PARTS OF INSECTS

The insect’s small body is flexible and well-armored. This has much to do with its success in staying alive. A protective hard shell, lighter in weight than bone, covers the many segments that form three main body regions: head, thorax, and abdomen. Other parts are antennae and eyes found on the head; wings and three pairs of jointed legs attached to the thorax.
HANDBOOK OF THE INSECT WORLD

ACKNOWLEDGMENT
This educational material has been made available for use in connection with official 4-H projects supervised by the Cooperative Extension Service. Special acknowledgment is given to Hercules Incorporated, Wilmington, Delaware, for preparation of the original materials. The handbook is published by the National 4-H Service Committee, Inc. 59 East Van Buren Street, Chicago, Illinois 60605 in behalf of the Cooperative Extension Service of the State Land-Grant Universities and the U. S. Department of Agriculture.
CONTENTS

An Approach to Insect Understanding ........................................ iii

Section A—Familiar Insects ..................................................... 1

Section B—Helpful Insects ..................................................... 9

Section C—Household and Storage Pests ................................. 15

Section D—Human and Animal Pests ........................................ 20

Section E—General Plant Feeders ........................................... 25

Section F—Crop Pests ........................................................... 29
   F-1. Vegetable Insects ...................................................... 29
   F-2. Corn Insects .......................................................... 36
   F-3. Legume, Grass, and Small-Grain Insects ...................... 38
   F-4. Cotton and Tobacco Insects ...................................... 42
   F-5. Fruit, Berry, and Nut Insects ................................... 45

Section G—Flower Pests ....................................................... 50

Section H—Shade and Forest Tree, and Shrub Pests ............... 53
An Approach to Insect Understanding

We live in a world teeming with insects. At least 686,000 known species, plus an additional 9,000 species of ticks and mites, compete with man. Each of these thousands of species numbers into millions, even billions of individuals. The common housefly, Musca domestica L., for instance, is just one species or kind of insect. Every summer day there are billions of this one insect species about.

Some insect species are large enough to be seen easily. Most are so small they are seldom noticed. Termite colonies containing thousands of individuals may exist hidden away unnoticed in the floors of homes for many years. Yet, a single roach running across the kitchen floor may be seen immediately.

This booklet presents in a single volume concise descriptions, drawings, and approximate sizes of some of the most common insects. Although an insect primer in one respect, it is sufficiently complete to be used as a guide by farmers, gardeners, students, 4-H and F.F.A. members, amateur collectors, and many others interested in insects.

Man's future on this earth may very well depend on how well we understand the insect world—how well we fight our insect enemies—how well we protect our insect friends. The more we know about the world of insects, ticks, and mites, the better chance we have of protecting ourselves against them.

It is impossible to illustrate every insect in this limited space. But we hope this booklet will encourage readers to seek further information from the excellent texts available on the fascinating study of entomology. Included also are some of the near relatives of insects, such as spiders and centipedes, commonly mistaken for insects.

From these drawings you will not be able to name exactly all the many kinds of insects you find. Hundreds of species differ from each other in ways so minute that even authorities find it difficult to tell them apart. But you will find out much of what you wish to know by comparing insects you collect with drawings in this booklet.

For extra help in identification, approximate size for the insects is given as the greatest body length usually attained, or as the average maximum wing span in cases where wings are a more prominent feature.
After establishing as much identification as possible, it may be important economically to know the exact name of the species you have. Kill your insect with chloroform or ether; pack it between layers of tissue paper in a pillbox of sufficient size, or put it directly in a vial containing alcohol (rubbing alcohol is adequate). Then send it to your county agent, state extension entomologist, state agricultural experiment station, or the Agricultural Research Service of the U.S. Department of Agriculture. Include a note giving your name and address, the name of the collector of the insect, the state and county in which it was found, the date of the capture, and the host on which it was found. Ask specific questions if you want to know more than the correct name of the insect.

For more information on any particular insect pest or all insects attacking various crops, ornamentals, trees, livestock, house, and garden, contact your local authorities or write the Agricultural Research Service, U.S. Department of Agriculture, Washington, D.C. 20250.

* * * *

We gratefully acknowledge the cooperation of the U.S. Department of Agriculture for help with this booklet, particularly Mr. David G. Hall, Mrs. Claudelle Gaddis, and the insect identification specialists of the Entomology Research Branch, Agricultural Research Service.

Publishers and authors of the excellent texts below gave generous consent to use certain illustrations as a guide for many drawings.

Cornell University Press, Ithaca, New York
An Introduction to Entomology by John Henry Comstock

American Insects by Vernon L. Kellogg

Applied Entomology by H. T. Fernald and Harold H. Shepard
Destructive and Useful Insects: Their Habits and Control by C. L. Metcalf and W. P. Flint

J. B. Lippincott Company, Chicago, Illinois
Insects Injurious to Fruits by William Saunders

The Macmillan Company, New York, New York
Manual of Vegetable-Garden Insects by Cyrus Richard Crosby and Mortimer Demarest Leonard

Illinois Natural History Survey, Urbana, Illinois
U.S. Department of Agriculture, Washington, D.C.
Most of you know the insects in this group from actual experience. Some are seen darting over ponds, streams, and lakes; others swarm around lighted doors and windows; and the flicker of the firefly is seen competing with evening stars. Colorful butterflies and moths attract attention, flitting from one blossom to another. These and other insects have enriched our lives since infancy.

We are constantly alert for those insects that molest our bodies, our dwellings, and our possessions. The barefoot child knows the merciless sting of the wasp and bee. Gardeners and farmers battle the plant pests.

Now when these insects are encountered, maybe this booklet will make it easier for you to identify them and understand their habits.

**Damsel Fly**
*Order Odonata*
*Wing Span: 2 in.*
Found around ponds and streams; adult feeds on soft-bodied insects; nymph is fish food.

**Dragonfly**
*Order Odonata*
*Wing Span: 3 in.*
Distinguished by large size and rapid flight; lives about fresh water; feeds on other insects.

**Caddis Fly**
*Order Trichoptera*
*Length: 1 in.*
Moth-like insect attracted to lights about lakes and streams; larva valuable fish food.

**Walking Stick**
*Order Orthoptera*
*Length: 4 in.*
Slow-moving, leaf-feeding insect; color mimics surroundings; can sometimes be serious pest.

**Praying Mantis**
*Order Orthoptera*
*Length: 2½ in.*
Adult waits patiently in praying position for insect victims; color blends with vegetation.
Firefly or lightning bug
Order Coleoptera
Length: 1/4 in.
Long, flatish; appears at night; both sexes emit light; larva called glowworm.

California prius
Order Coleoptera
Length: 1 1/2 in.
Long-horned, wood-boring beetle; teeth on prothorax; larva lives in tree-trunk burrows.

Junbug or May beetle
Order Coleoptera
Length: 1 in.
Adult, leaf-eater; white grub; root-feeder; in early summer adults buzz about foliage.

Rhinoceros beetle
Order Coleoptera
Length: 3/4 in.
Name suggested by horned male; one of largest beetles; larva lives in decaying tree roots.

Eyed click beetle
Order Coleoptera
Length: 1/2 in.
Adult, leaf-eater, when lying on back springs up with clicking sound; larva is wireworm.

Giant stag beetle
Order Coleoptera
Length: 2 in.
Mandibles resemble stag antlers; night flier, attracted to lights; larva lives in decaying wood.

