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Insects Attacking Forage Crops

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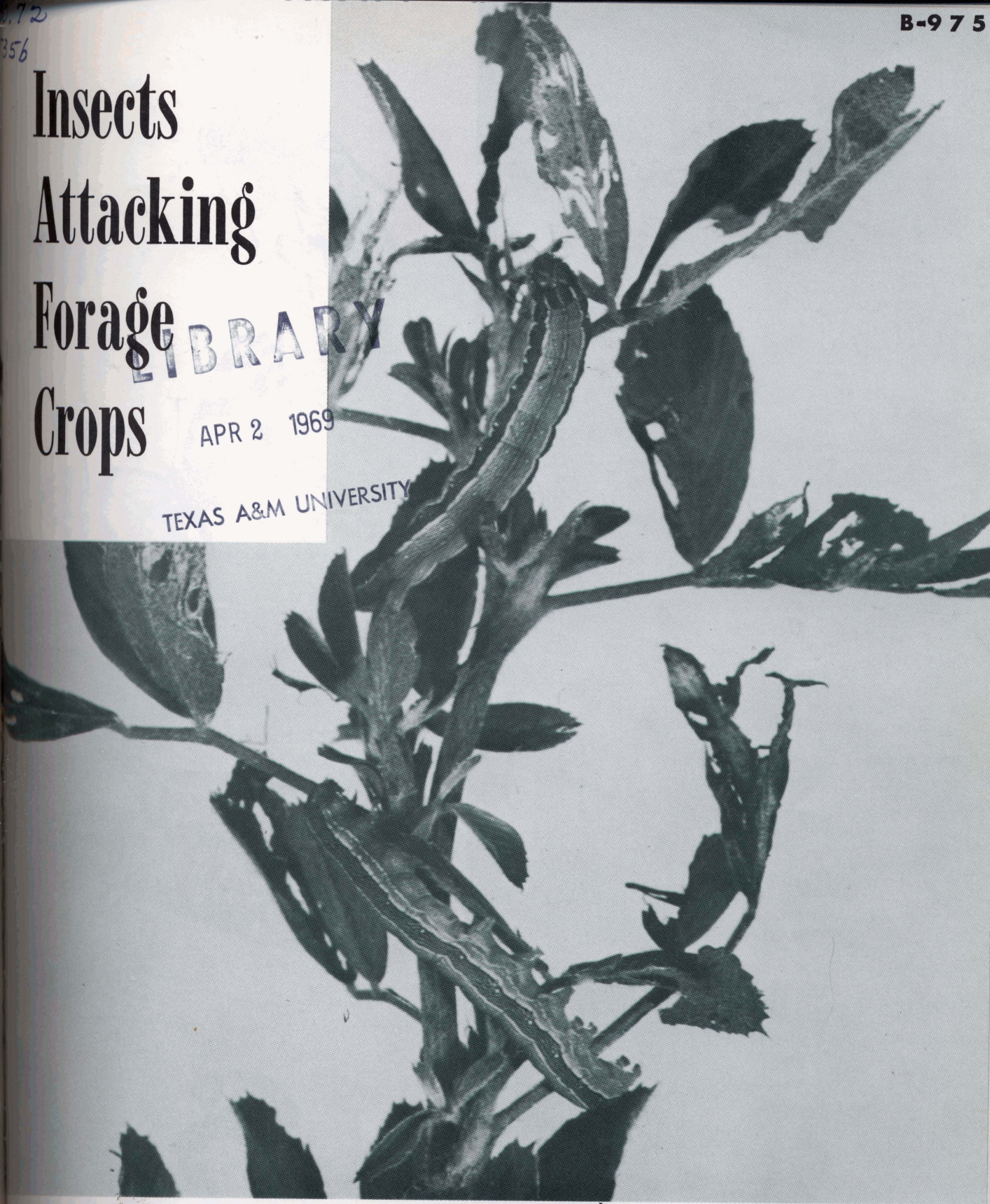

THE AGRICULTURAL AND MECHANICAL COLLEGE OF TEXAS
TEXAS AGRICULTURAL EXTENSION SERVICE

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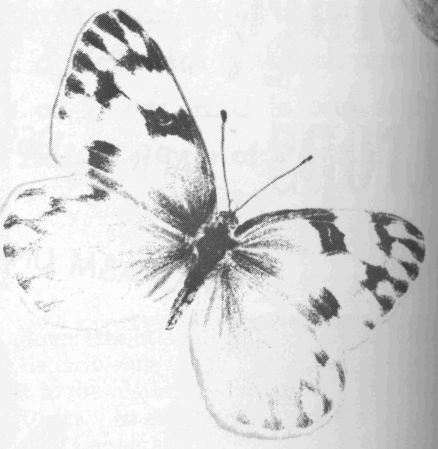

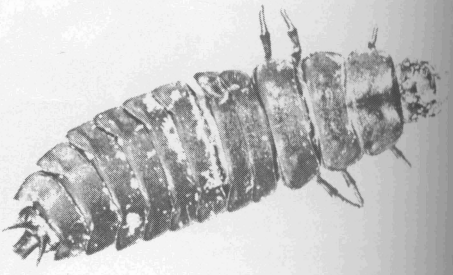

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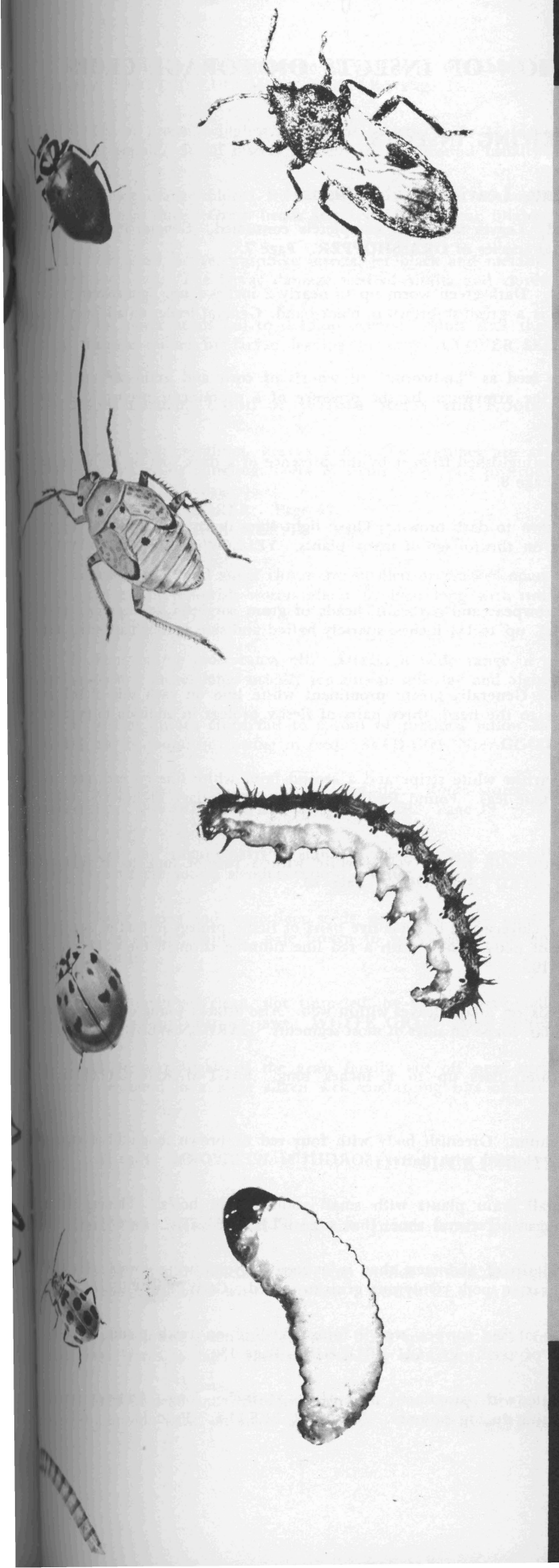

Insects Attacking Forage Crops

FOR MANY YEARS cultural practices were the main methods to prevent or reduce infestations of forage crop pests. Measures such as destruction of crop residues and volunteer plants, variation in time of planting or harvesting and crop rotation, added little or no cost to the production of these crops. Insecticides had to be low in cost because forage crops generally were of such low value per acre that expensive methods of control were impractical.

More recently, increases in yields and market value of forage crops have encouraged greater expenditures for insect control. Also, more efficient insecticides and application equipment than formerly were available have been developed. However, cultural control practices continue to be invaluable in controlling or mitigating infestations of certain insects on some crops. Grain sorghums planted during late February or March on the Gulf Coast of Texas may be past the blooming stage before many adults of the sorghum midge have emerged to infest the plants. Moderately late plantings of corn are damaged less than early plantings by the corn rootworm and budworm. Most insects attacking forage crops, however, require chemical control practices. Frequent outbreaks of mites, aphids, caterpillars and other insects may destroy a forage crop within a few days. Acreage planted to such crops and their value are increasing annually. Generally, the greater the acreage the more concentrated insect damage will be. For specific control measures of forage insects, see Extension Service publication MP-339, Texas Guide for Controlling Insects on Corn, Sorghum, Small Grains and Grasses.

FIELD KEY FOR IDENTIFICATION OF INSECTS ON FORAGE CROPS

I. CHEWING INSECTS

A. Insects Eating Foliage and Fruits of Plants, Leaving Visible Signs.

1. Early damage noticeable along margin of field. Leaves ragged or completely consumed. General feeders on corn, grain sorghum, small grains, grasses and legumes. Several species of GRASSHOPPER. Page 7.

2. Leaves with irregular holes with ragged edges. Dark green worm up to nearly 2 inches long; light-colored, broken line down middle of back and on each side of this line is a greenish-brown to black band. General feeder on all forage crops. ARMYWORM. Page 7.

3. Holes eaten in leaves have smooth edges; also feed as "budworms" in whorls of corn and grain sorghum. Full-grown worms about 1½ inches long. Distinguish from the armyworm by the presence of a prominent inverted Y on front of head. FALL ARMYWORM. Page 7.

4. Very similar to fall armyworm but may be distinguished from it by the presence of a dark spot on the upper area of the middle thoracic segment. BEET ARMYWORM. Page 8.

5. Mature larva 1½ to 1¾ inches long; light brown to dark brown. Three light lines down back with a double row of triangular dark spots between the outer lines. Feeds on the foliage of many plants. YELLOW-STRIPED ARMYWORM. Page 9.

6. Foliage of alfalfa, clover, vetch and pods of cowpeas and soybeans, heads of grain sorghum and ears of corn are eaten by brownish to green caterpillar, (color is variable) up to 1¾ inches; sparsely haired and skin is rough-appearing under a magnifying lens. CORN EARWORM. Page 9.

7. Looping worms feeding primarily on legumes. Generally green; prominent white line on each side of body and two other white lines near middle of back. Body tapers to the head; three pairs of fleshy prolegs in addition to three pairs of true legs. CABBAGE LOOPERS. Page 10.

8. Light-green worm up to 1¼ inches, with a narrow white stripe and a second faint white line on each side. Four pairs of fleshy prolegs in addition to three pairs slender true legs. Found feeding primarily on foliage of legumes. GREEN CLOVERWORM. Page 10.

9. Pale gray to dark-brown larva, mottled slightly with red to yellow-white with a row of four to six light spots down middle of back; up to two inches long. VARIEGATED CUTWORM. Page 10.

10. Primarily a pest of alfalfa. Similar to green cloverworm but has five pairs of fleshy prolegs instead of four. Dark-green pubescent worm with a white band on each side of body usually with a red line running through the white band; up to 1¼ inches long. ALFALFA CATERPILLAR. Page 10.

11. Yellowish-green worms up to 1 inch long, feeds on alfalfa leaves within web. Also attacks young corn and sorghum plants near ground. Have three dark spots in triangular shape on sides of most segments. GARDEN WEBWORM. Page 11.

12. Foliage devoured by very hairy or wooly caterpillars up to 2 inches long. SALT-MARSH CATERPILLAR. Page 11.

13. Feeding on kernels inside head of grain sorghum. Greenish body with four red or brown longitudinal stripes on back. Flattened body up to ½ inch long and thickly clothed with hairs. SORGHUM WEBWORM. Page 12.

14. Leaves of young corn, grain sorghum and small grain plants with small round "shot holes." Shining black or greenish-black jumping beetles from the size of a pinhead to several times that size. FLEA BEETLE. Page 12.

