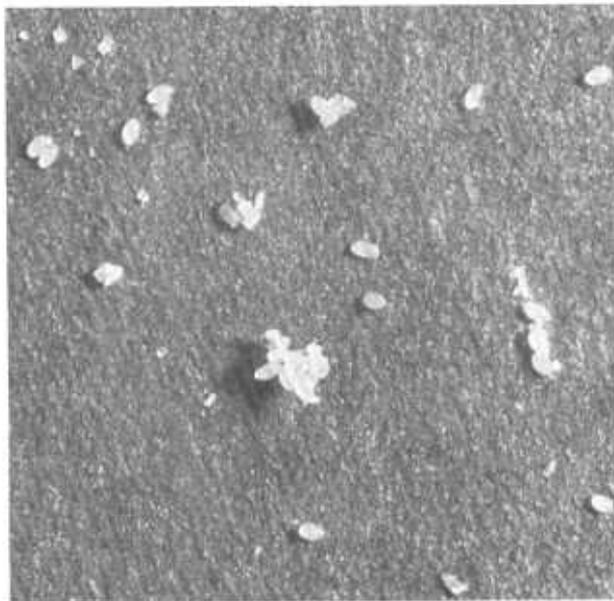
Adults of the sweetpotato flea beetle, *Chaetocnema confinis* Crotch, have long been recognized as pests of sweetpotato foliage (10), but the larval injury to the roots was reported only recently (5). This insect occurs almost everywhere that sweetpotatoes are grown and lives on bindweed, *Convolvulus* sp., as well as sweetpotatoes.

The adult beetles are black, about a sixteenth of an inch long, and characteristically hop away when disturbed. They eat narrow channels or grooves in the upper surface of sweetpotato leaves (fig. 26). This injury is quite characteristic and easily recognized.



TC-7590

FIGURE 26.—Adults of the sweetpotato flea beetle (*Chaetocnema confinis*) and injury to sweetpotato foliage. ($\times 7$)



TC-7591

FIGURE 27.—Eggs of the sweetpotato flea beetle (*Chaetocnema confinis*). ($\times 15$)

The adults pass the winter in sheltered locations in hedgerows and the edges of woods. They move into sweetpotato fields soon after planting. The eggs (fig. 27) are laid in the soil and after a few days hatch into slender white larvae (fig. 28) that are similar to *Diabrotica* and *Systema* larvae but have no dark spot or fleshy tubercle on their tail end. When fullgrown the larvae are about three-sixteenths of an inch long. They change into pupae (fig. 28) in the soil. During the warmer months of the year the entire life cycle of the sweetpotato flea beetle is completed in about 30 days. A succession of broods occurs during the spring, summer, and autumn.

Sweetpotato flea beetle larvae make small winding tunnels just under the skin of sweetpotato roots. These tunnels are nearly invisible at first but soon darken and can be seen through the skin (fig. 29). As the roots grow, the skin over the tunnels splits away leaving shallow scars on the surface (fig. 30). Although large larval populations of the sweetpotato flea beetle are often found in sweetpotato plantings, usually they cause little injury to the harvested roots. Apparently the larvae feed mostly on the fibrous roots and attack the enlarged roots only under certain conditions. Sweetpotato varieties differ widely in their susceptibility to economic injury by this insect.



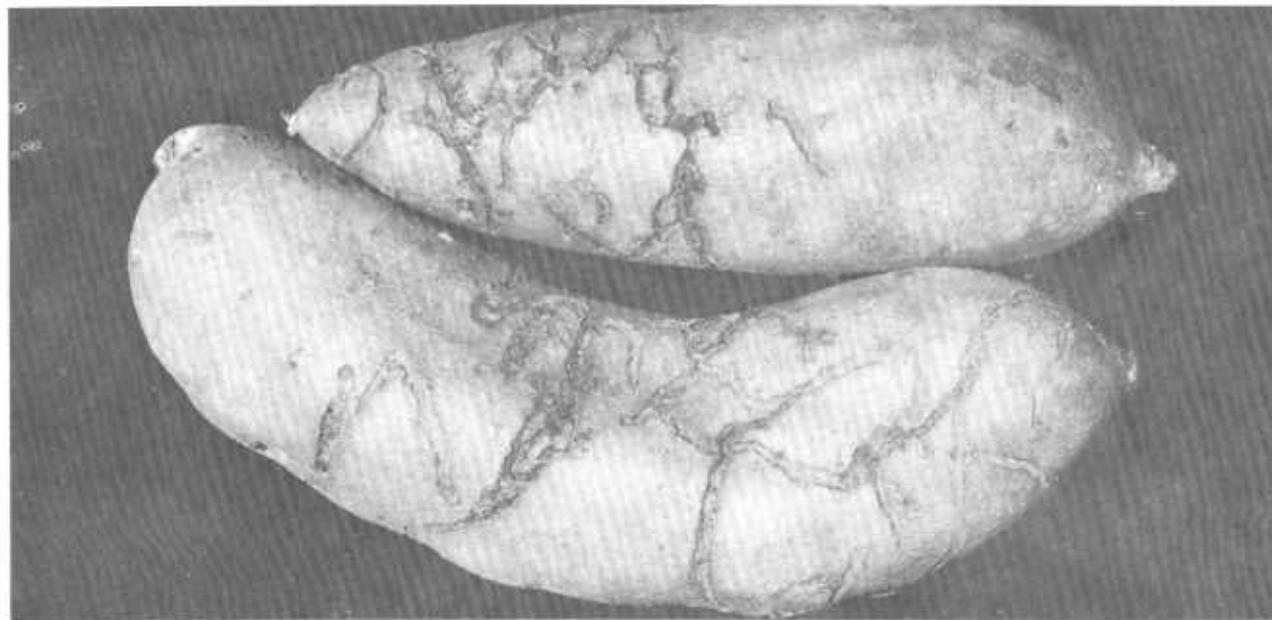
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FIGURE 28.—Larvae (top), prepupal larvae (middle), and pupae (bottom) of the sweetpotato flea beetle (*Chaetocnema confinis*). ($\times 10$)



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FIGURE 29.—Injury by larvae of the sweetpotato flea beetle (*Chaetocnema confinis*). ($\times 1\frac{1}{2}$)



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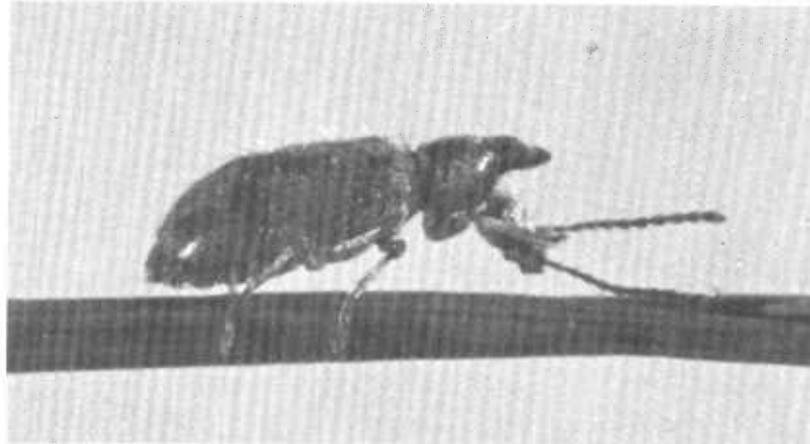
FIGURE 30.—Sweetpotato flea beetle (*Chaetocnema confinis*) larval injury as it appears at harvesttime. ($\times 1$)