Mayfly
Order Ephemeroidea
Wing span: 1 1/2 in.
Found around lakes and streams; nymph feeds on water vegetation and is important fish food.

Stonefly
Order Plecoptera
Length: 1 in.
Adult probably eats nothing, immature stages found in aerated water, food for fish.
March fly
Order Diptera
Length: ¾ in.
Adults common in early spring;
fly in swarms; larva feeds on
decaying matter or grass roots.

House fly
Order Diptera
Length: ¼ in.
Most familiar insect of its order;
common in dwellings; many
generations a year.

Mosquito
Order Diptera
Length: ¾ in.
Female is bloodsucker; some
transmit diseases; larvae or
wrigglers seen on water surface.

Giant crane fly
Order Diptera
Length: 8 in.
Large species of fly; lives at
water edges; feeding habits and
jumping ability of family vary.

Springtail
Order Collembola
Length: ⅛ in.
Minute, primitive, wingless;
found in damp places; moves
by jumping; lives on decaying
matter.

Cockroach
Order Orthoptera
Length: ⅜ in.
Many species common in dwell-
ings; feeds on many things;
breeds rapidly in warm areas.

Grasshopper
Order Orthoptera
Length: ⅜ in.
Commonly seen hopping or
jumping in grassy areas;
voracious ant feeder, found world-wide.

Booklouse
Order Collembola
Length: 1/16 in.
Minute, soft-bodied insect found
in old books and damp, dark,
unused rooms.

Scorpionfly
Order Neuroptera
Length: 1 in.
Found along shaded streams and
in damp woods; feeds on dead or
infested insects.
Green lacewing
Order Neuroptera
Wing span, 1 1/4 in.
Golden-eyed adult; larva, known as aphid lion, eats aphids and other insects.

Dobsonfly
Order Neuroptera
Wing span, 8 1/4 in.
Horned adult; larva, a fish food, called hellgrammite by anglers; eats other insects.

Water scorpion
Order Hemiptera
Length, 1 1/2 in.
Adult lives concealed in shallow water; breathes by keeping long tube at water surface.

Teed bug
Order Hemiptera
Length, 1/4 in.
Common on muddy stream banks; protective colors vary with soils; lives on insects.

Giant water bug
Order Hemiptera
Length, 2 in.
Adult, electric-light bug; flies from pond to pond, living on insects, snails, and small fish.

Water boatman
Order Hemiptera
Length, 1/2 in.
Lives in ooze, feeds on minute animals at pond bottom; air bubbles surround swimming body and glisten like silver.

Silverfish
Order Thysanura
Length, 3/4 in.
Name suggested by silvery-white scales covering body; common in dwellings, libraries.

Flea
Order Siphonaptera
Length, 3/32 in.
Adult bites dogs, cats, and man; common; may infest dwellings.
Ant
Order Hymenoptera
Length: 3/8 in.
Social insect living in colony composed of males, females, and workers; widespread.

Bold-faced hornet
Order Hymenoptera
Length: 1 in.
Builds large, grayish paper nest on tree limbs and buildings; feeds on insects; vicious stinger.

Yellow jacket
Order Hymenoptera
Length: 1 1/4 in.
Builds paperlike nest in ground, feeds and raises young on other insects; has painful sting.

Honeybee
Order Hymenoptera
Length: 3/8 in.
Builds nest in hollow trees or man-provided hives; collects pollen, produces honey, pollinates many crops.

Mud dauber
Order Hymenoptera
Length: 1 1/4 in.
Makes mud nest on lower surface of stones or buildings; feeds young on spiders or caterpillars.

Louse
Order Anoplura
Length: 3/32 in.
Minute, wingless insect; sucking louse that attacks domestic animals.

Aphid or plant louse
Order Hemiptera
Length: 3/32 in.
Minute, soft-bodied, green insect; attacks vegetation; sucks plant juices.

Harvestfly or cicada
Order Hemiptera
Length: 1/3 in.
Shrill cry familiar in late summer; foliage-feeder; seldom harmful.

Thrips
Order Thysanoptera
Length: 1/30 in.
Very active, minute insects with piercing, sucking mouth parts.
**Woolly bear caterpillar**  
Order Lepidoptera  
Length, 2 in.  
Common fuzzy caterpillar seen crawling in or near plants; grows up to be a moth.

**Tiger swallowtail butterfly**  
Order Lepidoptera  
Wing span, 6 in.  
Magnificent; tail-like edges on hind wings; black marked with yellow, blue, or green.

**Luna moth**  
Order Lepidoptera  
Wing span, 4½ in.  
Favorite with amateur collectors; delicate light-green with purple-brown band and transparent-center eyelike spots.

**Monarch butterfly**  
Order Lepidoptera  
Wing span, 4 in.  
Tubby-brown, black-bordered, white-spotted; larva feeds on milkweed; distasteful to birds.

**Viceroy butterfly**  
Order Lepidoptera  
Wing span, 3 in.  
Orange to cinnamon with black, white-spotted; mimics monarch in detail, perhaps for protection.

**Clouded sulphur or roadside butterfly**  
Order Lepidoptera  
Wing span, 2½ in.  
Pale greenish-yellow, blackish-brown border; underside sulphur-yellow; found in muddy places.

**Clearwing moth**  
Order Lepidoptera  
Wing span, 1½ in.  
Wings have transparent areas; larva chews into woody plant stems; this one peach tree borer.

**Clothes moth**  
Order Lepidoptera  
Wing span, ½ in.  
Straw color to silvery brown, some spotted; larva feeds on fabrics, some stored products.

**Cabbage butterfly**  
Order Lepidoptera  
Wing span, 1½ in.  
One of most common butterflies; wings are dull-white with black spots; larva is plant feeder.
**Cecropia moth**
Order Lepidoptera  
Wing span, 7 in.  
Tawny-brown, red, golden, black; largest of giant silkworm moths; larva, leaf-feeder.

**Regal moth**
Order Lepidoptera  
Wing span, 8 in.  
Magnificent royal moth; olive, yellow, red, orange-red; larva, hickory horned devil, feeds on leaves of trees and shrubs.

**Bollworm**
Order Lepidoptera  
Wing span, 1½ in.  
Yellowish to brownish; larva insects many plants; known also as corn earworm, tomato fruitworm, tobacco budworm.

**Cutworm**
Order Lepidoptera  
Wing span, 2 in.  
Night-flying moths attracted to lights; varying colors; larvae cut plants off near soil surface.

**Armyworm**
Order Lepidoptera  
Wing span, 1½ in.  
Pale-brown or brownish-gray with white dot in front wing; center; larva, very destructive.

**White-lined sphinx or hawk moth**
Order Lepidoptera  
Wing span, 9½ in.  
Olive-brown, buff, black, red, with white stripes; larva feeds on plants.

**Great spangled fritillary**
Order Lepidoptera  
Wing span, 4 in.  
Tawny, black-checkered, silver-spotted; Latin name means dice box; larva feeds on passion plant.

**Mourning-cloak butterfly**
Order Lepidoptera  
Wing span, 9½ in.  
Purplish-brown, yellow border, brown and blue spotted; larva feeds on tree leaves.
Red-admiral
Order Lepidoptera
Wing span, 3/4 in.
Upright-black, bright orange and white spots; larva feeds on certain tree leaves.