15. Beetle 1/5 inch long with two black spots on tip of abdomen that is exposed beyond wing covers. The white, nearly footless grubs may be found in developing cowpeas in pod. Only one grub to a seed. COWPEA WEEVIL. Page 13.

16. A small dark-colored beetle about ½ the size of the cowpea weevil found feeding on vetch plants. More of a pest to vetch seed. Adults emerge following maturity of seed. VETCH BRUCHID. Page 13.

17. Long, cylindrical, black, gray or striped beetle with prominent neck ½ to ¾ inches long. Abdomen protrudes beyond wing covers. Feeds on leaves, especially, of alfalfa during summer. BLISTER BEETLE. Page 13.

18. A greenish or yellowish beetle 1/4 inch long, with black spots on wing covers. Eats irregular holes in leaves of many crops. SPOTTED CUCUMBER BEETLE. Page 14.

19. Red or brown, wingless or winged insects, 1/8 to 3/8 inches long, abdomen is joined to the thorax (middle body) by a slender petiole. Social insects in dens in the ground usually construct noticeable mounds. ANT. Page 14.

20. Minute orange-colored flies with robust bodies noticeable during early morning in and around grain sorghum head about bloom stage. Grain heads attacked later appear blighted or blasted. SORGHUM MIDGE. Page 15.

21. Very small, active, wasp-like insects, jet black and metallic in color. Not detectable unless collected by use of a fine-mesh sweep net. The larvae damage seed of alfalfa and clover. CLOVER SEED CHALCID. Page 16.

22. Red clover heads fail to develop evenly. Adult flies the shape of mosquitoes but much smaller, occur in late spring. Damage caused by larvae feeding in seed. CLOVER SEED MIDGE. Page 16.

B. Insects Feeding Upon or Within Stems and Roots of Plants

1. Corn, grain sorghum, grasses and a few legumes are attacked. Usually plants are twisted and stunted; leaves often ragged, broken or dangling; holes in stems with frass protruding. SOUTHWESTERN CORN BORER. Page 16.
SUGARCANE BORER. Page 16.
LESSER CORNSTALK BORER. Page 17.
SUGARCANE ROOTSTOCK WEEVIL. Page 17.

2. Stems of red and sweet clover are swollen or cracked open, with pith eaten out. Stems sometimes break off. Larvae in stems are smooth yellowish worms about 1/2 inch long with two curved hooks at the posterior end of the body. CLOVER STEM BORER. Page 17.

3. Stems and/or roots eaten off. Attacks a wide range of plants. Plump, smooth appearing, of several shades and markings; up to 2 inches long; usually remains in soil day and nights; curls the body when disturbed. CUTWORM. Page 17.

4. Seed of various crops fail to sprout or produce yellow sickly seedlings. Dirty, yellowish-white legless maggots 1/4 inch long may be found burrowing in seed. SEED-CORN MAGGOT. Page 18.

5. Clover plants turn brown, wilt and die. Roots scored on surface; tunneled through. Injury most common in old stands of clover. SWEET CLOVER ROOT BORER. Page 19.

6. Roots and ground parts of stalks of several crops, especially corn, eaten off or containing small brown tunnels in which sometimes are found slender yellowish-white worms about 1/2 inch long. SOUTHERN CORN ROOTWORM. Page 19.

7. Young plants and sometimes seeds, especially corn, small grain and grain sorghum, killed out over irregular areas of the field by slender, shining, pale brown to yellowish larvae up to 2 inches long. WIREWORM AND FALSE WIREWORM. Page 19.

8. Roots eaten off clean, not tunneled, by white, curve-bodied or U-shaped, 6 legged grubs, 1/2 to 1 inch long, with large brown heads and distinct jaws. WHITE GRUB (May Beetles). Page 19.

9. Plants, particularly of the grass family, cut off near surface of soil similar to that caused by cutworms, but the worm will be found in a loose silken web containing bits of dirt. SOD WEBWORM. Page 20.

II. SUCKING INSECTS

A. Insects and Mites That Suck the Juices from Foliage, Fruits and Stems, Causing Discoloration

1. Masses of soft-bodied, bluish-green aphids within leaf whorls or in developing tassels of corn and heads of small grain sorghum. Associated with honeydew. CORN LEAF APHID. Page 20.

2. Pale yellowish-green aphids, with black spots on back, feeding on stems and underneath leaves of alfalfa often causing lower leaves to fall. Honeydew usually abundant. SPOTTED ALFALFA APHID. Page 20.

3. Areas of dead and whitened plants in small grain fields, especially during cool weather. Small, pale-green aphid, with dark stripe on back, on stems and leaves. GREENBUG. Page 21.

4. Green to light green long-legged insect about 1/6 inch long infesting many types of leguminous plants. This is one of the larger species of aphids occurring on legume crops. PEA APHID. Page 21.

5. Spiney grayish-brown nymphs and green adults on stems of various legumes, especially alfalfa. Adults, 1/5 inch long, have yellowish-orange lines from head and converging along the back into a Y-shape; girdled stems. THREE CORNERED ALFALFA HOPPER. Page 21.

6. Greenish to yellowish-brown, flatlike bugs, about 1/5 to ¼ inch long, causing blasted buds, flower drop and shriveled seeds of alfalfa and other legumes. LYGUS BUG. Page 22.

7. Slender, flat-backed brown bug about ¾ inch long. The tibae of hind legs expanded like a leaf. Transverse yellow line across wing covers. Attack grain sorghum and field peas. LEAF-FOOTED BUG. Page 22.

8. Very minute slender, yellowish to brown bodied, bristly winged insects 1/25 to 1/5 inch long. Commonly found in flowers of legumes. THRIPS. Page 22.

9. Shield-shaped, bad smelling, flattened bugs, ¼ to 3/5 inch long. Adults vary in color and size according to species. Young usually with contrasting color markings. Important pest on legumes but may damage a wide range of plants. STINK BUG. Page 22.

10. Patches of young small grain, grain sorghum and corn wilting usually in parts of field where stands are thin and on poor soil. Great numbers of small, reddish-brown or black-and-white bugs cluster on lower portion of plants. CHINCH BUG. Page 23.

11. Insects on grain sorghum which resemble chinch bugs but their color is grayish to dark brown. Insects congregate on heads. FALSE CHINCH BUG. Page 23.

12. Elongate, active, wedge-shape bugs (usually ¼ inch or less) feeding underside of leaves, which become mottled. Pests primarily of legumes. LEAFHOPPER. Page 23.

13. Small grain, grasses and legumes are attacked by mites causing mottled discoloration of leaves. They are very small (1/25 inch or less) and vary in color (metallic dark brown, reddish, yellowish, etc.) according to species. Some spin webs. MITE. Page 24.

III. BENEFICIAL INSECTS

A. Predaceous Insects. Page 24

B. Parasites. Page 25

C. Bees. Page 26

Chewing Insects

INSECTS EATING FOLIAGE AND FRUITS

Grasshoppers

These insects feed on a wide range of crops. Of the approximately 600 species that occur in the United States, only a few are of economic importance. Most species of grasshoppers pass the winter in the egg stage. The eggs are laid during summer and fall in packet-like masses below the surface of the soil of pasture land, field margins and roadsides. The eggs hatch into small nymphs in April, May and June. The exact time and percentage of eggs hatching depend on weather conditions and locality. For detailed information on grasshoppers, see Extension Service Leaflet, L-429, Grasshoppers Common to Texas.

Armyworm, *Pseudaletia unipuncta* (Haw.)

PLANTS ATTACKED: All forage crops.

DESCRIPTION: Adult. Pale-brown or brownish-gray with a wing expanse of about 1½ inches. There is a small but prominent white dot near the center of each forewing.

Larva. The young worms are pale green and have looping habits; older worms do not loop while crawling. The mature larva is about 1½ inches long, greenish brown and has three stripes on each side of the body. The upper stripe is pale orange, the middle one is dark brown, and the bottom stripe is pale yellow. The worm has a smooth skin, honeycombed head, three pairs of true legs and five pairs of prolegs.

LIFE HISTORY: These insects usually pass the winter as larvae in the soil about clumps of grasses. After a short period of feeding in the early spring, they pupate in the soil and moths emerge from the pupal cases about 2 weeks later. The moths remain hidden during the day but are active at night and are attracted to lights. The females lay greenish-white eggs in long rows or clusters on the lower leaves of the host plants, but they frequently are deposited on clothes hung to dry. Each mass is composed of about 50 eggs. Each cluster of eggs is covered with a white adhesive fluid which fastens them together and draws the edges of the leaf. Eggs hatch in 3 to 14 days, depending upon the prevailing temperatures. The larval period

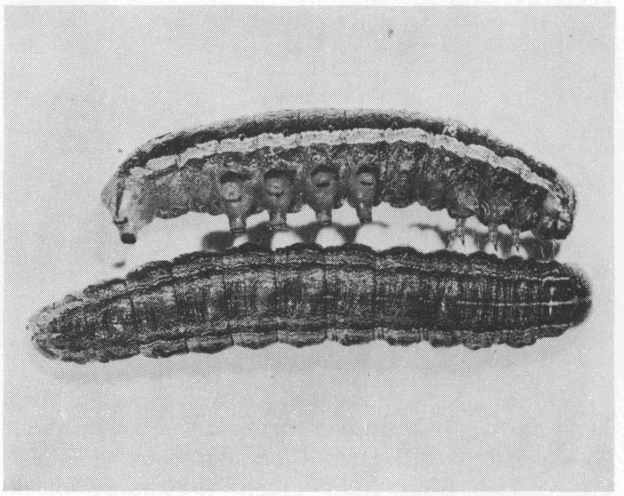

Fig. 1. Armyworm larvae.

extends usually from 20 to 30 days. There are 3 to 5 generations per year.

DAMAGE: The newly hatched larva begins feeding immediately upon foliage, eating the epidermis at first and causing a skeletonized appearance. Older larvae straddle the outer margins of the leaves, especially grass blades, and cut holes reaching to midrib. They often cut the heads off of small grain plants. Although the insects prefer grass crops, they also feed on legumes. After devouring the food supply in an area where they hatched, the larvae move in armies to nearby fields. Usually, most damage to field crops is caused during the spring by first generation larvae.

Fall Armyworm, *Laphygma frugiperda* (J. E. Smith)

PLANTS ATTACKED: Grass crops, such as corn, small grains, grain sorghum and native grasses, and some legumes, especially alfalfa and peanuts.

DESCRIPTION: Adult. The moth is about ¾ inch long and approximately 1½ inches across its outspread wings. The forewings of the male are grayish and have a mottled appearance, with an irregular white spot near the tip. The female's forewings usually are duller than those of the male. The hind wings of both sexes have a pinkish-white luster, bordered by a smoky-brown band.

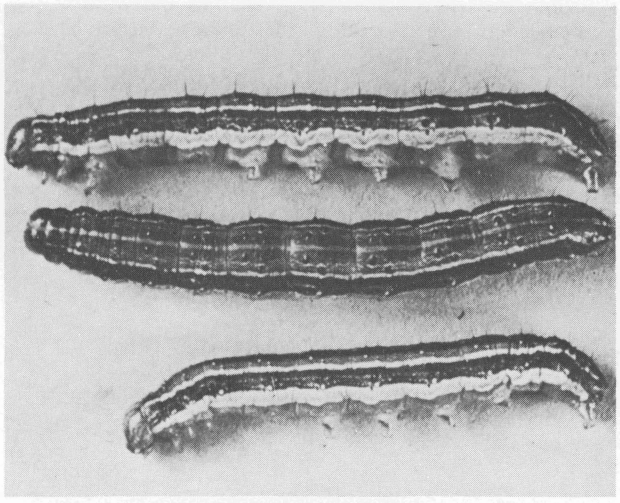

Fig. 2. Fall armyworm caterpillars.

Larva. Newly hatched larva has a jet black head and light body but turns darker when about 3 days old. A fully grown larva is about 1⅛ inches and varies from light green to almost black. The front of the head is marked with an inverted Y that usually is prominent but this character does not always serve as a reliable means of identification. The larva has three yellowish-white lines down the back from the head to tail: on each side next to each outer dorsal line is a wider dark stripe below which is an equally wide, wavy, yellow stripe, splotched with red.