NOTOXUS CALCARATUS

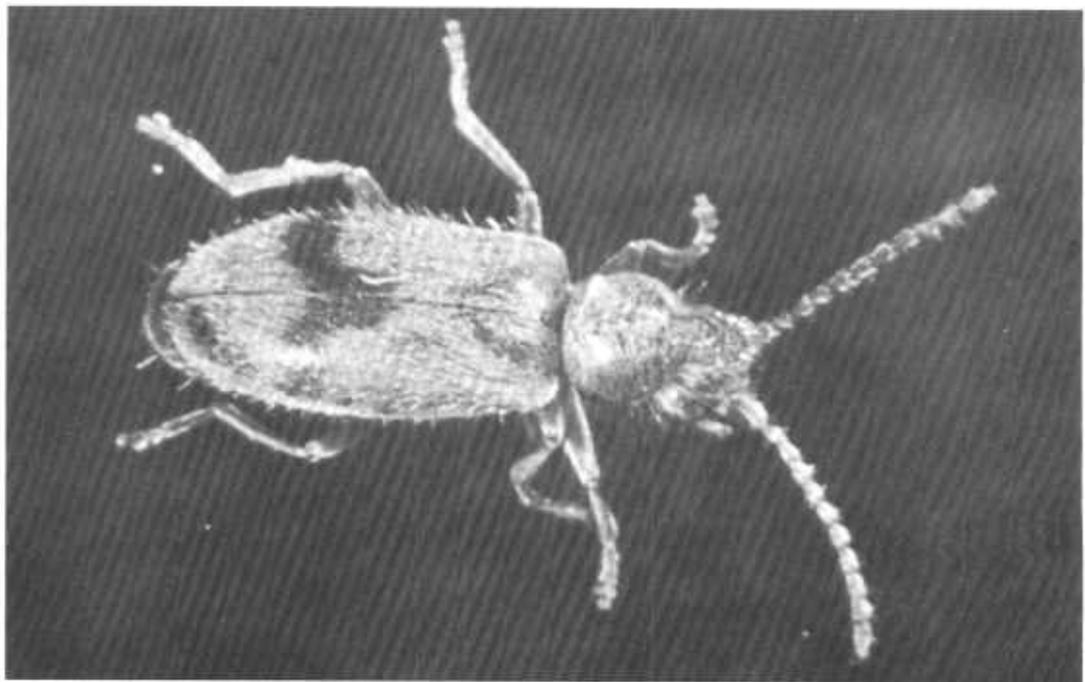
Notoxus calcaratus Horn and the other members of the family Anthicidae are sometimes called the ant-like flower beetles. Most of them do not damage crops and some prey on other insects. Studies at Charleston, S.C. (5) disclosed that *Notoxus calcaratus* larvae sometimes feed on the roots of sweetpotatoes. The species is widely distributed and may be responsible for considerable injury that is attributed to other insects.

The adults (fig. 31) are inconspicuous tan beetles with brown markings. They are about an eighth of an inch long and have a characteristic hornlike projection over their head. No one knows whether or not the adult beetles feed on sweetpotato foliage.

The cream-colored larvae resemble small wireworms, but the tail end of their body is conspicuously notched and has no brown markings



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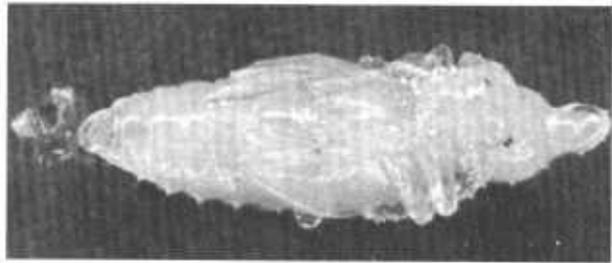


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FIGURE 31.—Adult of *Notoxus calcaratus*. Top photograph shows side view ($\times 13$), bottom photograph shows top view ($\times 19$).



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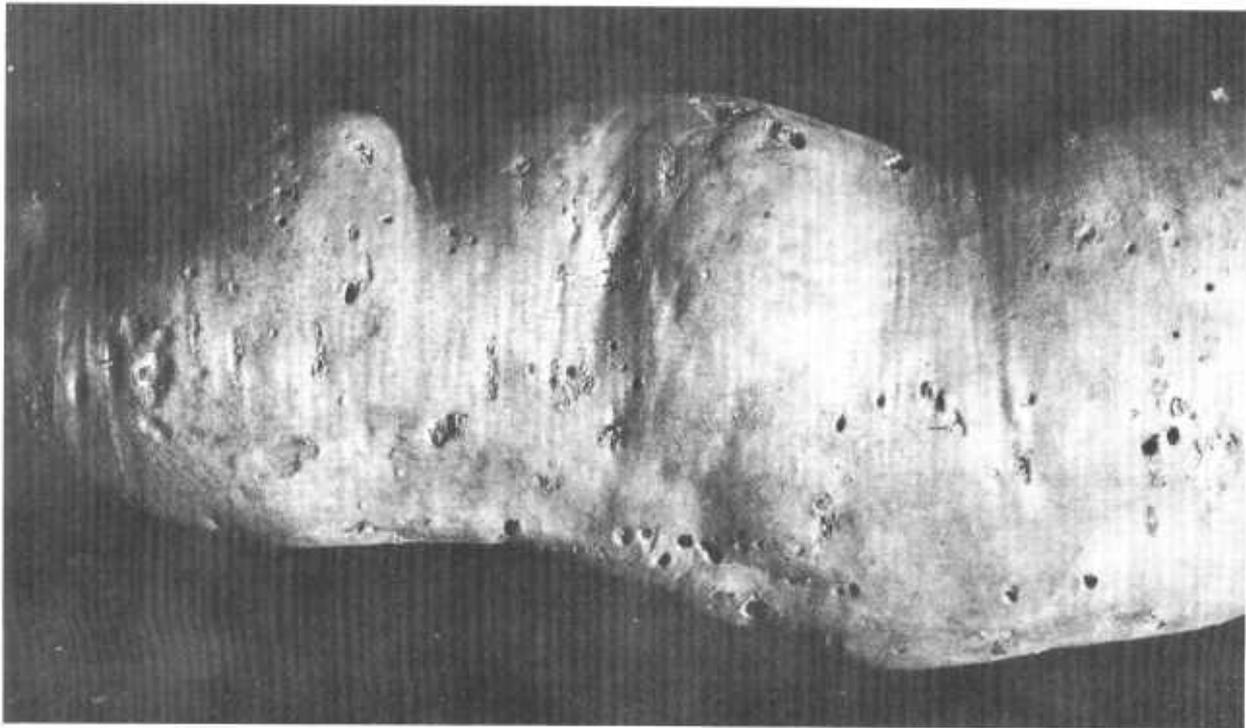
FIGURE 32.—Larvae of *Notoxus calcaratus*. ($\times 10$)