Zebra swallowtail butterfly
Order Lepidoptera
Wing span, 3 1/2 in.
Black wings are crossed by several bands of greenish-white; larva feeds on pawpaw.

Painted-lady
Order Lepidoptera
Wing span, 9/16 in.
Dark brownish-black, orange; eyelike spots on hind wings; larva feeds on composite plants.

Giant skipper
Order Lepidoptera
Wing span, 3 in.
Daytime flier with rapid, darting flight; rests wings vertically; larva, stem-borer.

Promethea moth
Order Lepidoptera
Wing span, 4 in.
Giant silkworm; reddish-brown, whitish and black lines, clay-colored margin; cocoons common sight in trees.

Black witch
Order Lepidoptera
Wing span, 6 in.
Night-flying moth attracted by lights; eyes shine in darkness; larva feeds on tree leaves.

California tortoise-shell butterfly
Order Lepidoptera
Wing span, 3 in.
Angle-wing butterfly with rapid light; caterpillar feeds on leaves of various plants.

Diamondback moth
Order Lepidoptera
Wing span, 9/16 in.
Gray; male fore wings yellow-striped to form diamond shapes; larva, plant-feeder.
"Great bugs have lesser bugs  
Upon their backs to bite 'em  
And they in turn have lesser bugs  
And so ad infinitum."

Scientists think about one-tenth of all insects may be helpful to man's economy. Assistance from this small group of beneficial insects could be essential to our survival.

At least fifty of our important food crops are dependent upon pollinating insects, such as bees, for setting of fruit and resultant seed. Insect pests could soon ruin crops and vegetation but for predatory insects that capture and feed on other insects, and parasitic species that help check insect pests.

The scavengers receive our thanks for helping keep the earth clean and sanitary. Some insects help to aerate, fertilize, and condition the soil. There are insects that make shellac, others dyes; the silkworm produces silk, and only bees make honey and beeswax. Other benefits from insects are: providing food for fish and animals, aiding scientific research, and producing certain medicinal substances.

Knowing man's friends in the insect world can be important in controlling his enemies. Entomologists study the life cycles of the beneficial insects, learning how to utilize them to our fullest advantage.
**Sphexid digger wasp**
Order Hymenoptera
Length: 3/4 in.
Est builder in earth or dead wood; provisions nest with paralyzed insects or spiders.

**Black and yellow chalcid**
Order Hymenoptera
Length: 1/4 in.
Resembles yellow jacket; parasitic in pupae of moths and butterflies; may attack parasite already in host.

**Oakworm ichneumonid**
Order Hymenoptera
Length: 3/4 in.
Parasitic in grubs, caterpillars including Calif. oakworm; size varies according to host.

**Small braconid wasp stinging ephid**
Order Hymenoptera
Length: 1/12 in.
Inserts egg in aphid body; wasp larva kills aphid; destroys many grain aphids.

**Minute trichogrammatid wasp**
Order Hymenoptera
Length: 3/64 in.
Stings moth eggs, putting in own egg; larva hatches, destroying moth egg; widespread.

**Braconid wasp**
Order Hymenoptera
Length: 1/10 in.
One of most beneficial braconids, laying eggs in many caterpillars; larvae emerge simultaneously.

**Braconid wasp**
Order Hymenoptera
Length: 1/4 in.
Amber; ovipositor long as body; parasite in caterpillars, colonized to control Oriental fruit moth.

**Braconid wasp**
Order Hymenoptera
Length: 1/4 in.
Parasitic to European corn borer; numbers may develop from one parasitized caterpillar.
Secondary parasite
Order Hymenoptera
length, ¾ in.
Tracks many species of helpful insects; proof that not all parasites are helpful to man.

"Longtail" ichneumonid parasite
Order Hymenoptera
length, ¾ in.
Interesting; long ovipositor; drills in tree trunks, placing eggs to hatch in horntail larvae.

Wingless wasp or velvet ant
Order Hymenoptera
length, ¼ in.
Some clothed in velvetlike hairs; guest or parasite in nests of wasps or bees; strong stinger.

Small tachinid fly
Order Diptera
length, ¾ in.
Enemy of Mexican bean beetle; lays eggs in beetle larva; fly larva feeds on beetle larva.

Ichneumonid hyperparasite
Order Hymenoptera
length, ¼ in.
Enemy of tachinid fly that attacks Mexican bean beetle; lays eggs in fly larva.

Robberfly
Order Diptera
length, ¾ in.
Large, fierce fly capable of fast flight; adult, larva feed on insects including large species.

Bumblebee-like robberfly
Order Diptera
length, ¾ in.
Protective mimicry; larva lives on decaying wood; feeds on insects, nectar, pollen.

Flowerfly or syrphid fly
Order Diptera
length, ¾ in.
Adults hover around flowers and do some pollinating; larvae feed on aphids and other insects.

Net-winged midge
Order Diptera
length, ¼ in.
May appear in large swarms, dancing in air; breeds in swamps.
Tachinid fly
Order Diptera
Length: 1/4 in.
Found in larvae of European corn borer; imported from Europe to help control corn borer.

Tachinid fly
Order Diptera
Length: 3/4 in.
Found about flowers and rank vegetation; larva parasitic in caterpillars; interesting how eggs are deposited.

Window-pane fly
Order Diptera
Length: 3/16 in.
Often found around windows of mills and warehouses; preys on stored-grain insect pests.

Beefly
Order Diptera
Length: 1/4 in.
Adult feeds on flower nectar, stays on sunny paths, sticks or posts; larva feeds on insects.

Conopid fly
Order Diptera
Length: 1/4 in.
Protective mimicry; adult feeds on nectar and pollen; larva parasitic to other insects.

Two-spotted lady beetle
Order Coleoptera
Length: 3/16 in.
Feeds on insects; may receive chant "Lady bird, lady bird! Fly away home! Your house is on fire, your children do roam!"

Convergent lady beetle
Order Coleoptera
Length: 1/4 in.
Adult, pupa, larva, eggs; red with black spots; larva and adult feed on other insects.

Black lady beetle
Order Coleoptera
Length: 1/4 in.
Adult, larva and adult help fruit growers, feed on orchard mites and scale insects.
Rove beetles attacking cabbage maggot
Order Coleoptera
Length: ¾ in.
Black adults; feed on fly maggots; common about decaying animal or vegetable matter.

Great water-scavenger beetle
Order Coleoptera
Length: 1½ in.
Common in quiet pools; swims or crawls on plant life; feeds on decaying material in water.

Fiery hunter
Order Coleoptera
Length: 1⅛ in.
Hairy black ground beetle with reddish punctures; keen hunter of cutworms, other insects.

Corrion beetle
Order Coleoptera
Length: 1½ in.
Buries dead animals in which eggs are deposited; adult, larva feed on decaying animal matter.

Spined soldier bug
Order Hemiptera
Length: 3/8 in.
Destroys many pests in various stages; sucks eggs dry of Calif oakworm; related to destructive harlequin bug.

Whirligig beetle
Order Coleoptera
Length: 9/16 in.
Groups spin or dart rapidly on still water; some emit fluid with disagreeable odor; feed on aquatic insect larvae.