LIFE HISTORY: The moth lays eggs at night in clusters of 50 to several hundred, preferably on blades of grass and frequently on lawn grass. The eggs hatch in 2 to 4 days. The larva becomes full grown in 2 to 3 weeks at which time it burrows into the soil 1 to 2 inches and pupates, where it remains for about 8 to 10 days and emerges as an adult. The biology of this insect is similar in many respects to that of the cotton leafworm. It can, however, overwinter as an adult along the Gulf Coast of Texas and fly north in the spring. Cold weather is unfavorable to the production of many insect enemies of the worm and, the abundance of moisture provides conditions for luxuriant plant growth, upon which the larvae thrive. Outbreaks of the fall armyworm usually follow wet seasons, especially during the summer and early fall. There may be five to ten generations annually.

DAMAGE: The tiny larva begins feeding immediately after hatching on the shell of the egg from which it hatched, but soon attacks plants near the surface of the soil. The larvae grow rapidly and within 2 or 3 days begin to devour the plants. They frequently do considerable damage to ears of corn, similar to that caused by corn earworms. These worms also feed as "budworms" in the whorls of grain sorghum and corn. The unfolding leaves from the whorls of such crops attacked are perforated with holes caused by the feeding of the fall armyworm. Like the armyworm, they move in armies to other fields after devouring plants in the area where they hatched.

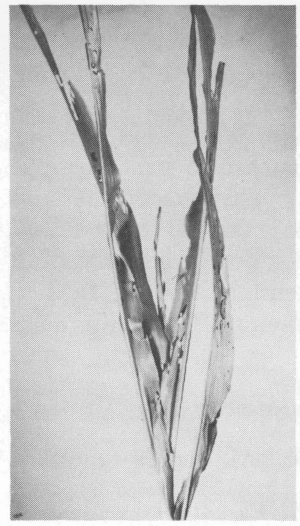

Fig. 3. Characteristic damage of the fall armyworm.

Beet Armyworm, *Spodoptera exigua* (Hbn.)

The beet armyworm is closely related to the fall armyworm and has similar habits. It commonly attacks corn, grain sorghum, cotton, castor beans, alfalfa, vetch and clover. The larva is striped, about 1¼ inches long, and varies from light brown to almost black. Perhaps the most distinguishing characteristic is the presence of a dark spot on the upper area of the middle thoracic segment.

Fig. 4. Beet armyworm larvae on alfalfa.

Yellow-striped Armyworm,
Prodenia ornithogalli (Guen.)

PLANTS ATTACKED: Corn, small grain and legumes.

DESCRIPTION: Adult. The moth has a wing-spread of about 2 inches. The front wings are dark gray to brown with zig-zag lines of light and dark areas. The hind wings are pearly white with dark margins.

Larva. The full-grown larva is 1½ to 1¾ inches long. It has a pair of dorsal, triangular, black spots on each of most of the segments. There are three lines on the back; an outer bright orange stripe on each side and a median yellowish white line.

LIFE HISTORY: The female deposits eggs in masses on foliage of many plants, including trees, or on buildings, and the moth covers the egg masses with scales from her body. There are two to four generations a year. Winter is spent in the pupal stage in the soil.

DAMAGE: The larvae generally are day feeders on foliage of forage plants. They are solitary feeders, but otherwise their habits are similar to armyworms.

Corn Earworm, *Heliothis zea* (Boddie)

(Also known as cotton bollworm and tomato fruitworm)

PLANTS ATTACKED: General feeder; corn, grain sorghum and legumes.

DESCRIPTION: Adult. The moth varies in color but generally the front wings are a light grayish-brown, marked with dark-gray to olive-green irregular lines and each has a dark area near the tip. The hind wings are light with more or less wavy dark bands, especially near the extremities. The moths have a wing expanse of about 1½ inches.

Larva. The general color of this worm varies from light green or pink to brown or nearly black. Alternating longitudinal dark and light stripes mark its body but the colors are so variable that such characters are not dependable for identification purposes. The presence of short microspines (visible through a hand lens) on the skin, of abdominal segments, and its feeding habit are very useful characteristics for separating these from similar worms.

LIFE HISTORY: The corn earworm spends the winter as a pupa 2 to 6 inches below the soil surface. It emerges as a moth during the spring and early summer and soon deposits its eggs. Freshly laid eggs are waxy white but soon change to yellow. They are about half the size of a pin head, and are hemispherical with ridges along their sides. A female oviposits 500 to 3,000 eggs, singly on foliage and fruits of many plants. Fresh corn silk is one of the favorite places for egglaying but eggs are commonly deposited in the curl of young corn and grain sorghum plants. Later in the season, grain sorghum heads are preferred. During warm temperatures, eggs hatch in 2 to 4 days, but it may take up to 10 days under cold weather conditions. The worm stage lasts from 2 to 4 weeks. The full-grown larva crawls down the host plant or drops to the ground into which it burrows, forms a walled cell and pupates. The adult or moth emerges 10 to 25 days following pupation. The time required from egg to adult varies from 1 to 2 months depending upon weather conditions. Four to seven generations occur annually in the southern states.

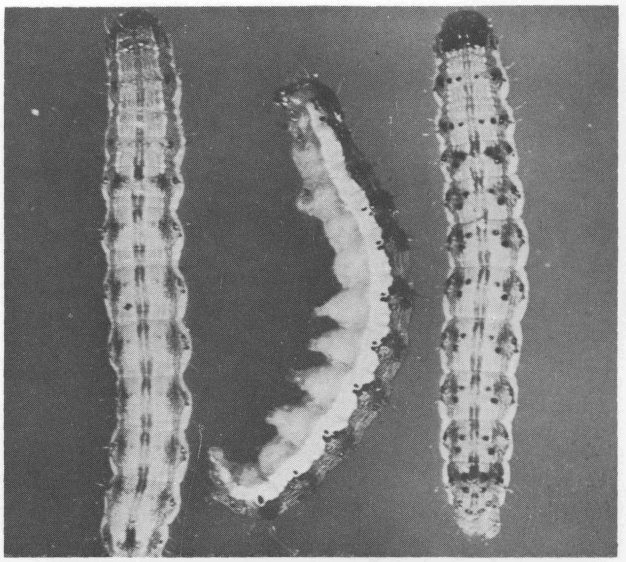

Fig. 5. Corn earworm larvae.

DAMAGE: The newly hatched larva begins feeding almost immediately on that part of the plant upon which the eggs were laid. On corn silk, the worm makes its way to the developing grains which they consume. Here the larva frequently is referred to as the "roasting earworm." It also feeds in the whorls of young grain sorghum and corn plants but usually is not considered of economic importance. The worms cause considerable damage to grain sorghum heads, but they are cannibalistic and usually only one larva will reach the full-grown stage in each head as well as in each "roasting ear" of corn.

Cabbage Looper, *Trichoplusia ni* (Hbn.)

PLANTS ATTACKED: Legume crops.

DESCRIPTION: Adult. A grayish-brown moth with a wing-spread of about 1½ inches. Each front wing has a silvery spot resembling a figure 8 near the middle.

Larva. The looping caterpillar is green and has a noticeable white line on each side of its body. It has three pairs of fleshy prolegs. The overall length of a mature worm is slightly more than 1 inch. The body is smooth and tapers from the tail to the head.

LIFE HISTORY: Many small, round, greenish-white eggs are laid singly on the upper surface of young and tender foliage. The egg superficially resembles the corn earworm egg. The larva feeds on the foliage for 2 to 4 weeks and then spins a flimsy cocoon, usually on the lower leaf surface of the host plant, in which it pupates. The cocoon is so thin that the pupa can be seen inside. This stage lasts about 2 weeks. Usually there are more than four generations in the South.

DAMAGE: The worms feed on the undersides of leaves, producing ragged holes. With the exception of occasional outbreaks, this insect is not considered a serious pest on forage crops in general.

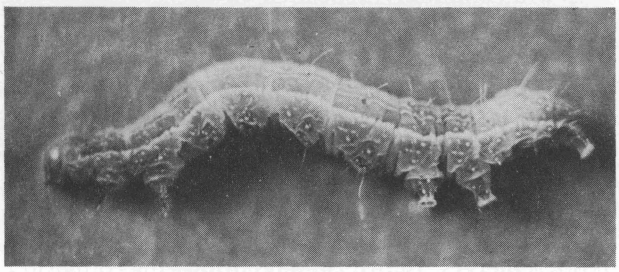

Fig. 6. Cabbage looper.

Green Cloverworm, *Plathypena scabra* (F.)

The larva of this insect often is found in alfalfa, vetch, clovers, and other legumes but the degree of economic importance is questionable. This pest occasionally rags the leaves of its host plants but seldom reduces the yield of the crop materially.

Variegated Cutworm,
***Peridroma saucia* (Hubner)**

This insect feeds on legumes and, to some extent, on corn and other crops of the grass family. This worm commonly is referred to as the climbing cutworm. It frequently damages vetch severely. The mature larva is pale yellow or brown and is about 2 inches long. Well-marked characteristics are the presence of a row of four to six dull yellow or pink diamond-shaped spots on its back and a crudely shaped black "W" on the top of the last abdominal segment. In most parts of Texas the insect survives the winter in the larval stage. The number of generations vary, but most of the damage is caused by a generation that occurs during the April-June period.

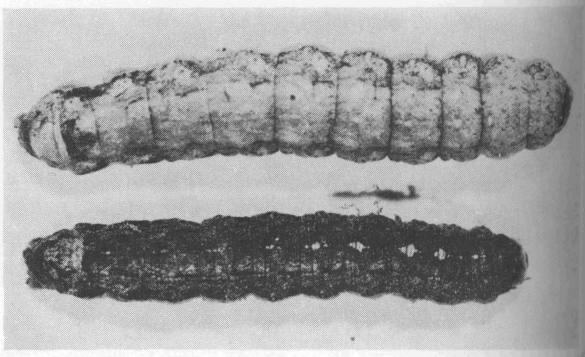

Fig. 7. Variegated cutworm larvae. Left, dark phase; right, light phase.

Alfalfa Caterpillar,
***Colias philodice eurytheme* (Latr.)**

PLANTS ATTACKED: General feeder on all legumes.

DESCRIPTION: Adult. The butterfly has a wing-spread of about 2 inches. Each wing is yellow, bordered by black. Yellow spots in this border distinguish the female from the male.

Larva. The full-grown larva is about 1½ inches long. Its body is grass-green and usually has a fine white stripe on each side through which passes a red line.

LIFE HISTORY: This insect may spend the winter in the pupal stage on the plant; however, the larva may be found throughout the year in extreme southern regions of Texas. The female lays 200 or more eggs, which she deposits singly on the undersides of leaves. Eggs hatch into worms which are black at first but soon become green. The larva reaches maturity within about 2 weeks and changes to a pupa without spinning a cocoon. The pupa attaches itself to a plant stem by its narrow tail end and then throws a loop of silk about its body and over the stem by which it holds the head upright. It remains in the pupal stage for 5 to 7 days. There may be as many as seven generations a year.

DAMAGE: The larvae feed at first by eating small "shot-holes" in the leaves but eventually may

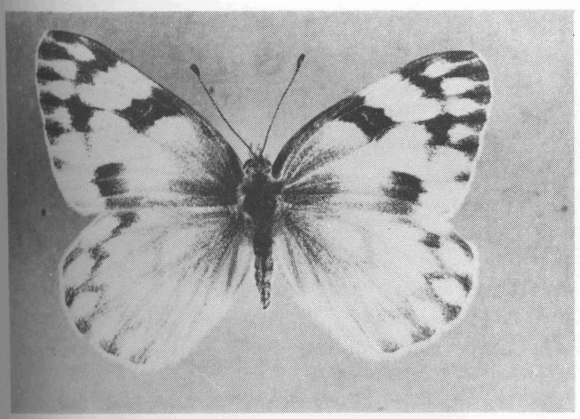

Fig. 8. Alfalfa caterpillar butterfly.

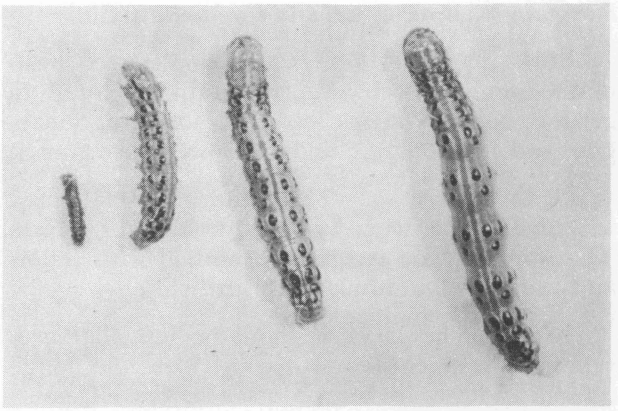

Fig. 9. Larvae of the garden webworm moth.

consume all the leaves and may feed on the stems of alfalfa and other legume plants.