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FIGURE 33.—Pupa of *Notoxus calcaratus*. ($\times 22$)

(fig. 32). They are about a quarter of an inch long when fully grown. Little is known about the life history of this insect. The larvae and pupae (fig. 33) live in the soil. The larvae appear to be most abundant in sweetpotato plantings during the late summer and fall, and much of their injury occurs shortly before harvest.

Notoxus calcaratus feeding scars on sweetpotato roots (fig. 34) are similar to those of small wireworms, but lack the dark discoloration usually associated with wireworm injury. The feeding scars are relatively shallow and seldom contain tunnels.



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FIGURE 34.—Injury to sweetpotato by larvae of *Notoxus calcaratus*. ($\times 1$)

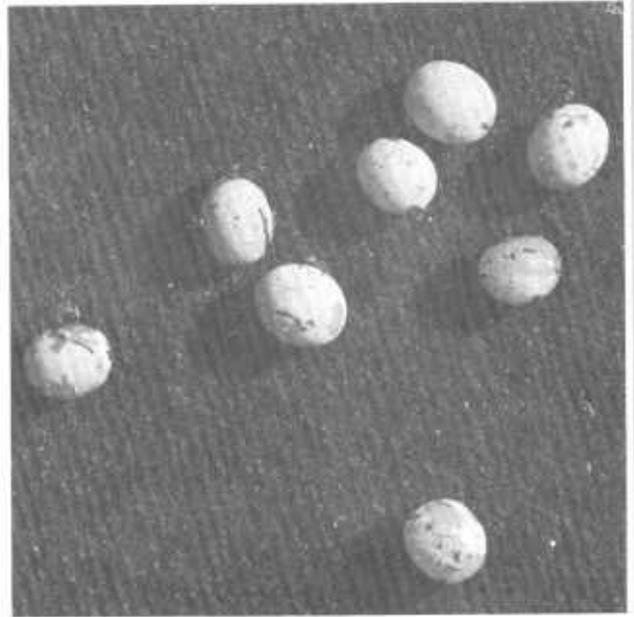
GRUBS

Some grub (scarabeid) injury to sweetpotatoes occurs in most areas where the crop is grown. There are many species of grubs and undoubtedly several of them feed on sweetpotatoes. Cuthbert and Reid (5) reported injury at Charleston, S.C. by an introduced species, *Plectris aliena* Chapin. White grubs (*Phyllophaga* spp.) are often reported as pests of sweetpotatoes. These are the larvae of May beetles or June beetles.

Adults of the various grubs vary in size and color but all are robust beetles. Many of them are night flyers and frequently come to lights. *Plectris aliena* adults (fig. 35) are light tan, and their body conformation is typical of most scarabeids.

The eggs (fig. 36) are laid in the soil during the spring and summer and soon hatch into fleshy larvae that are typically C-shaped (fig. 37). They are usually white or cream with light-tan heads and grayish areas on the tail end. The larvae pass the winter in the soil and change into pupae (fig. 38) the following spring.

Grubs gouge broad shallow areas in sweetpotato roots (fig. 39). Their injury is unlike that of any other insect except cutworms, but grub scars are much rougher and frequently shallower. Since grubs feed upside down in the soil, horizontal roots are injured mostly on the under side.



TC-7600

FIGURE 36.—Eggs of *Plectris aliena*. (× 10)

TC-7599

FIGURE 35.—Adult of *Plectris aliena*. (× 7)

TC-7601

FIGURE 37.—Larva of *Plectris aliena*. (× 7)



TC-7602

FIGURE 38.—Pupa of *Plectris aliena*. (X 7)

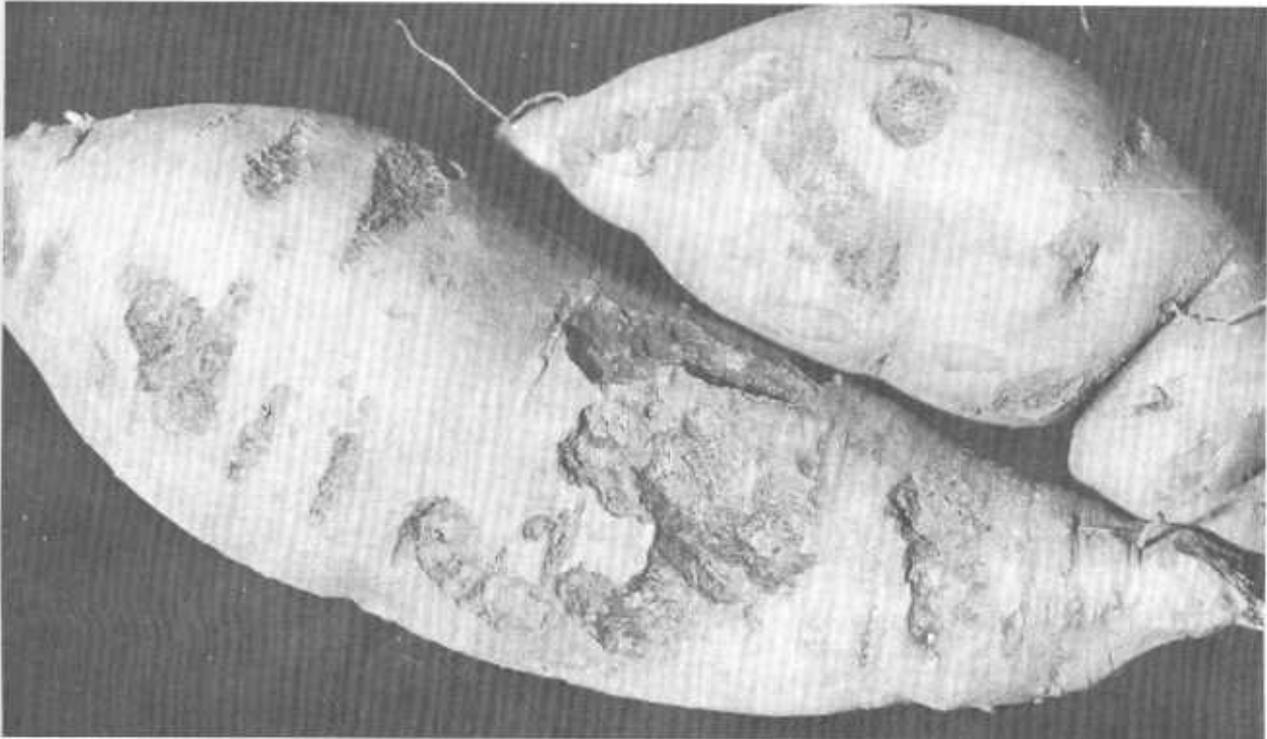


FIGURE 39.—Injury to sweetpotatoes by larvae of *Plectris aliena*. (X 1)