Predaceous flower bug
Order Hemiptera
Length: 3/8 in.
Common on vegetation; enemy of corn earworm, spider mites, etc.
**Jerusalem cricket**
Order Orthoptera  
length, 1 1/4 in.  
Baby-faced, clumsy creature; lives under stones, in loose soil; feeds on insects, dead vegetation.

**Dragonfly**
Order Odonata  
wing span, 3 in.  
Adult, immature stages predaceous on many insects captured in flight; seen about fresh water.

**Scorpionfly**
Order Mecoptera  
length, 1 in.  
Hangs suspended by fore legs from rank herbage; hind and fore legs catch living insects.

**Ant lion**
Order Neuroptera  
length, 1 in.  
Graceful adult; larva, doodlebug, digs pit, partially buries itself in bottom waiting for ant victims; pupa rests in sand cocoon.

**Aphid lion**
Order Neuroptera  
length, 3/8 in.  
Lacewing larva; feeds on aphids, other insects; stalked eggs on leaf keep larvae from eating each other.

**Praying mantis**
Order Orthoptera  
length, 2 1/2 in.  
Sits in praying position waiting to catch insects; color resembles surroundings.
Insects and the damage they cause can be seen easily in any home. A woolen suit or favorite carpet, with newly discovered moth holes, brings immediate attention to the insect problem. Rice, flour, cereal, or dried fruit—infested with a wormlike pest—is ruined for human food. Roaches, ants, and termites are among the most despised of household pests. The crawlly appearance of the house centipede makes it unwelcome, even though it does little harm and much good.

Other pests shown in this chapter emphasize in a forceful way the constant battle man has with insects in mills, granaries, and storage silos, as well as on other commercial premises.

Each year millions of dollars are spent to keep homes, food, and merchandise free of such insect pests.
Black carpenter ant
Order Hymenoptera
Length, ¾ in.
Winged female and two workers; largest common ant; fond of sweets; attacks house timbers.

Little red ant or Pharaoh's ant
Order Hymenoptera
Length, ½ in.
Light-yellow, most troublesome of dwelling invaders; builds nest in walls and foundations.

Ants
Order Hymenoptera
Pinched-in waistline, rear wings smaller than front wings.

or

Termites
Order Isoptera
Thick waistline, front and rear wings almost same size.

Termite
Order Isoptera
Length, ⅛ in.
Winged adult, second-generation caste; worker, soldier; live in social colonies; infest house timber.

Little black ant
Order Hymenoptera
Length, ¾ in.
Troublesome household ant nests outside, invading dwelling in search of food.

Argentine ant
Order Hymenoptera
Length, ½ in.
Workers; annoying, destructive; gets in foods, beehives, poultry yards; fosters injurious insect...
**Booklouse**
Order Coleoptera
Length: 1/16 in.

Minute, soft-bodied insect found in old books and unused, damp rooms; feeds on dead vegetable and animal matter.

**Boxelder Bug**
Order Hemiptera
Length: 3/16 in.

Bright-colored; seen around houses fall and spring; cannot bite, or harm household articles.

**European Earwig**
Order Dermaptera
Length: 3/16 in.

Reddish-brown; foul odor; nests in decaying matter near house; feeds on organic material.

**Cheese Skippor or Meggot**
Order Diptera
Length: 3/16 in.

Tiny fly; larva infests meat, cheese, other foods; tends to fly to leap; worldwide.

**Indian-Meal Moth**
Order Lepidoptera
Wing span: ¾ in.

Pest of stored foods, grain; larva spins silken tubes through meal, dried fruits, and other products.

**Mediterranean Flour Moth**
Order Lepidoptera
Wing span: 1 in.

Larva prefers flour and meal; attacks other foodstuffs; weavings masses of flour in mills.

**Angoumois Grain Moth**
Order Lepidoptera
Wing span: ¾ in.

Weathered straw-colored adult; larva, dangerous common pest.

**Clothes Moth**
Order Lepidoptera
Wing span: ½ in.

Adult flies about, depositing eggs; larvae feed on fabric.
Carpet beetle
Order Coleoptera
Length, 3/16 in.
Larva pest of woolen fabrics, pecially carpets; hides in dark covered places; active adult eats on flowers.

Block carpet beetle
Order Coleoptera
Length, 3/16 in.
Larva injures woolen fabrics, carpets, fur, leather; infests cereals, stored grain; cosmopolitan.

Old-house boror or housebuck
Order Coleoptera
Length, 1 in.
Infests old and new wood construction, stored lumber; larva lives in wood 2 to 17 years.

Powder-pest beetle
Order Coleoptera
Length, 1/4 in.
Small, narrow adult; grub is severe pest of seasoned wood.

Cadelle
Order Coleoptera
Length, 1/2 in.
Found in granaries, mills, ships, railroad cars; attacks stored grain, other dry food products; larva often bores woodwork.

Yellow mealworm
Order Coleoptera
Length, 1¼ in.
Infests stored cereal products scavenger on animal and vegetable matter; fish bait; bird food adult, black beetle.

Cigarette or tobacco beetle
Order Coleoptera
Length, 1/10 in.
Adult: light-brown; serious pest to tobacco and infects other stored products; widespread.

Drug-store beetle
Order Coleoptera
Length, 1/10 in.
Adult reddish-brown; named for serious feeding on pharma-ceutical drugs, infects most dry plant and animal products.
**Square-necked grain beetle**
Order Coleoptera
Length: 1/6 in.
Attacks seed pods of many plants; common in stored corn, damages ears in field.

**Bean weevil**
Order Coleoptera
Length: 1/8 in.
Adult appears on plants, depositing eggs; larva feeds on beans in field and in storage.

**Confused flour beetle**
Order Coleoptera
Length: 1/4 in.
Shiny, reddish-brown; most injurious pest in U.S. flour mills found where grain or grain products are stored.

**Saw-toothed grain beetle**
Order Coleoptera
Length: 1/10 in.
Beetle often found in stored food and dry organic matter; adult and larva serious pests.

**Larder beetle**
Order Coleoptera
Length: 1/8 in.
Larva feeds on meat and animal products; adult sometimes feeds on pollen; world-wide.

**Rice weevil**
Order Coleoptera
Length: 1/8 in.
Attacks corn in field, and many stored and grain products; many generations a year possible.
Insect problems of towns and cities are multiplied many times in rural areas, where conditions and hosts are more favorable for development of certain pests. The annual production of livestock and crops would be half or less if farmers did not control these insect enemies. Thousands of people would die and hundreds of thousands more would be ill each year, if disease-carrying insects were not controlled.

Mosquitoes and flies are major pests familiar to everyone. A flea infestation, originating with a house pet, is an experience never to be forgotten; ticks picked up in wooded areas are a danger to both man and animal. The black widow spider, bed bug, or gnat molest town, city, and rural dwellers.

Stockmen and farmers wage a constant battle against insect pests to produce the food and fiber necessary for man’s well-being, and we are all in the battle against insects to protect man’s health.

**Southern house mosquito**
Order Diptera
Length, ¾ in.
Rests parallel to surface; lays eggs in masses on water surface; not important U.S. disease carrier.

**Northern house mosquito**
Order Diptera
Length, ¾ in.
Male with large, feathery antennae; female is bloodsucker; rests parallel to surface.

**Common malaria mosquito**
Order Diptera
Length, ½ in.
Rests at angle with surface; lays eggs singly on water surface; transmits malaria.