Webworms

Garden Webworm, *Loxostege similalis* (Guen.)
Alfalfa Webworm, *Loxostege commixtalis* (Wlk.)
Beet Webworm, *Loxostege sticticalis* (L.)

PLANTS ATTACKED: Webworms are general feeders on alfalfa, clovers, cowpeas, peas and similar crops. They also feed on several species of weeds, especially pigweed.

DESCRIPTION: Adult. Garden webworm — This species probably is the most common webworm that attacks forage crops, and it is the only one described in this publication. The adult is buff with shadings and irregular marking of light and dark gray. It has a wing-spread of about ¾ inch. The moth is active primarily at night and is strongly attracted to lights. However, frequently it is noticeable in the field during the day, since when disturbed, it makes short flights of several yards and then alights in a hidden part of the foliage.

Larva. The larva is about 1 inch long, yellowish or greenish to almost black with a light stripe down the middle of the back. The presence of three dark spots forming a triangle on the side of each segment is a distinguishing characteristic of the larva.

LIFE HISTORY: The webworm passes the winter as a pupa or larva within a silk-lined cell in the soil or under plants fed upon by the fall generation. The moth emerges in the spring and lays eggs in masses of two to fifty, primarily on the leaves of the host plant. The egg hatches in 3 to 5 days and the larva begins feeding on the underside of the leaves. The worm matures in about 1 month and goes into the ground for pupation. Three to six generations occur annually.

DAMAGE: Cultivated crops frequently are attacked by these worms migrating from weeds which they have devoured. The larvae feed primarily on the underside of leaves, more or less skeletonizing them. They spin webs and draw other leaves within their webbing as additional food is needed. Flimsy webs near the plant terminals are noticeable in alfalfa infested with these insects.

Salt-marsh Caterpillar, *Estigmene acrea* (Drury)

The salt-marsh caterpillar frequently is a pest on forage crops such as small grain and alfalfa. The female deposits eggs in clusters on the underside of the leaves of the host plant. The caterpillar is clothed with long black, brownish or yellowish hairs and is often called "woolybear." The full-grown worm is about 2 inches long. Winter is passed either in the larval or pupal stage. There may be as many as four generations annually.

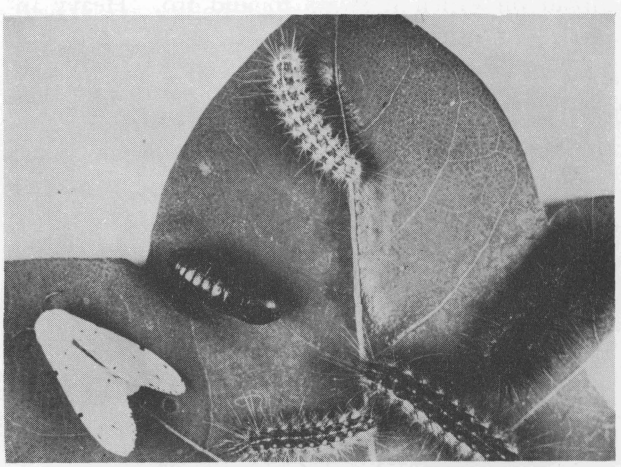

Fig. 10. Salt-marsh caterpillar (larvae, pupa and moth).

Sorghum Webworm, *Celama sorghiella* (Riley)

PLANTS ATTACKED: The preferred hosts of the sorghum webworm are grain sorghums in general, but they attack seed of broomcorn, Sudangrass and Johnsongrass, and probably native grasses.

DESCRIPTION: The moth is small and whitish, with a wing expanse of about ½ inch. The forewings are irregularly mottled with yellow and brown. The hind wings are white.

Larva. The larva is more or less flattened, yellowish or greenish and marked with four longitudinal reddish to black dorsal stripes. Densely spaced spines and long hairs cover the body. The mature larva is about ½ inch long.

LIFE HISTORY: The insect hibernates in the larval stage on the host plant. At the advent of cold weather, the larvae leave the sorghum grain head and crawl down the stalk to protected areas behind leaf sheaths which envelop portions of the stalk. These worms pupate the following spring and emerge as moths about 1 week later. They are active primarily at night and deposit their eggs singly on the flowering parts or seed of the host plant. A female lays 100 to 300 eggs which are white with a pale tinge when laid but soon change to yellow or brown. Eggs hatch in 3 to 6 days. The larvae mature in about 2 weeks. There may be as many as six generations annually.

DAMAGE: The larva begins to feed almost immediately following emergence from the egg. It gnaws circular holes through the outer tissues of the grain, and then feeds on the starchy contents of the seed which usually is only partly consumed. One larva has been observed to consume the greater part of more than a dozen seed within a 24-hour period. The worm does not spin a web but when disturbed or dislodged from the grain head, it often will suspend itself by a finely spun silken thread on which it sways to and fro. Heavy infestations of these worms destroy most of the grain of a sorghum head. Heavily damaged grain heads contain large masses of fecal material excreted by the larvae.

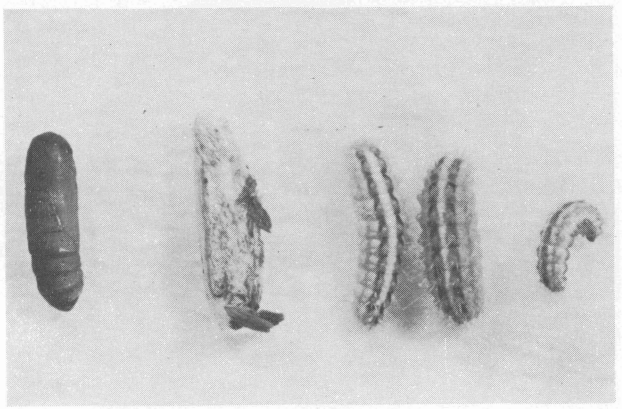

Fig. 11. Sorghum webworm. Left to right, pupa with case removed; pupa; 3 larvae.

Fig. 12. Sorghum webworm and damage to a grain sorghum head.

Flea Beetles

PLANTS ATTACKED: Corn, grain sorghum, small grain, broomcorn and several other crops.

DESCRIPTION: Adult. Many species of flea beetles attack forage crops. The overall color varies greatly according to the species. Some are uniformly pale brown to black, while others are yellow to almost black with broad white or yellow stripes. The femora of the hind legs are enlarged and used for jumping.

LIFE HISTORY: The insect passes the winter as an adult in areas along fence rows, roadsides, in trash and other debris affording protection from adverse weather conditions. It becomes active during the spring. After mating, the female deposits eggs on the leaves or in the ground about the roots of the host plant. The larva may cause some damage, but information pertaining to this stage is scant. Some species have only one generation while others may have two generations per year.

DAMAGE: The adults of the overwintering generation are especially injurious to young corn. They eat tiny holes in the leaves and the attacked plant soon becomes bleached. Growth of the plant is retarded greatly. Corn plants usually are fed on during the first 2 or 3 weeks following germination. Injury caused by these insects is severe during cold or wet seasons because the growth of the

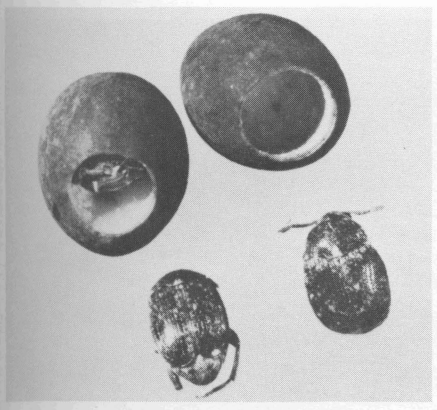

Fig. 13. Vetch seed showing emergence hole cut by adult weevils shown below.

plants is slow under such conditions, thus affording a long period for the flea beetles to feed on them. Flea beetles are also credited with the spread of bacterial wilt of corn.

Weevils

Pea weevil, *Bruchus pisorum* (L.)

This weevil is a pest of field and garden peas of the genus *Pisorum*. It feeds only on green peas in which the larva devours the inner content of the seed. The adult is gray or brownish gray, marked with black and white spots, and is about 1/5 inch long. The adult hibernates in the seed or in other protected areas. It emerges in the spring and migrates to the field and feeds upon pollen. The female deposits eggs on pea pods in all stages of development. There is only one generation per year.

Cowpea weevil, *Callosobruchus maculatus* (F.)

The cowpea weevil is a pest of field peas growing in fields as well as dry seed in storage. The adult is 1/8 to 1/5 inch long; is dark colored and has four pale brown spots on the wing covers. Like the pea weevil, the damage is caused by the grub-like larva. Reproduction may be continuous in peas stored under warm temperatures. There are several generations annually.

Bean weevil, *Acanthoscelides obtectus* (Say)

This brownish beetle is about 1/8 inch long. Its feeding habits and biology are similar to that of the cowpea weevil.

Vetch Bruchid, *Bruchus brachialis* (Fahr.)

PLANTS ATTACKED: Vetch.

DESCRIPTION: The chunky vetch bruchid or vetch weevil is about 1/8 inch long and is black with mottled markings of white and gray. The legless larva has a yellowish-white body and a black head and is found only inside the vetch seed.

LIFE HISTORY: The adult bruchid survives the winter in places affording protection from adverse weather conditions. It emerges in the spring and migrates to the vetch fields until peak populations are reached during April and May. The female deposits many eggs on the vetch pods which are glued to the surface of the pod with a sticky secretion. Upon hatching, the larva eats its way through the bottom of the egg shell, through the green hull and then into the immature seed inside the pod. The length of the larval stage is about 1 month. Only one weevil develops within a seed. The adult emerges through a circular hole previously made by the larva from the inside of the seed. There is only one generation per year.

DAMAGE: Adults feed upon developing buds and pollen of the vetch flowers, but the primary damage is caused by the larvae. They consume the content of the seed, often reducing production of seed 10 to 75 percent. Bruchids do not reproduce in stored vetch seed, although they may be found occasionally inside the seed hull.

Blister Beetles

PLANTS ATTACKED: Alfalfa, peas, soybeans, clovers, occasionally a few other field crops, and weeds.

DESCRIPTION: Several species of blister beetles are of economic importance. They range from 1/2 to 1 1/4 inches in length. Their bodies are cylindrical and relatively soft. Color and markings of the adult vary from gray, black or brown to striped or spotted forms with a combination of colors. The antennae are conspicuous, and the head is noticeably larger than the thorax. These insects are called "blister beetles" because their bodies contain a substance, cantharidin, a vesicant.

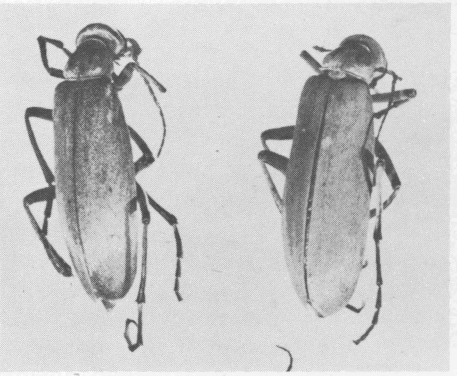

Fig. 14. Blister beetles.

Most of the larval stages are grub-like and have three pairs of legs.

LIFE HISTORY: The blister beetle passes the winter as a larva in the soil. After pupation it emerges as an adult during the late spring or summer. The female lays masses of 50 to 300 eggs in cavities prepared in the soil. The eggs hatch into very active larvae, in which stage some species remain in the soil for 1 to 2 years. Normally, there is only one generation per year.

DAMAGE: Adults frequently may be found in clusters on the tips of alfalfa and other host plants. They eat the flowers and foliage which results in ragged, stunted plants. The beetles may suddenly appear in mass in fields, having migrated like armyworms. The larvae of the common blister beetles feed upon and destroy many grasshopper egg pods.

Spotted Cucumber Beetle, *Diabrotica undecimpunctata howardi* Barber

The larva of this insect is more of an economic pest than is the adult and is discussed in detail on page 19.