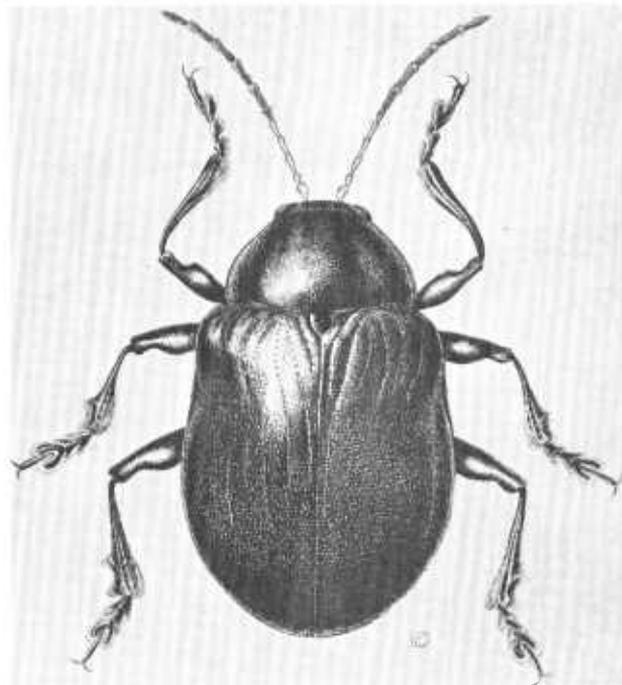
TC-7603

SWEETPOTATO LEAF BEETLE

The sweetpotato leaf beetle, *Typophorus nigrinus viridicyaneus* (Crotch), is a minor but widely distributed pest of sweetpotatoes. Brannon (1) studied its biology in North Carolina.

The adults (fig. 40) are metallic bluish-green beetles about a quarter of an inch long. They eat the leaves of sweetpotatoes by beginning at the margins and working inward (fig. 41). The eggs are laid during the spring and summer in clusters on the underside of the leaves or just beneath the surface of the soil under sweetpotato plants. The larvae (fig. 42) are pale yellow or yellow with brown heads. When mature they are almost a half of an inch long. The insect passes the winter as larvae; the pupae are formed in the soil after the weather becomes warm. Adults emerge during the spring or early summer.

Newly hatched larvae tunnel into the sweetpotato vines and later into the enlarged roots. Injury to the roots is easily recognized by the large excrement-filled tunnels that penetrate deeply into the roots (fig. 43). Frequently the larvae are found in the tunnels, sometimes a month or more after harvest.



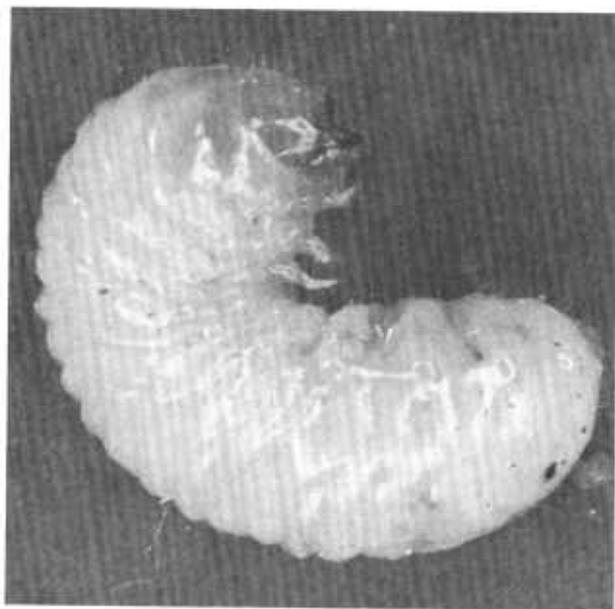
TC-306

FIGURE 40.—Adult of sweetpotato leaf beetle (*Typophorus nigrinus viridicyaneus*). (× 10)