**Yellow fever mosquito**
Order Diptera
Length, ¾ in.
Primarily in tropics; lives and breeds in water near man’s habitats; transmits yellow fever.

**Black fly, turkey or buffalo gnat**
Order Diptera
Length, ½ in.
Bites man, livestock, poultry; widespread; some carry disease.

**House fly**
Order Diptera
Length, ½ in.
Common in dwellings narrow; deposits eggs in stall manure; disease carrier.
Little house fly
Order Diptera
Length: 3/16 in.
larva or maggot sometimes found in man, causing intestinal myiasis.

Striped horse fly
Order Diptera
Length: 3/8 in.
Adult with green eyes; sucks blood of livestock; larva lives in moist soil.

Stable fly
Order Diptera
Length: 3/8 in.
Looks like house fly; attacks animals and man; bites, especially on legs.

Cattle grub, heel or warble fly
Order Diptera
Length: 3/16 in.
Adult deposits eggs on cattle hairs; maggots live in body, bore out back, fall to ground, pupate in soil.

Horn fly
Order Diptera
Length: 3/16 in.
Annoying, bloodsucking pest of cattle; deposits eggs in fresh wounds.

Horse bot fly
Order Diptera
Length: 3/8 in.
Adult annoys livestock by buzzing flies; larvae live in skin.

Deer fly
Order Diptera
Length: 3/8 in.
Attacks man and animals in forest.
Sheep bot fly
Order Diptera
Length, 3/8 in.
Adult deposits larvae in nose of sheep and goats; maggots develop in sinus area.

Red-tailed flesh fly
Order Diptera
Length, 3/4 in.
Attacks various animals; sometimes man; works in sores.

Soldier fly
Order Diptera
Length, 3/8 in.
Adult; widespread; larva may invade human body, causing intestinal myiasis.

Sheep tick, louse fly, or ked
Order Diptera
Length, 1/8 in.
Wingless fly; lives in fleece of host, sucking blood through skin; attacks goats, sheep.

Green-bottle fly
Order Diptera
Length, 3/16 in.
Blowfly species; breeds in decomposing animal matter; is known to deposit eggs in foodstuff or open wounds of animals.

Screw-worm fly
Order Diptera
Length, 3/8 in.
Bluish-green livestock pest feeds and lays eggs on wounds; sometimes infects man; larva develops in living flesh.

Bed bug
Order Hemiptera
Length, 3/16 in.
Feeds primarily on man at night; sometimes found on caged animals and birds; rests during day in cracks and dark areas.

Masked hunter
Order Hemiptera
Length, 3/8 in.
Infests houses to prey on bed bugs, other insects; painful bite; sticky nymph attracts dust; looks like mass of lint.

Scorpion
Class Arachnida
Length, 3 in.
Crablike with long, fleshy tail catches and stings spiders and insects at night; sting painful to man.
Dog flea
Order Siphonaptera
Length, 3/32 in.
Bites both man and animals; shifts from host to host; transmits disease.

Human flea
Order Siphonaptera
Length, 3/32 in.
Adult bites man and animals; larva lives in dirt or excreta; can transmit disease.

Sticktight flea
Order Siphonaptera
Length, 1/4 in.
Southern chicken flea; found dense masses around head poultry, sometimes animals stays on host for long period.

Large chicken louse
Order Mallophaga
Length, 3/16 in.
Smoke-gray to almost black; found on chickens and other fowl; skin contact serious.

Shaft louse
Order Mallophaga
Length, 1/16 in.
Small body louse attacks chickens and other fowl; commonly found on long wing feathers.

Hog louse
Order Anoplura
Length, 3/16 in.
Bloodsucking pest of hogs.

Cattle biting louse
Order Mallophaga
Length, 1/16 in.

Imported fire ant
Order Hymenoptera
Length, 9/16 in.
Thief ant; steals planted seeds; severe sting; often kills young
**Black widow spider**

*Class Arachnida*
- Length: 0.4 in.
- Most venomous spider in U.S.; has hourglass-shaped spot on underside; lives in dark places.

**Spider**

*Class Arachnida*
- Length: 1/3 in.
- Most spiders harmless to man; feed on insects; webs evidence of spinning skill; widespread.

**Itch mite or sarcoptic mange**

*Order Acarina*
- Length: 1/40 in.
- Causes mange in livestock and wildlife; sometimes infesting entire body; known to spread "Cavalryman's itch" to man.

**Chicken mite**

*Order Acarina*
- Length: 1/30 in.
- Feeds nymph; adult, nymph sublesome poultry pests; lays 500 eggs in cracks of roosts, nests.

**Cattle tick**

*Order Acarina*
- Length: 1/8 in.
- Seed tick; stage destructive cattle parasite in southern areas; transmits Texas fever.

**Chigger**

*Order Acarina*
- Length: 1/50 in.
- Orange-yellow; feeds on man and many animals; lives in grass and underbrush.

**American dog tick**

*Order Acarina*
- Length: 1/8 in.
- Male, female; pest of dogs, other animals, man; carries Rocky Mountain spotted fever.

**Fowl tick or bluebug**

*Order Acarina*
- Length: 1/10 in.
- Adult, nymph suck blood from domestic fowl, mostly at night; found in roost cracks during day.
There are many specialists in the insect world; their appetite can be satisfied by only one crop or group of related crops. But the insect pests introduced in this section may be encountered eating many different kinds of vegetation. Armyworms and cutworms are real headliners during severe outbreaks; and from man’s earliest records the destructive habits of the grasshopper or locust have been reported. The caterpillar seen crawling across the sidewalk—or the grub found instead of a fishing worm—may be the larval stage of one of these general feeders.

Be prepared to recognize these pests and to know how to deal with them before infestations become severe.

Differential grasshopper
Order Orthoptera
Length, 2 1/4 in.
Serious pest; brownish or oliveneen; one of largest and most destructive hoppers.

Lesser migratory grasshopper
Order Orthoptera
Length, 1 1/4 in.
Serious pest; attacks crops, range vegetation; migrates long distances in outbreak years.

Two-stripped grasshopper
Order Orthoptera
Length, 1 1/4 in.
Female laying eggs; widespread; eats any vegetation, preferring cultivated crops.

Red-legged grasshopper
Order Orthoptera
Length, 3/4 in.
Adult male; one of smallest and least destructive hoppers; at

Clear-winged grasshopper
Order Orthoptera
Length, 9/16 in.
Adult male; appears in early spring; destructive general

Long-horned grasshopper
Order Orthoptera
Length, 1 1/4 in.
Adult female; pretty, light-green, called "meadow grass"
Field cricket
Order Orthoptera
Length: 1 1/2 in.
Dark-colored, thick-bodied; feeds at night; seen in pastures, gardens, and under stones.

Mormon cricket
Order Orthoptera
Length: 3 in.
Adult female; serious pest on western ranges; migrates to crops during severe outbreaks.

Southern mole cricket
Order Orthoptera
Length: 1 1/2 in.
Covered with fine, brown, velvety hairs; burrows, nests in soil near water; feeds on plant roots.

Stone or camel cricket
Order Orthoptera
Length: 1/2 in.
Wingless, long-horned 'hopper; high-arched back like camel; eats plants in dark, moist places.

Angular-winged katydid
Order Orthoptera
Length: 3 3/4 in.
General foliage feeder; summer singer of "Katy did, Katy did; she did, she didn't."