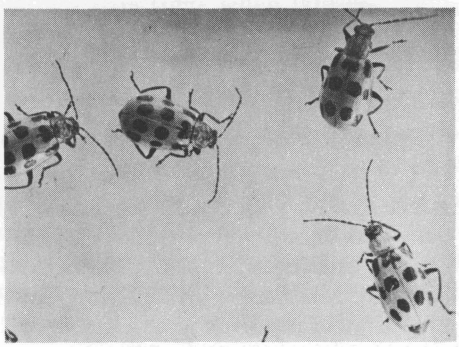

Fig. 15. Spotted cucumber beetles.

Texas Leaf-cutting Ant, *Atta texana* (Buckl.)

PLANTS ATTACKED: Field crops in general. These ants occur principally in the eastern part of Texas.

DESCRIPTION: The leaf-cutting ant is rusty brown. There are several castes or forms and vary considerably in size. The queen, the reproductive form, is approximately ¾ inch long. The worker ant, the form most commonly seen, ranges from ¼ to ½ inch in length. The colonies usually are found in well-drained sandy soils and may consist of a few mounds covering a small area to many mounds extending over several thousand square feet. A nest, the interior of the mound, consists of several chambers and may extend downward as far as 15 feet.

Fig. 16. Mounds of the Texas leaf-cutting ant.

LIFE HISTORY: Winged males and females develop in May and June, fly from their colony and mate. After mating, the females lose their wings, establish nests beneath the soil and become the queens of a new colony. They may continue reproduction within one nest for years. In such a case, they may build a nest 10 to 20 feet in size with numerous "craters," and each nest may contain many thousands of individuals.

DAMAGE: The worker ants are active from May to September. They forage during the night on field crops as well as many other plants. They often defoliate the plants, carrying the severed leaves to their nest. The leaves are used to maintain their "fungus garden" which eventually is used for food. Well-defined foraging trails that resemble miniature highways are established by the ants traveling to and from their nests to plants upon which they feed.

Texas Harvester Ant, *Pogonomyrmex barbatus* (Buckl.)

PLANTS ATTACKED: This ant attacks plants which produce small seed, such as alfalfa, clovers, Johnsongrass, rye and bermudagrass.

DESCRIPTION: The worker ant is reddish-brown and is ¼ to ½ inch long. The male and female are larger than the worker and are winged during the swarming season, but these two forms seldom are seen.

LIFE HISTORY: The eggs are laid in "ant nests" which are made up of chambers below the surface of the soil, and such areas are indicated by the presence of a barren mound. The diameter of the barren area depends upon the age and vigor of the colony, but usually it is from 3 to 35 feet. Swarming (the appearance of winged males and females) takes place during early summer when new colonies are established.

DAMAGE: Some damage is caused by the ants collecting seeds from plants near the ant "dens." However, the most important loss is the destruction of vegetations around the nests.

Imported Fire Ant, *Solenopsis saevissima richteri* Forel.

The "imported" fire ant is so named to distinguish it from other fire ants that are native to this country. Infestations of the imported fire ant have been found in several east and southeast counties in Texas.

The reddish to blackish red worker ant, which is one of three adult forms of this insect, is the most numerous. One mound or den may contain 25,000 workers. The worker ant is from 1/8 to 1/4 inch long. It forages on various pasture and cultivated plants.

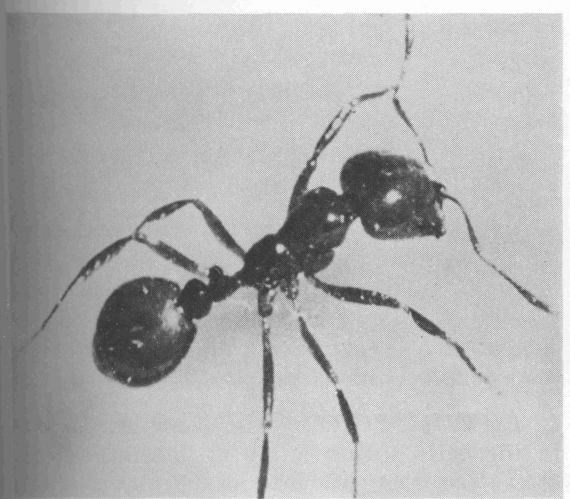

Fig. 17. Imported fire ant.

Mounds of this ant are most common in open areas in cultivated fields and pastures. The mounds, averaging 15 inches in diameter and 10 inches in height, often are obstacles to blades of machines in the process of harvesting a crop grown in ant-infested areas. The ant has a painful sting and often attacks young unprotected animals, such as newborn calves and pigs and newly hatched quail and poultry.

Sorghum Midge, *Contarinia sorghicola* (Coq.)

The sorghum midge is distributed over most of Texas, but its greatest injury to grain sorghum occurs in the more humid parts of the State. The adult midge is an orange fly, about 1/12 inch long. It overwinters as a larva within a cocoon in the spikelet or seed husk of Johnsongrass, Sudan-

Fig. 18. Sorghum midge adults.

grass, grain sorghum, broomcorn and probably some of the wild grasses. The larva pupates and the adult emerges in the spring about the time Johnsongrass begins to bloom. The female deposits eggs on the developing seed.

The first generation of the midge usually occurs on Johnsongrass, and the adults that develop in the Johnsongrass seed fly considerable distances to fields of grain sorghum at the time seed heads emerge from the boot. It requires 14 to 16 days for a complete life cycle. The adult usually is more noticeable during early morning when it crawls over the spikelets of developing grain heads. The female seldom lives more than a day during hot weather, and the life of the male is even shorter. The female deposits eggs in the spikelets soon after the heads appear from the boot and often, before bloom. Injury to sorghum grain is caused by the larva or maggot which feeds

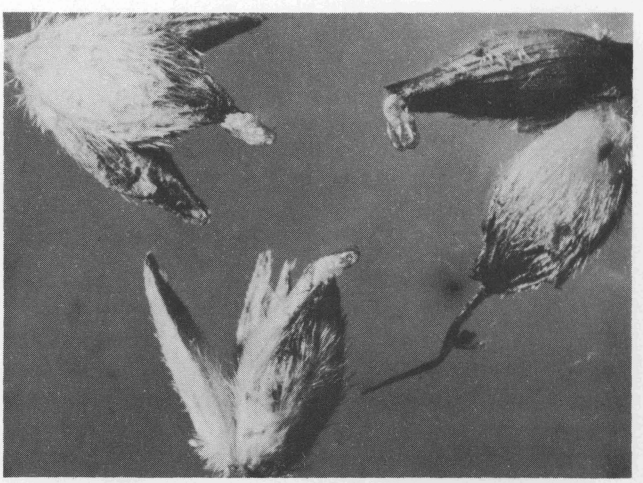

Fig. 19. Pupal cases on the tips of grain sorghum seed from which sorghum midges emerged.

on and consumes the internal content of the seed. Infested sorghum grain heads appear "blighted" or "blasted."

Clover Seed Chalcid,
***Bruchophagus gibbus* (Boheman)**

Clover Seed Midge,
***Dasyneura leguminicola* (Lintner)**

The larva of the clover seed chalcid feeds in the seed of all clovers and alfalfa. Red clover seed is the favorite host of the larva of the clover seed midge.

Insects Feeding Upon or Within Stems and Roots

Southwestern Corn Borer,
***Zeadiatraea grandiosella* (Dyar)**

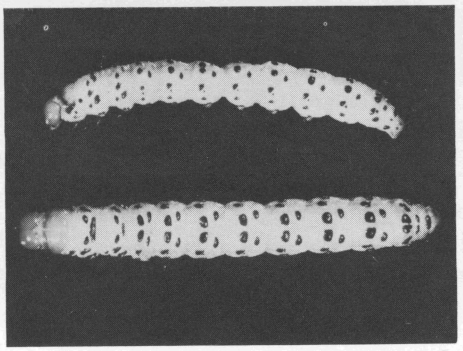

Fig. 20. Southwestern corn borer larvae.

PLANTS ATTACKED: Corn, grain sorghum, Johnsongrass, broomcorn and Sudangrass.

DESCRIPTION: Adult. The front wings of the moth are yellowish brown to almost black, and bordered by gray. Wing expanse is approximately 1¼ inch. The moth is active only at night.

Larva. The full-grown larva is about 1 inch long. It is yellow and spotted conspicuously with eight rounded brown or black spots across the anterior portion of each segment. Two smaller black spots are located near the posterior margin of each segment.

LIFE HISTORY: This insect passes the winter as a full-grown larva in the taproots of the old corn or sorghum stalks. It changes to a pupa inside the stalk during early spring and emerges as an adult a few weeks later. The moth deposits flattened, whitish, oval eggs in small groups on the underside of leaves and in an overlapping shingle fashion. The egg hatches within a few days, and the young worm feeds first upon the leaves but soon bores into the pith of the stalk. A larva may feed on several stalks. There are one to three generations annually.

DAMAGE: The damage caused by these insects often is unnoticed or the injury is attributed to other causes. Infested plants have ragged, broken and dangling leaves with many holes which were fed upon by the larvae when the leaves were curled in the heart of the plant. The worms also bore up and down the pith of the stalk and may cause the plants to lodge. Plants attacked by borers are twisted and stunted. These insects may reduce yields of corn and sorghum 15 to 50 percent.

Sugarcane Borer, *Diatraea saccharalis* (Fab.)

PLANTS ATTACKED: Sugarcane, corn, grain sorghum, broomcorn, Dallisgrass and Sudangrass.

DESCRIPTION: Adult. The straw-colored moth has black dots arranged in a V-shape on each forewing. The average distance from tip to tip of the wings is 1 inch. The amount of food taken by the larva determines to some extent the size of the moth.

Larva. The full-grown larva is about 1 inch long. It is yellowish with four noticeable brown spots on the dorsal area of each of most of the body segments. The head and prothorax are brown. These markings are absent or faded on the overwintering larva.

LIFE HISTORY: The larva becomes active in the early spring following hibernation within

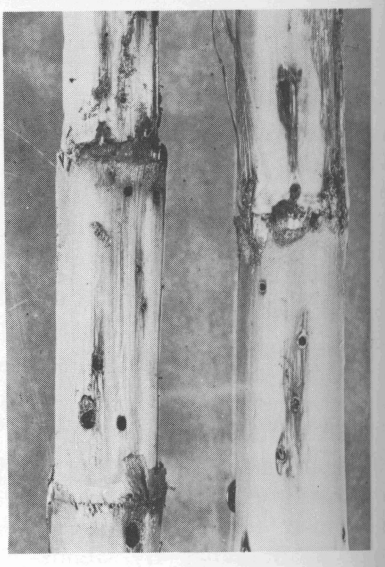

Fig. 21. Holes in cornstalks made by larvae of the Southwestern corn borer.

a tunnel in the plant. After extending the tunnel toward the outer surface of the stalk, the larva transforms to a pupa, from which the adult emerges a few days later. The female lays eggs in clusters of 25 to 50 on the leaves of the host. The egg hatches in about 1 week and the tiny worm feeds on the leaves for a short time and bores into the stalk where it feeds within the tunnel until late July. The larva tunnels down to the crown of the stalk and may pupate, but usually it moves out of the plant into the soil for transformation. The adult emerges 2 to 6 weeks later. There is only one generation per year.

DAMAGE: Injury by this insect to corn and other plants is similar to that caused by the southwestern corn borer and the southern cornstalk borer.

European Corn Borer, *Pyrausta nubilalis* (Hbn.)

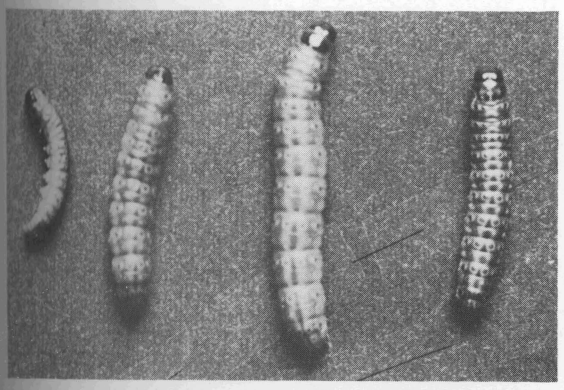

Fig. 22. Larvae of the European corn borer.

This insect has been collected in corn in Texas and may become a pest of corn and sorghums. The life history and habits are similar to that of the stalk borers discussed earlier.