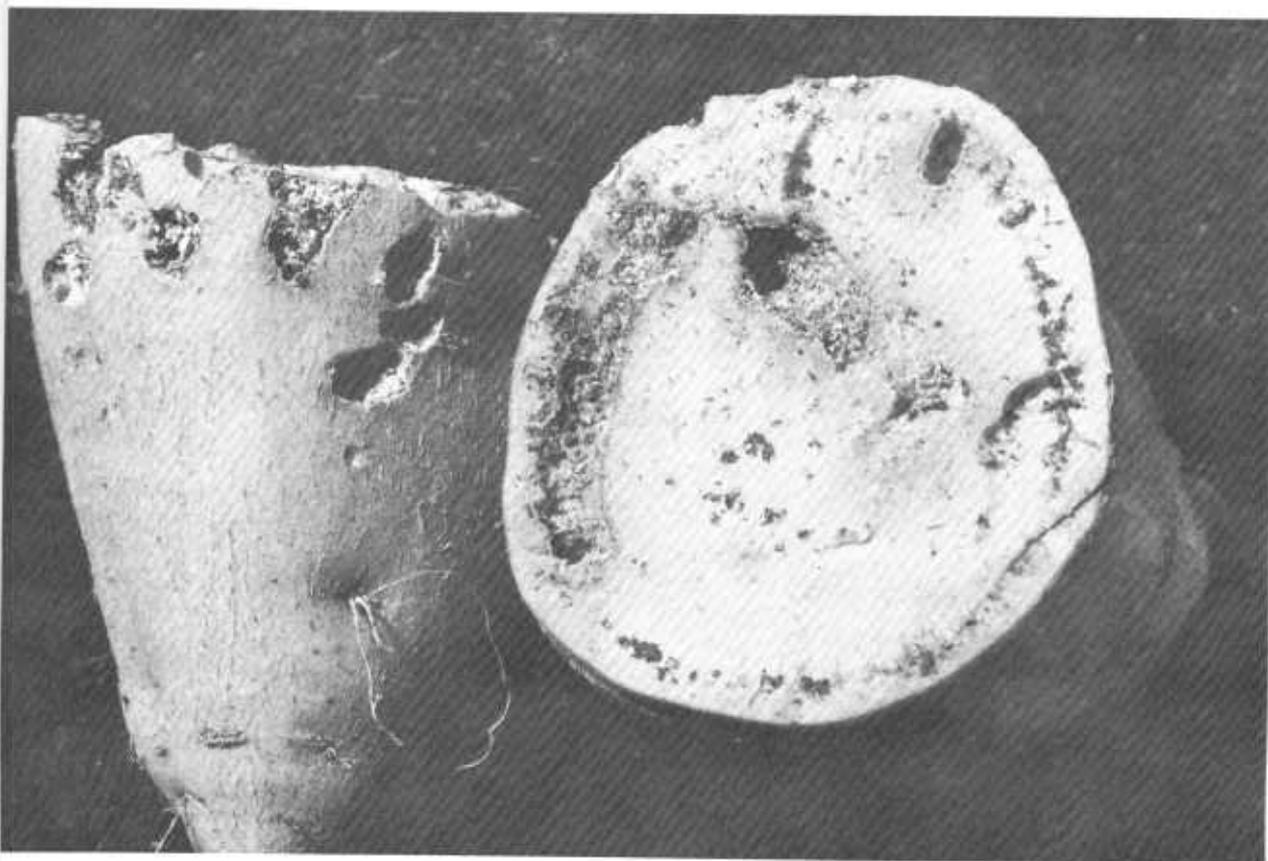
TC-1498

FIGURE 41.—Sweetpotato leaves and stem showing injury caused by the sweetpotato leaf beetle: A and C, typical adult injury; B, injury to vine caused by young larvae.



TC-7604

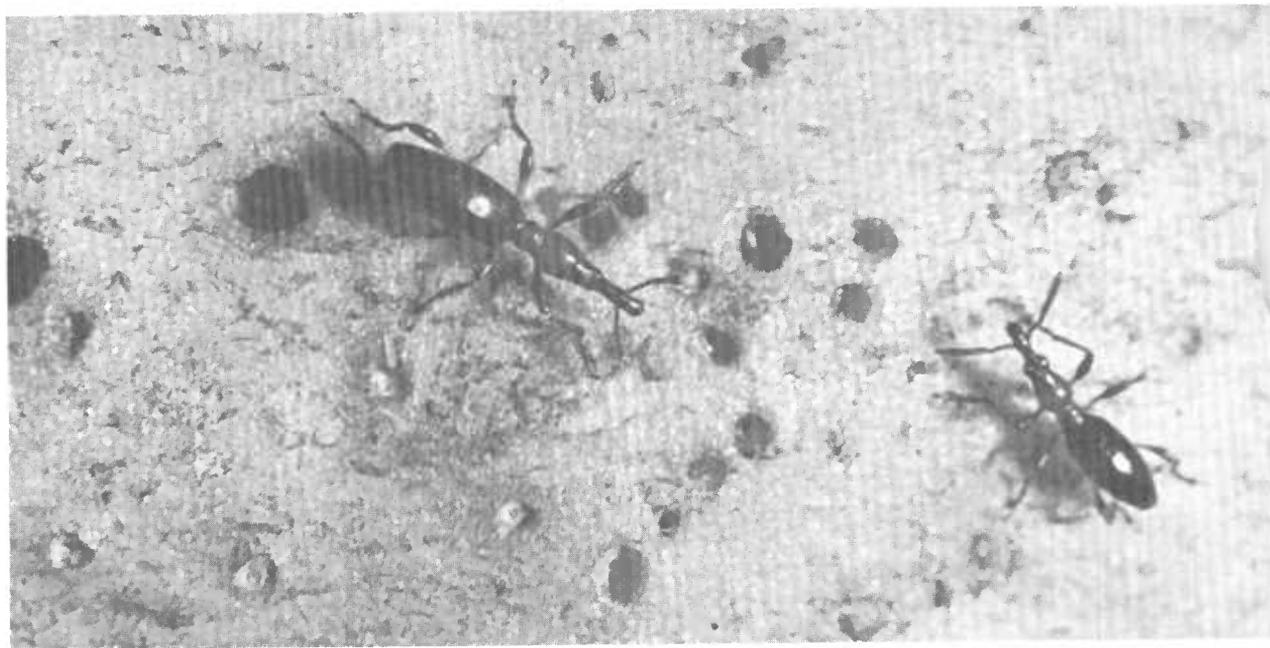
FIGURE 42.—Larva of sweetpotato leaf beetle (*Typophorus nigrinus viridicyaneus*). (× 10)



TC-7605

FIGURE 43.—Injury to sweetpotato by larvae of sweetpotato leaf beetle (*Typophorus nigrinus viridicyaneus*). (× 1)

SWEETPOTATO WEEVIL



TC-7606

FIGURE 44.—Adults of sweetpotato weevil (*Cylas formicarius elegantulus*) and their feeding and egg punctures on sweetpotatoes. ($\times 6$)

The sweetpotato weevil, *Cylas formicarius elegantulus* (Summers), has been studied more thoroughly than any other insect pest of sweetpotato roots. Cockerham and others (3) studied its biology in Louisiana, and control methods were published by the U.S. Department of Agriculture (11). This weevil is a serious pest of sweetpotatoes but occurs only in certain parts of South Carolina, North Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, and Texas.

Adult sweetpotato weevils (fig. 44) are antlike beetles about a quarter of an inch long. The head and wing covers are metallic dark blue and the thorax and legs, bright orange red. The adult weevil feeds on any exposed part of the sweetpotato plant but prefers the roots. Feeding scars on the roots consist of tiny shallow holes usually in patches (fig. 44).

The eggs are laid in specially prepared cavities in the vines or roots. The egg cavities are similar to the feeding punctures but may be distinguished by the mucilaginous covering secreted by the female. The eggs hatch in about 1 week during warm weather. The larvae (fig. 45) are white to ivory with light-brown heads. When full grown in 2 or 3 weeks they are about three-eighths of an