Spider mite
Order Acarina
Length: 1/80 in.
Whitish, reddish, or greenish; feeds on plant sap, spins slight web; attacks many plants.

Armyworm
Order Lepidoptera
Length: 2 in.
Attacks grain, forage crops; in outbreak years moves in armies, eats any vegetation.

Fell armyworm
Order Lepidoptera
Length: 1 1/2 in.
Inverted Y on head front; survives winter in Gulf states, moves northward in spring; attacks field and vegetable crops.

Cutworm
Order Lepidoptera
Length: 1 1/2 in.
Caterpillar of night-flying moth; gray, brownish-black, spotted or striped; lives in soil; eats young plants at night.
Garden webworm
Order Lepidoptera
length, 1 1/4 in.
Spins light web over plant; eats beneath it; widespread, serious pest; adult, moth.

Corn earworm
Order Lepidoptera
length, 1 1/4 in.
Worst U.S. corn pest; general feeder, also known as cotton bollworm, tomato fruitworm, and tobacco budworm.

Salt-marsh caterpillar
Order Lepidoptera
length, 3 in.
Dark-brown, hairy; feeds on leaves, destroying all but heavy veins; attacks many crops.

European earwig
Order Dermaptera
length, ¾ in.
Metropolitan; pest to many vegetable plants; broods over winter and young as birds do.

Tarnished plant bug
Order Hemiptera
length, ¾ in.
Sucks sap from varied crops, flowers, fruit-tree buds and blossoms.

Garden fleaheopper
Order Hemiptera
length, 1/12 in.
Feeds on plant sap, discoloring or destroying foliage; attacks many types of crops.

Seed-corn maggot
Order Diptera
length, 3/16 in.
Legless, yellowish-white grub with tough skin; severely damages roots of small grains.

Southern corn rootworm
Order Coleoptera
length, ¾ in.
Larva of spotted cucumber beetle; lives in soil, attacking underground parts of many corn varieties.
**White grub**
Order Coleoptera
Length: 1 in.

Among most destructive soil pests; attacks many plants; adult, lay beetle, feeds on foliage.

---

**Japanese beetle**
Order Coleoptera
Length: 1/2 in.

Serious imported pest; larva or grub, root-feeder; adult feeds on leaves and flowers of plants.

---

**Asiatic garden beetle**
Order Coleoptera
Length: 8/10 in.

Velvety, cinnamon-brown adult feeds at night on foliage; grub feeds on roots.

---

**Striped blister beetle**
Order Coleoptera
Length: 3/4 in.

Feeds on leaves of plants, flowers, goldenrod pollen; body substance blisters skin on contact.

---

**White-fringed beetle**
Order Coleoptera
Length: 1/4 in.

General plant feeder in southeast U.S.; no males; larva or grub serious pest to plant roots.

---

**Striped flea beetle**
Order Coleoptera
Length: 1/12 in.

Jumps about on plants, eating holes in foliage; larva feeds on plant roots; widespread.

---

**Vegetable weevil**
Order Coleoptera
Length: 3/4 in.

Spotted, grayish adult damages foliage of many plants; grub feeds on plant roots.

---

**Wireworm**
Order Coleoptera
Length: 1 1/2 in.

Hard, smooth, wirelike larva of click beetle; serious pest to root crops, newly planted seeds.

---

**Corn leaf aphid**
Order Homoptera
Length: 1/10 in.

World-wide; infests foliage of many plants including certain grasses.
Insect pests destroy the production of about 120 million acres annually in the United States. Instead of providing food and fiber for the population, production from these acres feeds insect enemies. Entomologists estimate this loss in dollars to be at least four billion for an average year.

Of the 86,000 insect species that occur in the United States, 10,000 are considered major pests. Other tens of thousands do not occur commonly enough now to be considered major pests, or their feeding habits are not yet known to be of economic importance.

Entomologists still do not know the destructive potential of most insect enemies; those they know most about are the ones that have caused the greatest destruction.

The following five chapters illustrate many crop pests by the specific and related crops on which they commonly feed. It is impossible in limited space to illustrate all the insects in each order that feed on any one group of crops. These sections include the familiar pests in each order, or insects representative of common types, now known to attack the crops.

The general plant feeders are not always repeated, for they can be found on many crops. And although many of the insects adapt their feeding habits to one particular crop, they may be found sampling another.

This booklet can be helpful in identifying the insects illustrated. Then use the recommendations put out by your own state agencies, or the U.S.D.A., to control these pests.
**Turnip aphid**
Order Homoptera
Length, 1/16 in.
Soft-bodied, sucking insect; infestations may seriously damage plants; secretes honeydew.

**Potato aphid**
Order Homoptera
Length, 3/16 in.
Elongated, pear-shaped adult; similar species attack many field and house plants.

**Corn root aphid**
Order Homoptera
Length, 1/32 in.
Wingless female; infests plant roots; cared for by ants that feed on its honeydew.

**Potato psyllid**
Order Homoptera
Length, 1/16 in.
Hopping insect resembles winged aphid; carries plant disorder more damaging than its feeding.

**Potato leafhopper**
Order Homoptera
Length, 3/16 in.
Pale-green; sucks juices from plants, causes hopper burn; found on underside of leaves.

**Spider mite**
Order Acarina
Length, 1/50 in.
Typical spider mite; attacks many plants, feeding on ss and spinning slight web.

**Garden flea hopper**
Order Homoptera
Black adults and greenish nymph suck sap from leaves and stems of many different plants.

**Stink bug**
Order Homoptera
Length, 3/8 in.
Variety of colors and markings; attacks many plants; leaves odor on plant fruit.

**Tarnished plant bug**
Order Homoptera
Length, 3/8 in.
Brownish, flattened bug; suck sap from many types of plant foliage; widespread.
Harlequin bug or cabbage bug
Order Hemiptera
Length: 3/8 in.
Black with red, orange, and yellow; important enemy of cabbage and related crops.

Squash bug
Order Hemiptera
Length: 2/3 in.
Grayish-black with dirty-yellow underside; attacks all cucurbits or vine crops; nation-wide.

Negro bug
Order Hemiptera
Length: 1/10 in.
Dark, beetle-like adult; injures celery, corn, wheat, other plants; deposits bad odor.

Cabbage maggot
Order Diptera
Length: 1/16 in.
Larval deposits eggs at base of leaves; maggot injures roots of cabbage, turnip, related crops.

Serpentine leaf miner
Order Diptera
Length: 1/16 in.
Larva disfigures leaves of cabbage, turnip, potato, spinach, many wild and forage plants.

Carrot rust fly
Order Diptera
Length: 1/8 in.
Shiny-black adult; maggot feeds on roots and surface of carrots, celery, parsley, similar plants.

Cutworm
Order Lepidoptera
Length: 1/4 in.
Larval lives in soil; cuts leaves; young plants during night; variously of species.

Garden webworm
Order Lepidoptera
Length: 1/3 in.
Slender, greenish or yellowish worm; skeletonizes leaves and stems; leaves them webbed.

Tomato hornworm
Order Lepidoptera
Length: 1 in.
Green-striped larva with red horn attacks tomato, potato, tobacco, related plants; adult.
**Imported cabbageworm**
Order Lepidoptera
Length: 1 1/4 in.
Light-green larva covered with fine down attacks cabbage, crucifers, other plants; adult, white cabbage butterfly.