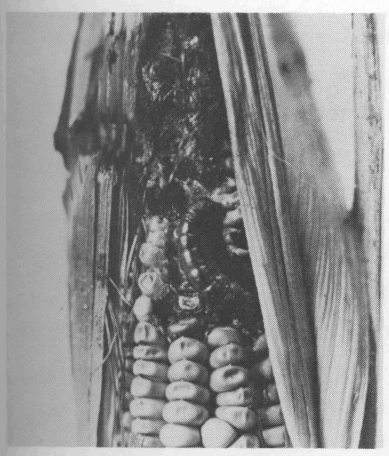

Fig. 23. Larva and characteristic damage of the European corn borer to an ear of corn.

Lesser Cornstalk Borer, *Elasmopalpus lignosellus* (Zeller)

The biology and habits of this insect are similar to those of the stalk borers discussed previously. It is frequently a serious pest of peanuts, beans, cowpeas and wheat, as well as corn.

Sugarcane Rootstock Weevil, *Anacentrinus deplanatus* (Csy.)

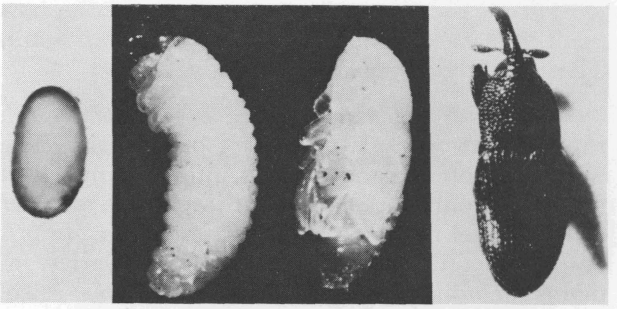

Fig. 24. Sugarcane rootstock weevil. Left to right, egg; larvae; pupa and adult.

This weevil is dark brown or black and about 3/8 inch long and 1/8 inch wide. The larva is a white, legless grub, with an amber-colored head and is about 1/5 inch long when full-grown. The pupa is white until shortly before emergence, when it takes on a brownish tint.

The larva tunnels in the sorghum stalk below and just above the surface of the soil. The tunnels resemble those made by other borers, such as the southwestern and sugarcane borers except that the tunnels are much smaller. The larva often is found at the nodes and near the outer surface of the stalk.

This insect overwinters as an adult in ground trash. It infests wild grasses, principally Johnsongrass, during early spring but later moves to grain sorghum plants.

Clover Stem Borer, *Languria mozardi* (Latr.)

This is potentially an economic insect on clover and alfalfa. The infestation has been spotted and little economic damage has occurred. The larva feed in the pith causing swollen or cracked areas to appear on the stem. The adult, which is a beetle, frequently is found on the plants. It is about 1/3 inch long, reddish with dark blue wing covers.

Cutworms

Forage crops frequently are attacked by several species of cutworms which may be divided into

the following groups based on the feeding habits of the larvae.

1. *Subterranean cutworms.* Members of this group feed almost entirely beneath the surface of the soil. The pale western cutworm, *Agrotis orthogonia* (Morr.), is a representative of this group and damages wheat and other small grains by severing the plant at or slightly above the crown. It passes the winter as a tiny larva within the egg shell. The worm emerges during early spring and feeds for a short time upon the leaves of the host plant but soon assumes the subterranean habit. There is only one generation annually.

2. *Tunnel makers.* These cutworms live in tunnels that open at the surface of the soil. The worm cuts off a plant, pulls it into its tunnel and usually devours the plant. An important member of the tunnel makers is the black cutworm, *Agrotis ypsilon* (Rott.), which attacks a wide variety of plants including corn, grain sorghum, clover, vetch, alfalfa and other legumes. There are several generations a year but probably the greatest damage is done by the first generation which usually occurs from April to June. Outbreaks frequently occur on "overflow land."

3. *Surface feeders.* These species of cutworms cut off small plants at or near the soil surface and may devour the fallen host plant. The worms are active mostly at night and hide in the soil or under surface trash during the day. Of the several species in this category, the army cutworm, *Chorizagrotis auxiliaris* (Grote), probably is the most important feeder on forage crops. This species attacks wheat and other small grain in North and Northwest Texas. The army cutworm may be active at temperatures slightly above freezing and frequently damages wheat and other small grain plants considerably during early spring. During cold weather the larva cuts off a plant tiller or leaf, pulls one end of it into the burrow and feeds on the plant. Grain fields attacked by this cutworm have the general appearance of having been grazed close to the soil surface. There is only one generation per year and the insect passes the winter as a larva in the soil or in debris affording it protection from extremely cold weather. Another species of surface-feeding cutworms occasionally of economic importance in forage is the granulate cutworm, *Feltia subterranea* (F.) Its primary range is Central and South Texas. Although vegetables are preferred, this cutworm also attacks alfalfa. The insect passes the winter in the pupal stage in the soil. There are three to five generations annually in the South.

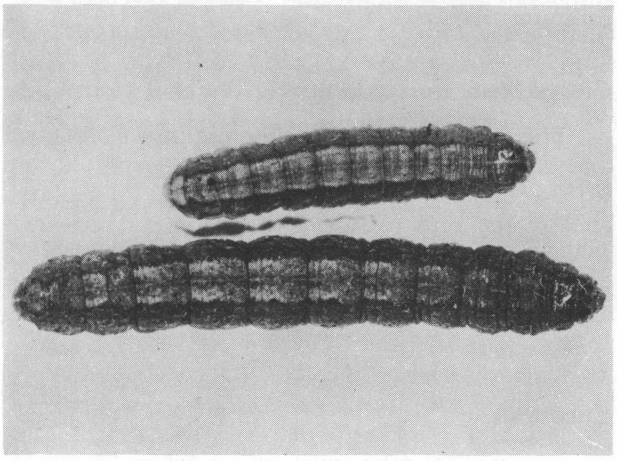

Fig. 25. Army cutworm larvae.

4. *Climbing cutworm.* Included in this group are several kinds of cutworms that climb the host plant to feed on foliage, stems, leaves and fruit. Like other cutworms, they feed primarily at night and hide under debris and other objects during the day. Some species, however, feed during cool, cloudy days.

The variegated cutworm, *Peridroma saucia* (Hubn.), is the most important species of this group and feeds on legumes and, to some extent, on corn and other crops of the grass family. This worm commonly is referred to as the climbing cutworm. It frequently damages vetch severely. The mature larva is pale yellow or brown and is about 2 inches long. Well-marked characteristics are the presence of a row of four to six dull yellow or pink diamond-shaped spots on its back and a crudely shaped black "W" on the top of the last abdominal segment. In most parts of Texas the insect survives the winter in the larval stage. The number of generations vary, but most of the damage is caused by a generation that occurs during the April-June period.

Seed-Corn Maggot, *Hylemya cilicrura* (Rond.)

PLANTS ATTACKED: Corn, peas, beans, clovers and several other plants.

DESCRIPTION: Adult. The fly is grayish brown and about 1/5 inch long. This fly would hardly be noticed by the layman.

Larva. The pale or yellow-white maggot is about 1/5 inch long, is sharply pointed at the anterior end, legless and has a tough skin.

LIFE HISTORY: The female deposits eggs in soil which contains a great deal of organic matter or on small seedling plants. The life cycle of the insect is completed in 2 to 3 weeks. There are three to five generations annually.

DAMAGE: Injury is caused by the larva or maggot. It burrows into the seed or plantlet, often destroying the seed germ before it can germinate. Damage is most severe during cold, wet seasons and on land rich in organic matter.

Sweetclover Root Borer, *Walshia amorphella* (Cl.)

The larva of this insect has caused serious damage to biennial sweetclovers in several North Texas counties. Its preferred host probably is the false indigo plant and the insect was considered harmless until a few years ago.

The larva tunnels from the crown to the roots of sweetclover plants. Severe infestations of this insect destroy the plant.

Southern Corn Rootworm, *Diabrotica undecimpunctata howardi* Barber

PLANTS ATTACKED: Corn, grain sorghums and many other cultivated crops.

DESCRIPTION: Adult. The adult of the southern corn rootworm is called the spotted cucumber beetle. It is about ¼ inch long, is yellowish-green and has 11 conspicuous black spots on the wing covers.

Larva. It is about ½ to ¾ inches long, has a yellowish-white body, three pairs of very small legs and a brownish head.

LIFE HISTORY: This insect passes the winter in the adult stage in shelters in or near fields that afford protection from adverse weather. Adults may be active throughout the year in southern regions of Texas. Hibernating beetles become active during early spring. The female lays eggs in the soil at the base of plants. There are two generations annually.

DAMAGE: The young larva bores in the roots and underground parts of the stems of the host plants.

Wireworms
False Wireworms, *Elodes* spp.
True Wireworms (several species)

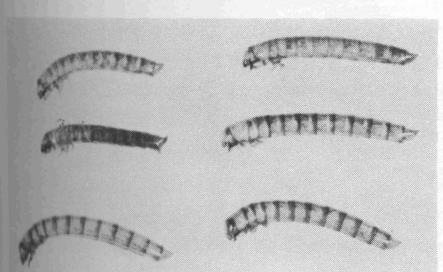

Fig. 26. False wireworm larvae.

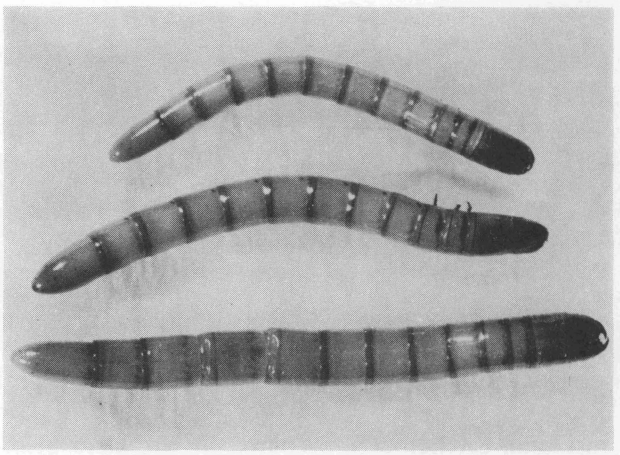

Fig. 27. True wireworm larvae.

The injurious stages (larvae) of these insects are similar in appearance and habits, however, they are unrelated. They feed on the roots of a variety of crops, including corn, small grain, grain sorghum and leguminous plants. The larva of the true wireworm is a hard, dark-brown, smooth, wire-like worm about 1 to 1½ inches long. However, some species are soft-bodied and yellowish. The larva of the false wireworm is similar in appearance to the true wireworm but usually is darker and has longer legs.

May Beetles (white grubs), *Phyllophaga* spp.

PLANTS ATTACKED: Grasses and grain crops, beans and many other cultivated crops.

DESCRIPTION: Adult. The May beetles vary in color and size according to the species but the most common are brown or brownish-black and are ½ to ¾ inches long.

Larva. This stage of the May beetle is commonly called the white grub and has a U-shaped body, brown head and three pairs of legs. Its body is white, and the digested food can be seen through the shiny and transparent tip of the abdomen.

LIFE HISTORY: The winter is passed in the soil in both the adult and larval stages. The length of the life cycle varies according to the species. A common species has a 2-year life cycle, and another develops in 1 year. The female usually deposits eggs during early summer in grass sod. The tiny grubs that hatch from the eggs feed on the plant roots until cold weather when they tunnel downward several inches in the soil where they overwinter. The following spring they move back to the vicinity of the solid surface, feed for 3 or 4 weeks on roots of plants and pupate. The pupa changes to an adult in about 4 weeks but remain

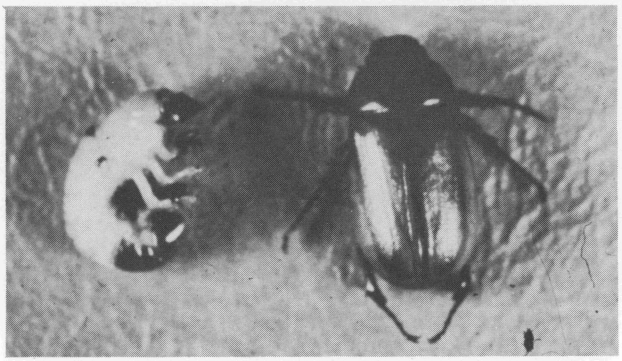

Fig. 28. May beetle. Left, larva (white grub); right, adult.

inside an earthen cell, prepared by the larva prior to pupation, and emerges in May or June.

DAMAGE: The grub feeds on the roots of many plants. It often kills patches of grass sod and frequently attacks roots of corn and soybean plants. Lodging of plants may be the result of damage by white grubs.