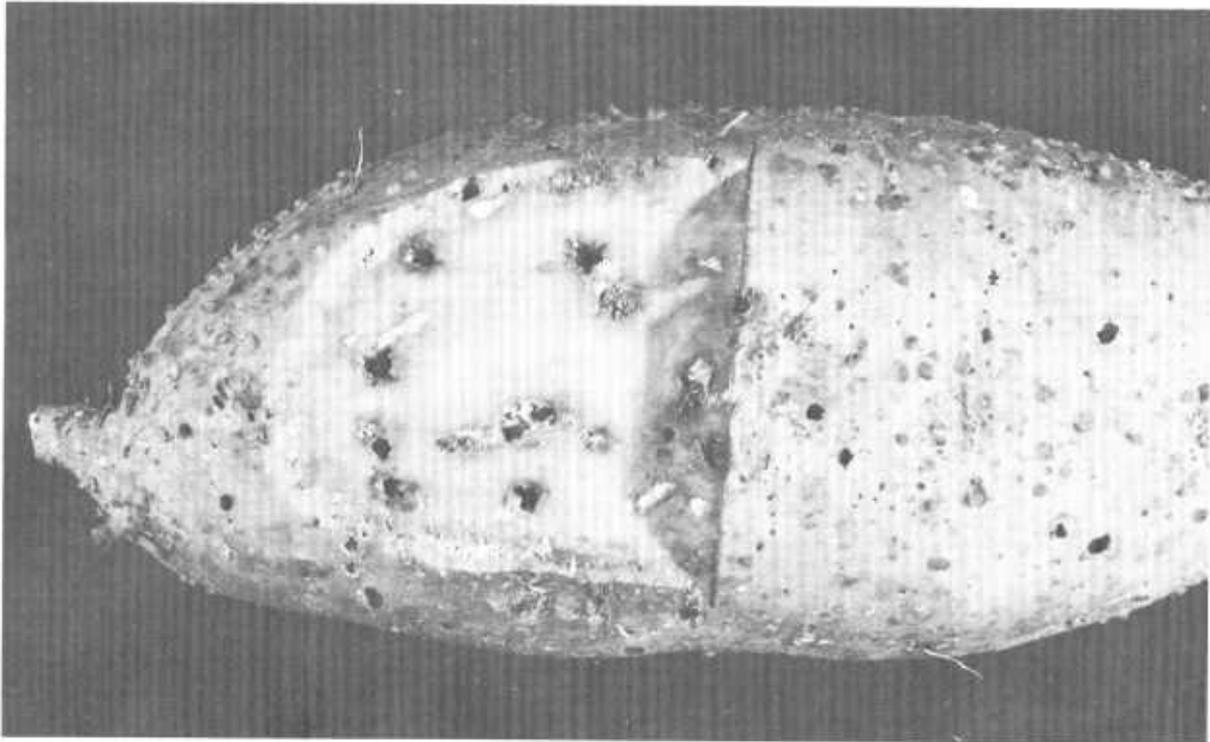
TC-7607

FIGURE 45.—Larvae (bottom) and pupae of sweetpotato weevil (*Cylas formicarius elegantulus*). ($\times 13$)

inch long. The pupae (fig. 45) are found in the vines or roots. In a week or longer they change into adult weevils. As many as six or eight generations may be produced in 1 year.

Injury to sweetpotatoes by weevil larvae (fig. 46) can be recognized by tunnels that start just

beneath the skin and become larger as they extend inward. The tunnels are much smaller than those of the sweetpotato leaf beetle and frequently contain larvae, pupae, or newly transformed adults. Adult exit holes (fig. 46) are about the size of a wooden match stem.



TC-7608

FIGURE 46.—Injury to sweetpotato by sweetpotato weevil (*Cylas formicarius elegantulus*). Small holes on uncut surface are adult feeding and egg punctures, and large holes on uncut surface are adult exit holes. Cut area shows larval tunnels and pupal chambers. ($\times 1$)

OTHER INSECTS

Other insects occasionally feed on the roots of sweetpotatoes but seldom cause economic loss. Among these are various kinds of cutworms, the larvae of which eat large, smooth, open cavities (fig. 47) usually near the stem end of the roots.

Ambrosia beetles (*Scolytid*) have been observed by Kantack (6) to infest sweetpotatoes in Louisiana.

Larvae of a longhorn beetle (*Cerambycid*) were found in the basal portion of sweetpotato vines at Charleston, S.C.²

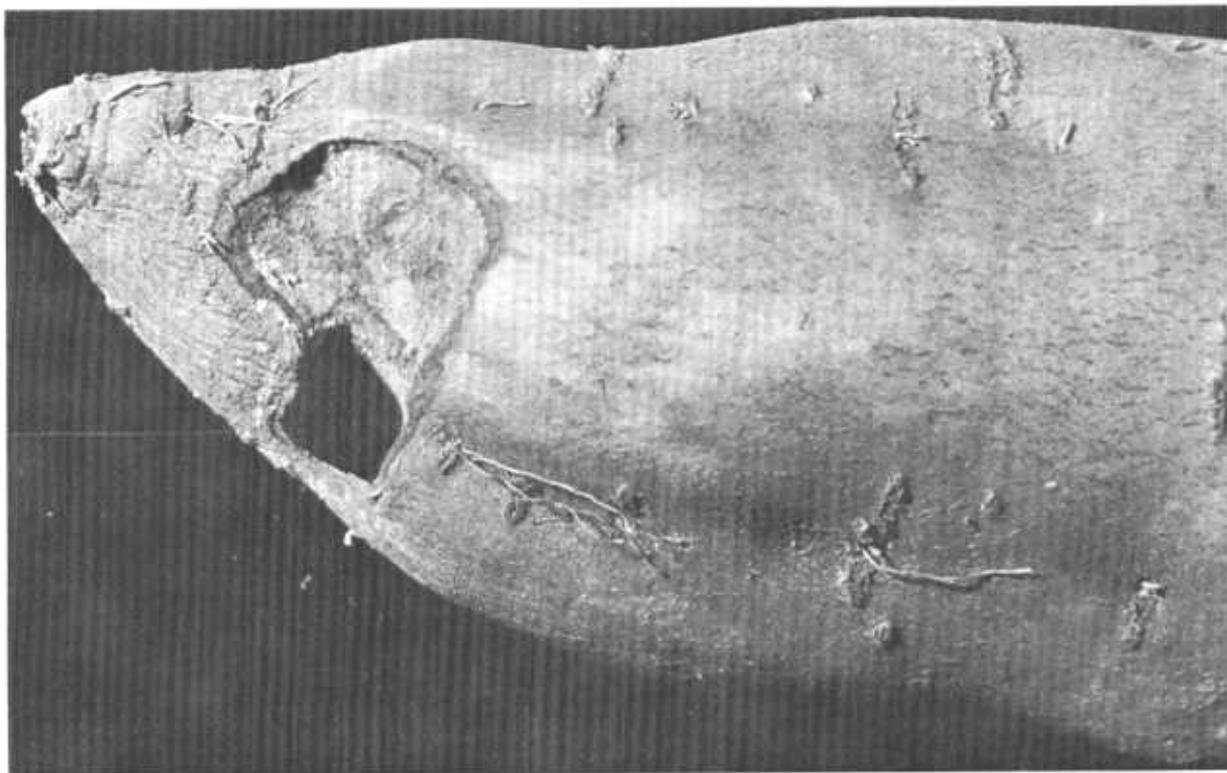
Larvae of the American plum borer, *Euzophera*

semifuneralis (Walker), were found tunneling stored sweetpotatoes in North Carolina.³

Mole crickets are frequently reported as insect pests of sweetpotatoes, but we have found no published description of their injury. The southern mole cricket, even when abundant, caused no recognizable injury in sweetpotato field-plot experiments at Charleston, S.C., between 1961 and 1962. Specimens caged with only sweetpotato roots, lived for several months but did not feed on the roots.

² Collected by L. R. Morgan, South Carolina Crop Pest Commission.

³ Personal correspondence from D. A. Mount, survey entomologist, North Carolina State University Cooperative Extension Service in Agriculture and Home Economics.