**Cabbage looper or inchworm**
Order Lepidoptera
Length: 1 1/8 in.
Light-green, white- or yellowish-striped caterpillar feeds on cabbage, related plants.

**Woolly bear caterpillar**
Order Lepidoptera
Length: 2 in.
Typical hairy caterpillar four feeding on many types of foliage.

**Melonworm**
Order Lepidoptera
Length: 1 1/4 in.
Translucent, yellowish-green larva feeds on leaves, fruit of cucurbits; adult, iridescent, pearly-white, black-bordered.

**Pickleworm**
Order Lepidoptera
Length: 1 1/8 in.
Light-green or yellowish larva destroys blossoms, mines into fruit of cucumber, related plants; serious in late season.

**Black swallowtail caterpillar**
Order Lepidoptera
Length: 2 in.
Green, black, yellow; forked horn rises when disturbed; feeds on celery, carrots, other plants.

**Valvetbean caterpillar**
Order Lepidoptera
Length: 1 1/4 in.
Striped larva; when disturbed spits brownish liquid; feeds on soybeans, peanuts, other crops.

**Zebra caterpillar**
Order Lepidoptera
Length: 2 in.
Black, yellow-striped, with red damages cabbage, other vegetables; two generations a year.
**Earworm or tomato fruitworm**
*Order Lepidoptera*
*Length: 1/2 in.*
Serious pest in buds and fruit of plants; known also as tobacco adworm, cotton bollworm.

**Potato tuberworm moth**
*Order Lepidoptera*
*Wing span: 1/4 in.*
Slender, dark-headed larva attacks potatoes, other plants in field and storage; known also as tobacco splitworm.

**Bean leaf beetle**
*Order Coleoptera*
*Length: 1/4 in.*
Reddish, yellowish, dark-spotted adult feeds on leaves; larva feeds on roots of peas, corn, other crops.

**Spotted cucumber beetle**
*Order Coleoptera*
*Length: 5/16 in.*
Yellowish-green, black-spotted; attacks many plants; larva bores under ground stems.

**White grub**
*Order Coleoptera*
*Length: 1 in.*
Serious soil pest; double row of spines on underside of last body segment; usual 3-year life cycle.

**Striped cucumber beetle**
*Order Coleoptera*
*Length: 1/8 in.*
Greenish-yellow adult feeds on cucurbit foliage, spreads disease; larva mines roots, stems.

**Orange potato beetle or potato bug**
*Order Coleoptera*
*Length: 5/8 in.*
Yellow, black adult; larva, reddish-orange soft bug; feed on foliage, tubers.

**Asparagus beetle**
*Order Coleoptera*
*Length: 3/16 in.*
Cream, bluish-black, red adult deposits eggs on plant stems; feeds on foliage and roots.

**Potato flea beetle**
*Order Coleoptera*
*Length: 1/16 in.*
Adult jumps about, feeding on foliage; spreads early potato blight.
Smartweed flea beetle
Order Coleoptera
length, ¼ in.
Adult feeds on leaves of many plants, destroys vitality, spreads disease; larva, root-feeder.

Striped cabbage flea beetle
Order Coleoptera
length, ⅛ in.
Dark, shiny adult feeds on foliage, preferring cruciferous plants; larva feeds on roots.

Spinach flea beetle
Order Coleoptera
length, ¼ in.
One of largest flea beetles; feeds on many plants, leaving leaf peppered with holes.

Ash-gray blister beetle or old-fashioned potato bug
Order Coleoptera
length, ⅜ in.
Fond of vegetable, legume foliage; secretion blisters skin; larva feeds on locust egg-pods.

Tortoise beetle or gold bug
Order Coleoptera
length, ⅔ in.
Turtleshaped adult and thorny larva feed on sweet potato foliage, morning glory, bindweed.

Nuttall blister beetle
Order Coleoptera
length, 1 in.
Restless, active beetles tend to feed together in swarms; secret skin-blistering oil.

Wireworm
Order Coleoptera
length, ⅛ in.
Hard, smooth, dark-brown larva of click beetle; serious pest to root crops and seeds.

Vegetable weevil
Order Coleoptera
length, ⅛ in.
Spotted, grayish adult feeds on vegetable foliage; larva and adult feed on roots.

Bean weevil
Order Coleoptera
length, ⅛ in.
Adult feeds on plant leaf concealed larva feeds on bean in field and storage.
Cowpea curculio or pod weevil
Order Coleoptera
length, ¼ in.
Umbrella-shaped weevil damages cowpeas, cowpea seeds, and cotton, growning in the soil. Grub develops in seeds, found in storage.

Pee weevil
Order Coleoptera
length, 1/8 in.
One of worst pests to peas; dark-brown or blackish adult feeds on leaves; larva develops in pods.

Sweet potato weevil or root borer
Order Coleoptera
length, ¼ in.
Bad pest of sweet potato; blue-black and red adult feeds on leaves, stems; grub honeycombs tubers in field and storage.

Potato stalk borer
Order Coleoptera
length, 1/8 in.
Adult minor foliage pest; larva eats stalk interior of many plants, causing wilt or death.

Grape colaspis
Order Coleoptera
length, 1/8 in.
Adult flies about crops, feeds on foliage; grub, root-feeder; also known as clover rootworm.

Southern cowpea weevil
Order Coleoptera
length, 8/16 in.
Major pest of cowpeas in field and storage; larva develops in seeds, found in storage.

Mexican bean beetle
Order Coleoptera
length, 1/8 in.
Yellow to coppery-brown adult and larva feed on underside of leaves; also attack pods and stems.

Carrot beetle
Order Coleoptera
length, ¾ in.
Adult feeds on corn and celery stalks, potato and carrot roots.
F-2—CORN INSECTS

Corn earworm
Order Lepidoptera
Length: 1 1/2 in.
Worst corn pest in U.S.; attacks ears in field; also known as tobacco budworm, tomato fruitworm, cotton bollworm.

European corn borer
Order Lepidoptera
Length: 1 in.
Among most damaging corn pests; larva feeds in whorl of young plant, bores in stalk-and ear; attacks other plants.

Stalk borer
Order Lepidoptera
Length: 3 in.
Brown, white-striped caterpillar bores in stems, feeds on head of plant, migrates about field.

Armyworm
Order Lepidoptera
Length: 2 in.
Migrates to cornfields; in outbreak years may strip fields of all vegetation.

Cutworm
Order Lepidoptera
Length: 1 1/2 in.
Many species; cut off young corn plants; can make replanting necessary.

Sod webworm
Order Lepidoptera
Length: 3/4 in.
Cuts off young plants, may drive them into tunnel; found loose, silken web in soil.

Maize billbug
Order Coleoptera
Length: 3/8 in.
Reddish-brown or black adult attacks young corn, damaging or killing plants; larva tunnels upper taproot.

Corn rootworm
Order Coleoptera
Length: 1/4 in.
Wrinkled, threadlike larva damages roots; transmits disease; adult general plant feeder.

Corn billbug
Order Coleoptera
Brown, gold, black adult foliage-feeder; larva, root-feeder sometimes destroy entire field.
**Striped flea beetle**
Order Coleoptera
Length: 1/12 in.
Adult jumps about, feeding on foliage, severely damaging plant; larva feeds on roots.