Sod Webworm, *Crambus luteolellus* (Clemens)

Although this insect is primarily a pest of golf greens and lawns, it frequently attacks cultivated and pasture grasses. It passes the winter as a larva in a silken cocoon in grass and sod lands. The worm eats the stems of grass near the soil surface. The larva is pale brown and about ½ to 2/3 inches long.

Sucking Insects

INSECTS AND MITES THAT SUCK JUICES FROM FOLIAGE, FRUITS AND STEMS

Corn Leaf Aphid, *Rhopalosiphum maidis* (Fitch)

PLANTS ATTACKED: Corn, broomcorn, small grain, grain sorghum and other plants of the grass family.

DESCRIPTION: The corn leaf aphid is greenish blue. Both winged and wingless forms prevail especially during the summer. The wingless female is somewhat ovate in form and about 1/12 inch long. She has black legs and antennae.

LIFE HISTORY: The aphid spends the winter in the adult stage. Activity and reproduction of the aphid may be conitnuous throughout the winter in extreme South Texas. The insect reproduces by giving birth to living young, and the offspring do not wander from their place of origin. A life cycle may be completed within a few days. There are several generations annually.

DAMAGE: The young and adults suck the plant juices, which frequently cause yellowish mottling on the leaves. The insect commonly is found deep in the whorl of the middle leaf, in the heads and on stems of various grass crops. It excretes honeydew in which fungi often grow. Heads of grain sorghum and small grain, and ears of corn affected by these fungi may become "sooty."

Spotted Alfalfa Aphid,
***Therioaphis maculata* (Buckton)**

PLANTS ATTACKED: Alfalfa and bur clover.

DESCRIPTION: The female aphid is about 1/16 inch long, is pale yellowish green and has on its back four to six rows of black spots bearing spines. Both winged and wingless forms occur. The wings have smoky areas along the veins. The aphid jumps readily when disturbed.

LIFE HISTORY: Activity and reproduction of this insect are more or less continuous throughout the year. Infestations are greatest during the late winter and spring. A female gives birth to 25 to 100 young which mature in approximately 1 week. The adult lives about 1 month. There may be many generations annually, the rate of reproduction depending on weather conditions. This insect generally is more active during dry weather and amid mild temperature.

Fig. 29. Spotted alfalfa aphids clustered on terminal of alfalfa plant.

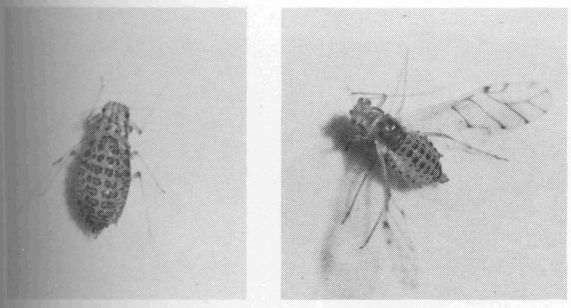

Fig. 30. Spotted alfalfa aphids. Wingless and winged adults.

DAMAGE: Spotted alfalfa aphids suck the juices from leaves and tender stems. They inject a toxin that interferes with the growth of the plant. Damaged leaves curl, turn yellow and usually drop off of the plant. Shedding of the lower leaves usually occurs first. Severely damaged plants are almost defoliated. Young and old alfalfa stands are greatly reduced and in some cases almost destroyed. These insects also excrete honeydew in which sooty molds grow. Alfalfa with heavy deposits of honeydew and sooty molds cannot be dehydrated properly, and it is difficult to cut and bale the crop.

Greenbug, *Toxoptera graminum* (Rond.)

The greenbug is a primary pest of small grain but also attacks grain sorghum. Details relative to the biology, habits and control of the greenbug are included in Texas Agricultural Experiment Station Bulletin 845, Greenbugs and Some Other Pests of Small Grain.

Pea Aphid, *Macrosiphum pisi* (Harr.)

PLANTS ATTACKED: Alfalfa, clovers, vetch, field and garden peas.

DESCRIPTION: This aphid is pea-green and about 1/6 inch long. Adults may be winged or wingless, but all the young (nymphs) are wingless. Cast-off white skins shed by nymphs are quite noticeable on aphid-infested plants and nearby on the ground.

LIFE HISTORY: The pea aphid spends the winter in the South as an adult in the crowns of the host plant but during mild winters may continue to reproduce intermittently throughout the year. Only the female occurs, and it gives birth to 50 to 100 living young. A generation may develop in about 10 days and, there may be 20 generations annually. Winged forms usually predominate when overcrowding of the aphids appear or when a shortage of food occurs. They migrate by flight aided by high winds. Infestations are greatest in cool weather during the spring and early summer.

DAMAGE: Plants severely infested are stunted and may even die. Generally the aphids damage the tops of plants first and progress downward as the infestation increases. In addition to sucking the juices from the plant, the aphids also produce a sugary, sticky material called "honeydew," which is visible on plants that have moderate to severe infestations.

Several other species of aphids attack various forage crops. Their habits, biologies and damages are similar to that previously discussed.

Three-cornered Alfalfa Hopper, *Spissistilus festinus* (Say)

PLANTS ATTACKED: Legumes, especially alfalfa.

DESCRIPTION: The adult is triangular when viewed from above. The general color of the insect is a bright green. Two reddish lines run from the head area and converge dorsally along the back. These lines are more prominent on males than on female. The adult is about 1/5 inch long.

The nymphs resemble the adults in general shape but do not have the greatly enlarged pronotum which is present on the adult. The nymph is straw or buff when young but later become light green. Its body is covered with conspicuous spines.

LIFE HISTORY: Eggs are deposited in the stems of the host plant and hatch in 7 to 10 days. It requires approximately 24 days for the nymphs to reach the adult stage. There are several generations annually. The overwintering adult is active except during freezing temperatures.

Fig. 31. Injury to alfalfa stems by the three-cornered alfalfa hopper. Normal alfalfa stem on extreme left; other four have been girdled by the hopper.

DAMAGE: Typical damage caused by the insect is a complete girdling of stems of the host plant. Most of the girdling is done by the nymphs. The girdle is the result of many punctures made in a ring around the stem of the plant.

Lygus Bugs,

***Lygus hesperus* (Knight)**
***Lygus elisus* (Van D.)**
***Lygus lineolaris* (P. de B.)**

These species commonly attack forage crops, especially legumes. The three species have practically the same biology and are similar. It is difficult for anyone other than a specialist to identify them readily. They are about 1/5 to 1/4 inch long, are flattened and vary from yellow or brown to dark brown or almost black.

Lygus bugs feed by sucking the juices from leaves, stems and fruits of many plants. The injury is concentrated on the terminal buds, blooms and young fruit. They pass the winter as adults usually in hibernation but may be more or less active throughout mild winters. A generation is completed in 20 to 30 days during the spring and summer.

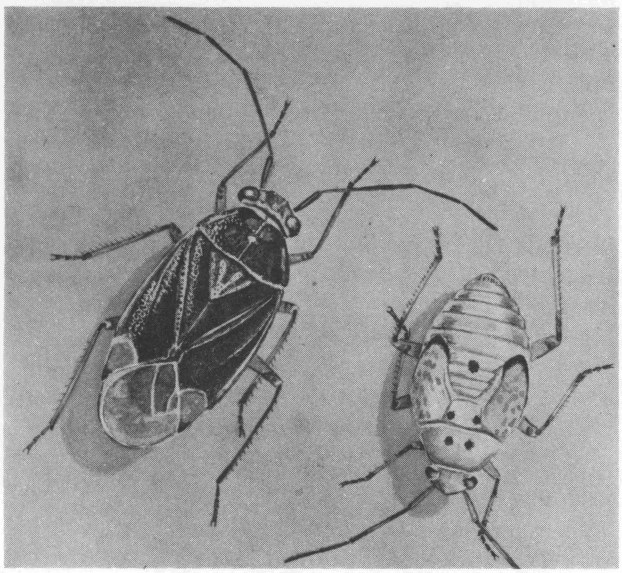

Fig. 32. Lygus bug (tarnished plant bug).

Leaf-footed Bug, *Leptoglossus phyllopus* (L.)

The adult is brown, oblong and flat-backed and is approximately 3/4 inch long. The ends of the hind legs are leaf-like and are very noticeable. There is a white or yellowish bank across the wing covers at about the mid section of the bug's body.

This insect frequently is a problem on field peas and on late-planted grain sorghum. It feeds by sucking the juices from pea pods and immature sorghum grain but also attacks tender foliage.

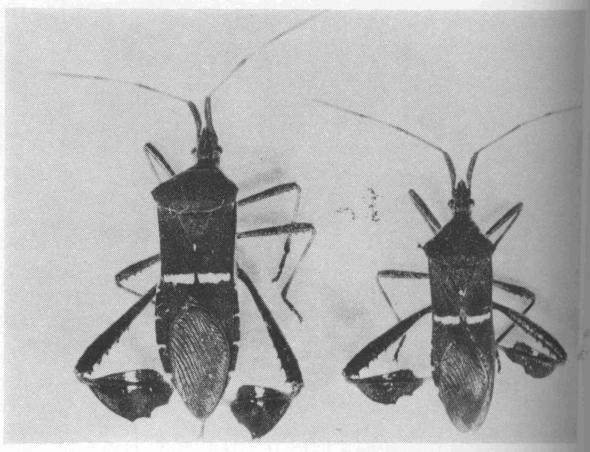

Fig. 33. Leaf-footed bugs.

Thrips

Probably the most common species of thrips occurring on forage crops are:

***Frankliniella tritici* (Fitch), *F. occidetalis* (Pergande), *F. exigua* (Hood) and *Thrips tabaci* (Lindeman).**

Thrips range from 1/25 to 1/10 inch in length and vary from yellowish to dark brown to black. They have slender bodies pointed at each end and most are winged or wingless, but others may possess nonfunctional wings. The insects puncture the leaves, tender stems, flowers and fruit from which they suck sap and cause the formation of white splotches on the leaves. Fruit frequently fails to set or the young fruit falls off immediately following formation. Severely attacked plants often become distorted, withered and discolored.

Stink Bugs

Several species of stink bugs attack forage crops in Texas. They are approximately 1/2 inch long, and each has a triangular-shaped scutellum that extends from just back of the "shoulders" and narrows posteriorly to a point. The front wings are thickened and quite stiff about the base but the distal half is much thinner and membranous. These membranous areas of the wings overlap on the back of the insect when not in use. Crushed bugs have an odor fitting their name.

Some of the important species of stink bugs in Texas are:

Southern green stink bug, *Nezara viridula* (L.); Conchuela, *Chlorochroa ligata* (Say); rice stink

bug, *Oebalus pugnax* (F.); and Say stink bug, *Chlorochroa sayi* Stal.

Life history and habits of each of the stink bugs are similar. Generally, barrel-shaped eggs are deposited in clusters usually on the underside of foliage. Eggs often are beautifully colored and ornamental. Development from egg to adult occurs in 4 to 6 weeks. From one to three or perhaps four generations may occur annually. They overwinter as adults in places affording protection from cold weather.

Chinch Bug, *Blissus leucopterus* (Say)

PLANTS ATTACKED: All cultivated and wild grasses, corn, grain sorghum and small grain.

DESCRIPTION: Adult. The adult insect is 1/6 to 1/5 inch long, has a black body, reddish yellow legs and fully developed wings. Each front wing is mostly white, but is marked with a triangular black patch at the middle of the outer margin.

Nymph. A newly hatched nymph (young) is bright red and has a white band across the back. As the bug grows, it darkens and is almost black by the time it reaches the last nymphal instar.

LIFE HISTORY: The chinch bug hibernates in the adult stage in clumps of grass and plant refuse. Frequently 5,000 bugs may be found on a square foot of surface of favorable hibernation. The adults migrate from the hibernating quarters to host plants during early spring, mate and lay eggs on the plant at or near the soil surface. The bug requires 30 to 40 days to complete its development. Usually, there are two generations per year.

DAMAGE: Chinch bugs suck the juices from plants. Most of the damage is caused by the nymphs which congregate and feed behind the sheaths of the lower leaves. Wilting and drying out of the plants upon which they feed often is the first indication of chinch bugs.