TC-7609

FIGURE 47.—Injury to sweetpotato by larva of the variegated cutworm (*Peridroma saucia*). (× 2)

INJURY FROM CAUSES OTHER THAN INSECTS

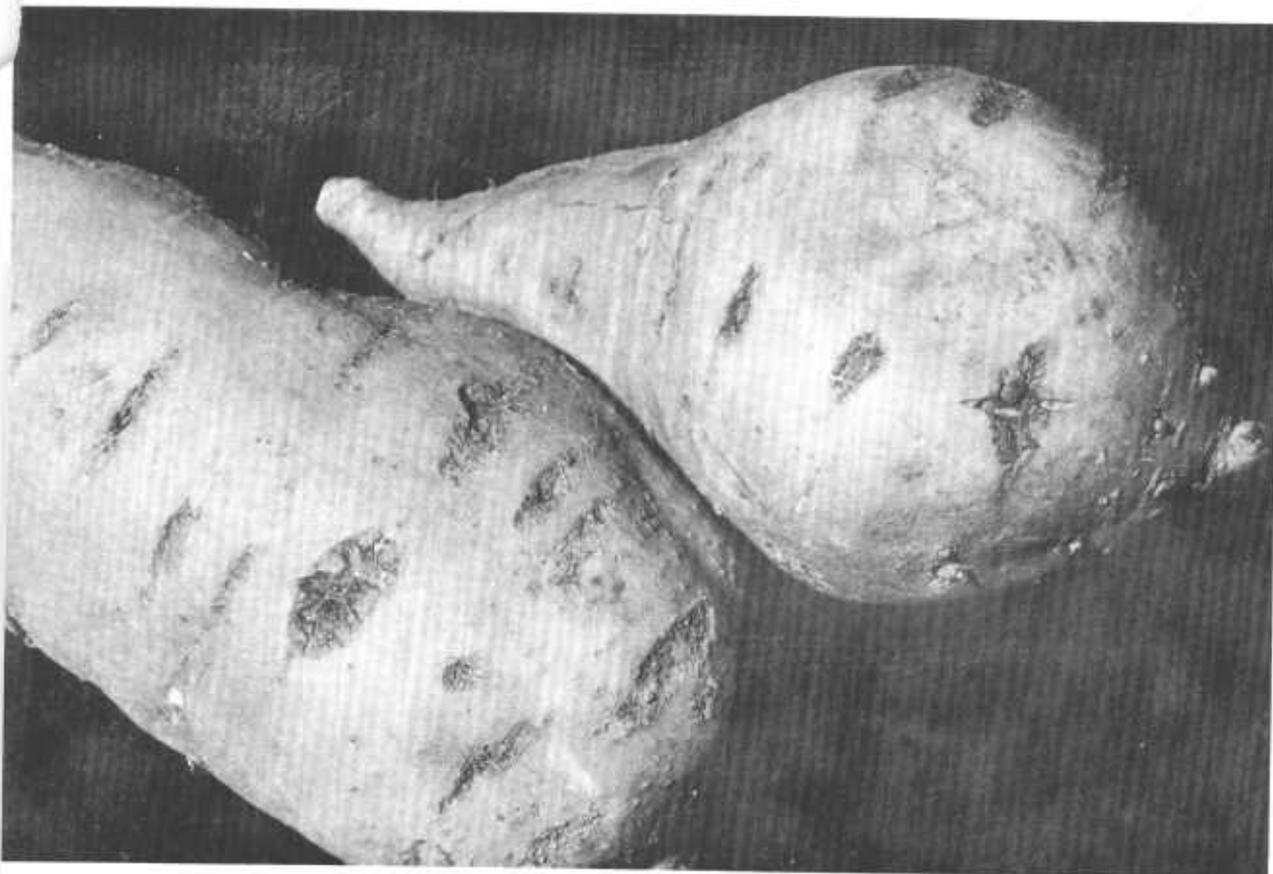
Sweetpotatoes are subject to certain types of scarring that may be mistakenly attributed to insect feeding. Perhaps the commonest of these is injury resulting from decay organisms attacking the lateral root scars (fig. 48). This injury usually consists of shallow oval areas of darkened scar tissue arranged in longitudinal rows on the roots.

Rodents frequently feed on sweetpotatoes in the field. The injury they cause can be easily

recognized by the large amount of root consumed and by their teeth marks (fig. 49).

Enlarged lenticils (fig. 50), a physiological condition caused by periods of excessive soil moisture, is sometimes confused with insect injury.

Root-knot nematodes frequently injure sweetpotatoes by causing cracking and malformation of the fleshy roots. The presence of nematodes is usually revealed by isolated darkened galls in the flesh of the roots (fig. 51).



TC-7610

FIGURE 48.—Injury to sweetpotatoes caused by decay organisms attacking lateral root scars. ($\times 1$)

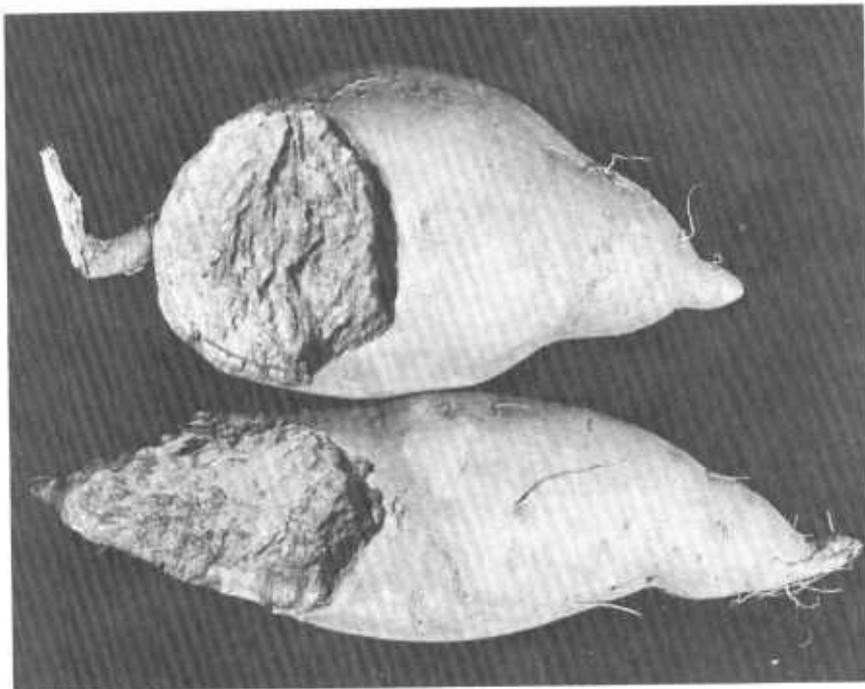


FIGURE 49.—Injury to sweetpotatoes by rodents. ($\times \frac{1}{2}$)

TC-7611

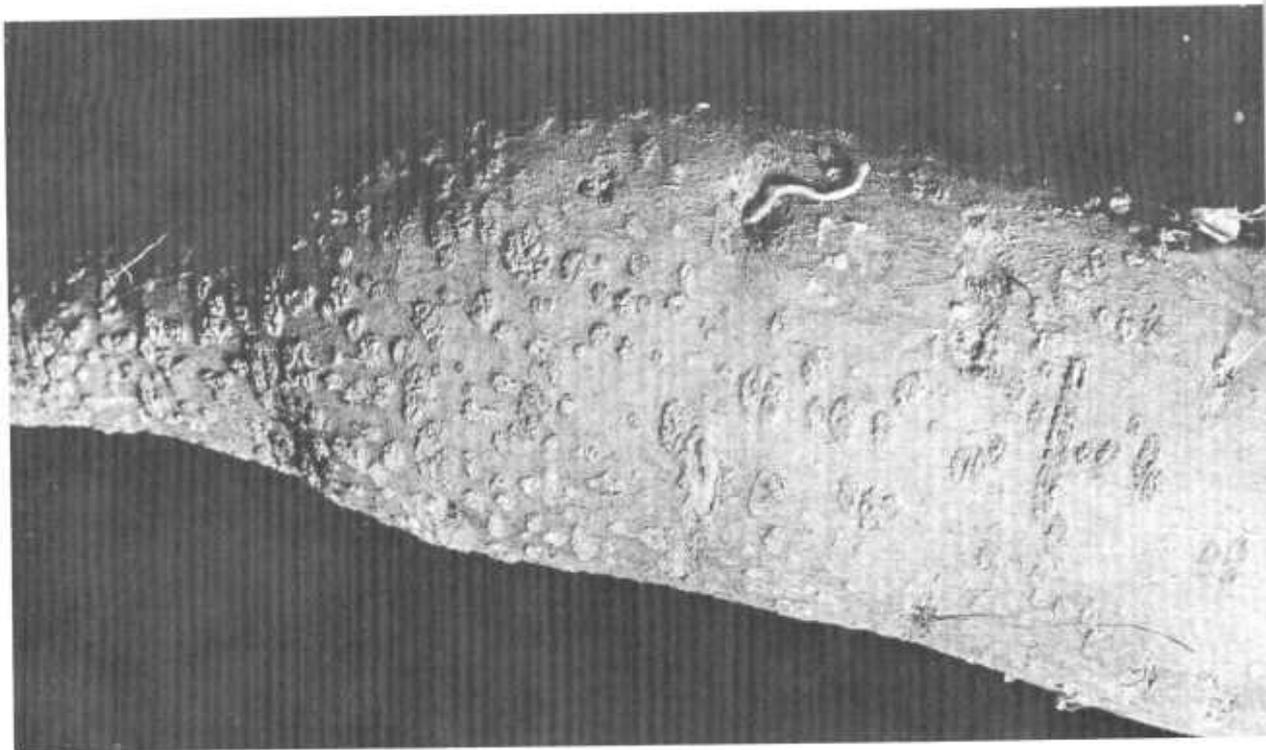
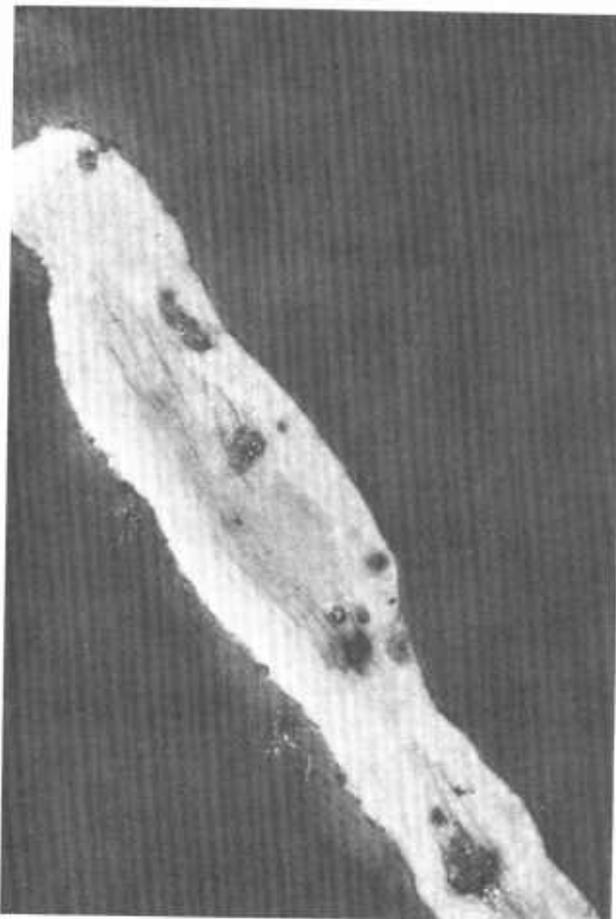


FIGURE 50.—Enlarged lenticils on sweetpotato. ($\times 1$)

TC-7611



TC-7613

FIGURE 51.—Nematode galls in the flesh of sweetpotato.
(× 2)

LIST OF INSECTS THAT ATTACK SWEETPOTATOES

<i>Scientific name</i>	<i>Common name</i>	<i>Scientific name</i>	<i>Common name</i>
Cerambycid-----	Longhorn beetles.	<i>Euzophora semifuneralis</i>	
<i>Chaetocnema confinis</i> Crotch--	Sweetpotato flea beetle.	(Walker) -----	American plum borer.
<i>Conoderus amplicollis</i> (Gyllenhal) -----	Gulf wireworm.	<i>Melanotus communis</i> (Gyll.)--	A wireworm.
<i>Conoderus falli</i> Lane-----	Southern potato wireworm.	<i>Metriona</i> spp-----	Tortoise beetles.
<i>Conoderus vespertinus</i> (Fabricius) -----	Tobacco wireworm.	<i>Notoxus calcaratus</i> Horn-----	An antlike flower beetle.
<i>Cylas formicarius elegantulus</i> (Summers) -----	Sweetpotato weevil.	<i>Peridroma saucia</i> (Hübner) --	Variegated cutworm.
<i>Diabrotica balteata</i> LeConte--	Banded cucumber beetle.	<i>Plectris aliena</i> Chapin-----	A grub.
<i>Diabrotica undecimpunctata howardi</i> Barber-----	Spotted cucumber beetle.	Scolytid -----	Ambrosia beetles.
		<i>Systema blanda</i> Melsheimer--	Pale-striped flea beetle.
		<i>Systema elongata</i> (Fabricius) --	Elongate flea beetle.
		<i>Systema frontalis</i> Fabricius--	A flea beetle.
		<i>Typophorus nigrinus viridicyaneus</i> (Crotch)-----	Sweetpotato leaf beetle.

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