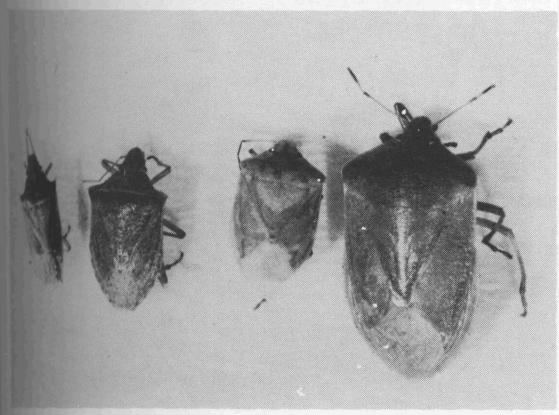

Fig. 34. Four species of stink bugs.

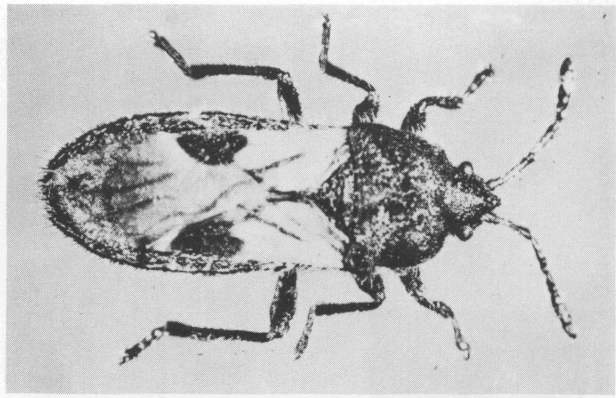

Fig. 35. Chinch bug.

Fig. 36. Chinch bugs feeding on corn stalk.

False Chinch Bugs, *Nysius raphanus* (Howard) and *Nysius ericae* (Schilling)

These two insects are similar in habits and appearance to those of the chinch bug. However, they feed chiefly on the heads of grain sorghum. The insects are uniformly grayish-brown. One species is difficult to distinguish from the other.

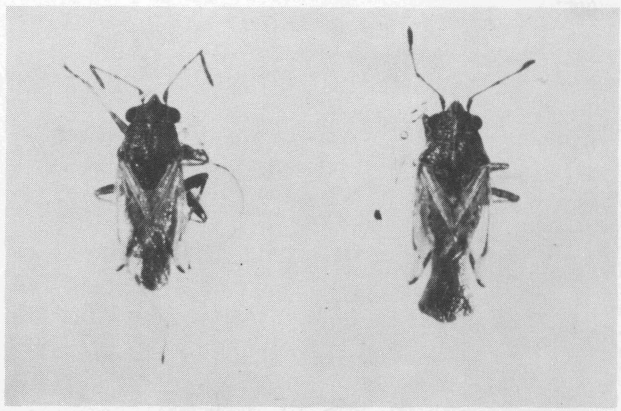

Fig. 37. False chinch bugs.

Potato Leafhopper, *Empoasca fabae* (Harr.)

This insect frequently is found in legumes, especially alfalfa but seldom builds up in number

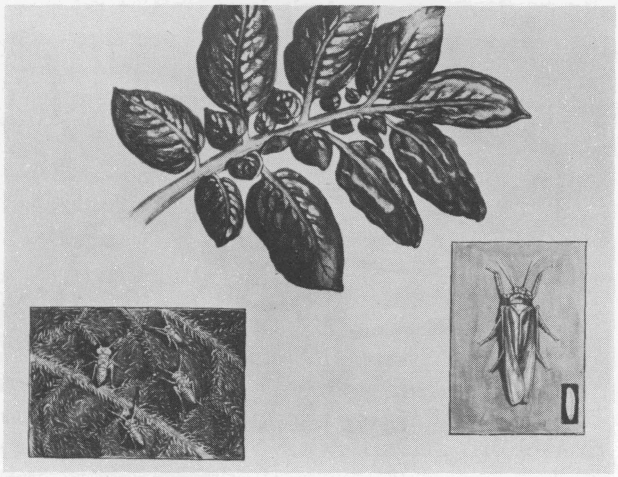

Fig. 38. Potato leafhopper. Upper left, nymphs; lower left, egg and adult; right, characteristic damage.

sufficient to cause severe damage. It is a wedge-shaped, pale greenish yellow insect about 1/8 inch long when full grown. The female deposits eggs in the petioles and in the larger veins of the leaves. The period from egg to adult under favorable conditions is about 3 weeks. Both adults and nymphs are extremely active and feed on the petioles and lower surface of leaves by sucking the sap from the plant. Severe attacks by these insects cause the plants to wilt. Other species of leafhoppers are found on various forage crops.

Mites

Information pertaining to species of mites injurious to forage crops is given in Texas Agricultural Experiment Station Bulletin 845, Greenbugs and Some Other Pests of Small Grains.

Beneficial Insects

PREDACEOUS INSECTS

Lady Beetles

Lady beetles are oval or roundish, hemispherical insects ranging from 1/16 to 1/4 inch in length and are about two-thirds as wide. Also, there is a great variation in color among the many species. The more common is yellowish with black spots. The larvae are carrot-shaped and have flattened, gradually tapering bodies, long legs and warty or spiny backs. The female lays masses of orange eggs on the foliage; each egg stands on its end in contact with other eggs.

Both adult and larval lady beetles feed on aphids or other small soft-bodied insects or their eggs.

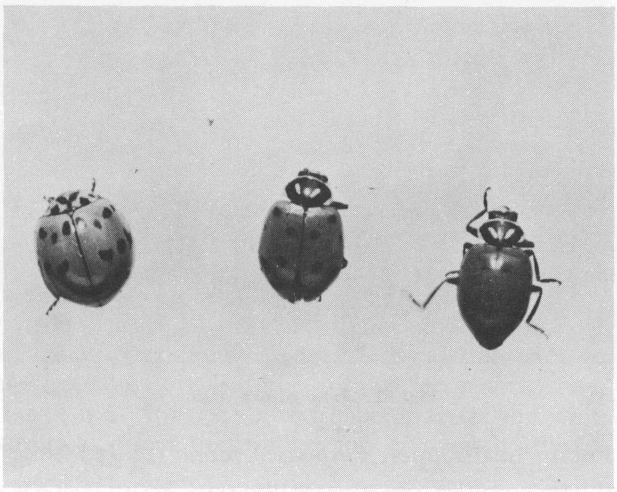

Fig. 39. Three species of lady beetles.

Ground Beetles

Ground beetles, especially *Calosoma sycophanta* and *C. scrutator,* are valuable as feeders on injurious insects, such as cutworms. Both adults and larvae are predaceous. They roam at night in search of prey but hide under stones or rubbish during the day. *C. sycophanta* is black or nearly so, and *C. scrutata* has greenish wing covers margined with red. Both species have long legs that are about 1 1/4 inches long. The larvae are 1 to 1 1/2 inches long and the body is almost the same breadth from head to tail. The mouthparts are sharp and project forward. A pair of conical bristly appendages is at the caudal end of the body.

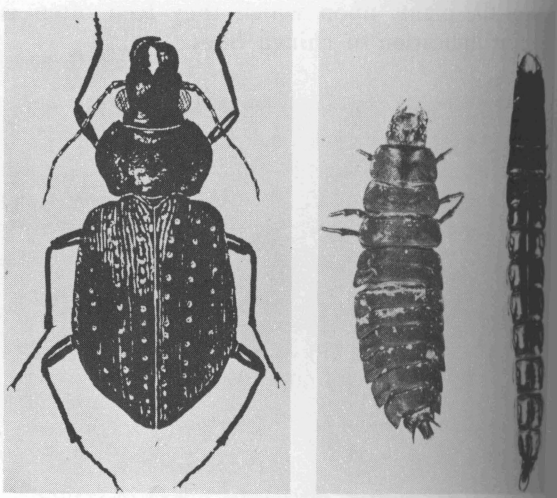

Fig. 40. Ground beetles; right, larvae.

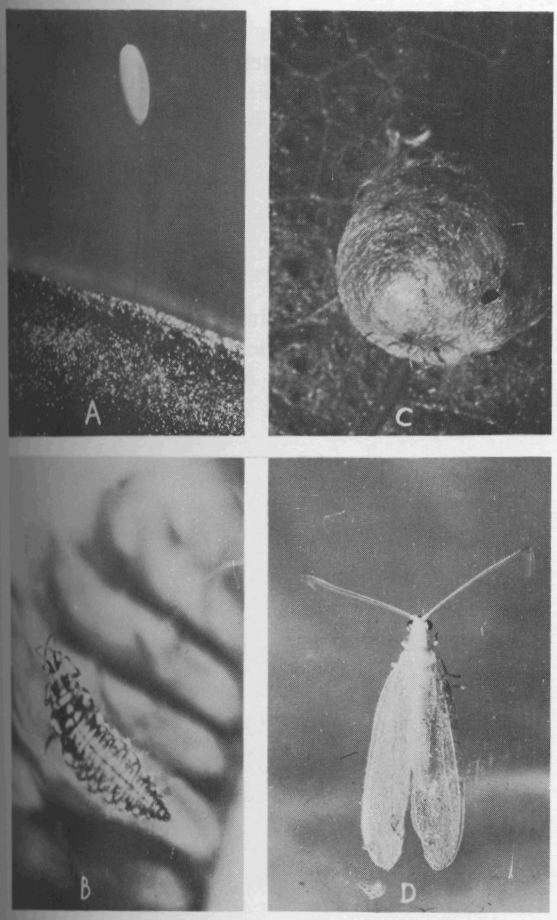

Fig. 41.–Lacewing fly. A, egg; B, larva; C, pupa; D, adult.

Lacewings or Chrysopids

The adults of these insects are light green to brown and are about ½ inch long. The wings are large in comparison to body size, are transparent and composed of a network of veins. They lay white oval eggs, each attached at the end of a thread-like stalk that projects from the plant surface. Only the larvae (Aphid-lions) are feeders on other insects. The spindle-shaped larvae have very long pincher-like mouthparts with which they capture and puncture bodies of soft insects, especially aphids.

Syrphid Flies

These insects commonly are referred to as "sweat flies." They are predaceous only in the larval stage and feed upon aphids and small caterpillars. The larva is an elongate, footless, slug-like, tan or greenish maggot.

Spiders

Several species of spiders are predatory on insects. They kill their prey by piercing it with a pair of pincer-like fangs. Each fang has a small opening at the tip from which poison is injected into the victim. While toxic to insects, this poison is harmless to people except in case of certain species of spiders.

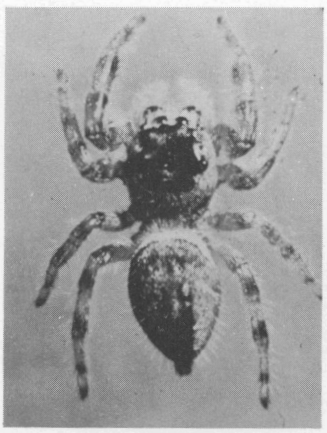

Fig. 42. Spider.

PARASITES

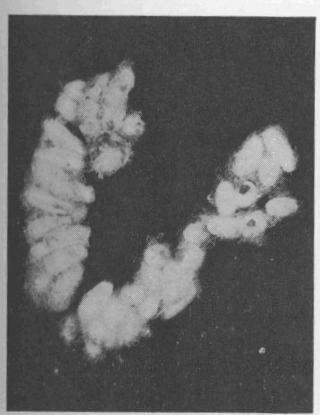

Fig. 43. Pupae of a parasitic wasp, Apanteles glomeratus, a common prey upon cutworms, armyworms and other caterpillars.

Fig. 44. Aphids parasitized by a wasp, Lysiphlebus testaceipes.

Many parasitic insects that prey on injurious insects belong to the order Hymenoptera, which include the wasps. One of the most important is the aphid parasite, *Lysiphlebus testaceipes* which has been known to eliminate large infestations of aphids within a few days. A braconid wasp, *Apanteles glomeratus,* is parasitic on many larvae of moths and butterflies. This wasp deposits eggs on the prey. Upon hatching the parasites eat the internal organs of larvae such as cutworms, cabbage loopers, earworms and others. Several species of chalcid flies are parasitic on eggs and larvae of members of the orders Homoptera, Lepidoptera, Coleoptera and Diptera.

BEES

Although bees are not predaceous on other insects they are extremely important as pollinators of many forage crops, especially legumes. Vetch crops amply supplied with honey bees have yielded as high as 20 times more seed than vetch excluded from these pollinating insects. Make every effort to avoid poisoning of bees when applying insecticides for the control of injurious insects attacking legumes.

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Your County

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can furnish you the latest information on farming, ranching and homemaking. They represent both The Texas A. & M. College System and the United States Department of Agriculture in your county.

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