**Grape colossus**
Order Coleoptera
Length: 1/8 in.
Larva attacks young roots, particularly crops following clover sod; also clover rootworm.

**Corn lanternfly**
Order Homoptera
Length: 3/32 in.
Young sucks sap from buds and leaves of late corn; found in scattered areas.

**Corn leaf aphid**
Order Homoptera
Length: 1/10 in.
Feeds on leaf sap, upper stalks; honeydew secretion limits pollination, attracts earworm.

**Corn root aphid**
Order Homoptera
Length: 1/16 in.
Clings to corn roots, retarding growth; sucks sap, secretes honeydew.

**Cornfield ant**
Order Hymenoptera
Length: 1/8 in.
Brownish adult; protects aphid eggs and young; nests in field to pasture aphids on plant roots; feeds on their honeydew.

**Grasshopper**
Order Orthoptera
Length: 2 1/4 in.
Outbreaks, various species migrate to cornfields, stripping leaves.

**Seed-corn maggot**
Order Diptera
Length: 1/8 in.
Larva feeds on seeds, causing failure to sprout or weak plants;

**Chinch bug**
Order Hemiptera
Length: 1/8 in.
Attacks leaves and plant base; sucks sap, wilting and killing plants.
Meadow spittlebug
Order Homoptera
Length, ⅛ in.
Attacks alfalfa and legumes; feeds in frothy mass of sap; spreads mildew, other diseases.

Greenbug or grain aphid
Order Homoptera
Length, 1/30 in.
Pest of wheat and other small grains; sucks plant sap, sometimes killing entire field.

Clover aphid
Order Homoptera
Length, 1/20 in.
One of numerous aphid species retards growth of plants; deposits harmful honeydew.

Green clover treehopper
Order Homoptera
Length, ⅛ in.
Grotesque adult; sucks juices of alfalfa, clover, timothy; lays eggs in stem punctures.

Sharp-headed leafhopper
Order Homoptera
Length, ½ in.
Common in meadow and pasture; nymphs and adults feed on plant sap.

Grasshopper
Order Orthoptera
Length, 1 1/4 in.
Various species migrate through fields; in outbreak years devours all vegetation.

Chinch bug
Order Hemiptera
Length, ⅛ in.
Attacks small grain; sucks sap, wilts and kills plants; bad odor when mashed.

Green stink bug
Order Hemiptera
Length, ⅝ in.
Shield-shaped, green adult; sucks sap from legumes; stunts and distorts seeds.

Rice stink bug
Order Hemiptera
Length, ⅘ in.
Adult and nymph feed on rice and grasses; suck sap from developing rice grains.
Alfalfa caterpillar
Order Lepidoptera
Length: 1 1/4 in.
Green; prefers alfalfa foliage, may eat clover, other legumes; adult: sulfur-yellow butterfly.

Cutworm
Order Lepidoptera
Length: 1 1/4 in.
Many species live in soil, cut off young plants; may strip fields in serious outbreaks.

Armyworm
Order Lepidoptera
Length: 3 in.
Wet weather, rank growth will attract them to small-grain fields; may strip vegetation.

Webworm
Order Lepidoptera
Length: 1 1/4 in.
Larva covers plant with silken mesh, feeds on foliage; pale-brown moth hides in grasslands.

Green cloverworm
Order Lepidoptera
Wing span: 1 1/4 in.
Dark-brown moth; slender, greenish larva attacks legumes and other crops.

Forage looper
Order Lepidoptera
Wing span: 3/4 in.
Moths appear early; several generations each year; late larvae most serious.

False wireworm
Order Coleoptera
Length: 1 in.
Dry areas; larva serious pest of wheat and other crops; black adult appears to stand on head.

Wireworm
Order Coleoptera
Length: 1 1/8 in.
Hard, dark-brown, smooth; feeds on seeds and roots; adult.

Maize billbug
Order Coleoptera
Length: 1/4 in.
Snout beetle eats holes in stems; feeding on inside tissue; larva.
**Striped cucumber beetle**
Order Coleoptera
Length: 1/8 in.
Adult general foliage-feeder; preads disease; larva mines dante roots and stems.

**Bean leaf beetle**
Order Coleoptera
Length: 3/16 in.
Reddish, yellowish adult eats holes in leaves; larva feeds on roots.

**Clover stem borer**
Order Coleoptera
Length: 1/4 in.
Reddish, blackish, shiny beetle feeds on foliage, lays eggs in stems, where larvae develop and feed.

**Clover root curculio**
Order Coleoptera
Length: 1/8 in.
Attacks most legumes; grub burrows into roots; adult beetle gnaws stems and roots.

**Clover leaf weevil**
Order Coleoptera
Length: 5/16 in.
In dry seasons may destroy alfalfa plantings; larva curves body with head and tail almost touching.

**Alfalfa weevil**
Order Coleoptera
Length: 1/8 in.
Important enemy of alfalfa; stout beetle and green larva hred and skeletonize foliage.

**Clover rootworm**
Order Coleoptera
Length: 1/8 in.
Adult feeds on foliage; larva feeds on roots; known also as grape colapsis.

**Rice water weevil**
Order Coleoptera
Length: 1/4 in.
Adult feeds on leaves; larv tunnels and feeds on roots.

**Clover seed chalcid**
Order Hymenoptera
Length: 1/16 in.
Black, wasplike adult; serious pest of alfalfa and red clover seed; larva develops in seed pod.
**Wheat stem sawfly**
*Order Hymenoptera*
Length: 3/8 in.
Wasplike adult; larva develops on upper stem of small grains and grasses, bores downward, weakens stems.

**Wheat straw-worm**
*Order Hymenoptera*
Length: 1/8 in.
Hairy, antlike adult; larva eats out crown of early wheat, stunts growth of late crop.

**Wheat jointworm**
*Order Hymenoptera*
Length: 3/8 in.
Wasplike adult; larva develops in stems, causing hard woody galls.

**Clover seed midge**
*Order Diptera*
Length: 1/8 in.
Becomes abundant, ruins red clover and crop; minor pest on other legumes; widespread.

**Wheat midge or red weevil**
*Order Diptera*
Length: 1/10 in.
Maggot develops in kernel of wheat and other small grains, reducing yields.

**Wheat-stem maggot**
*Order Diptera*
Length: 1/8 in.
Attacks lower stem parts; feed principally on wheat, rye, barley, oats; attacks other grasses.

**Hessian fly**
*Order Diptera*
Length: 1/8 in.
Wheat, barley, rye are preferred food, legless, headless maggots feed on plant sap.
Boll weevil
Order Coleoptera
Length, 1/4 in.
Serious pest to U.S. cotton; grub and beetle feed on squares, bolls, or terminal buds.

Darkling beetle
Order Coleoptera
Length, 1/4 in.
Cuts off young seedlings at night, burrows in loose dirt in daytime; larva, false wireworm.

Flea beetle
Order Coleoptera
Length, 1/10 in.
Dark, oval, jumping beetle; eats shot-holes in leaves; also attacks seedbeds.

Wireworm
Order Coleoptera
Length, 1/2 in.
Blunter worms attack seeds, cause failure to sprout; attack roots, hollow-out stems.

Thrips
Order Thysanoptera
Length, 1/20 in.
Light-yellowish to black; injure leaves, young terminal buds; leaves get cup-shaped, ragged.

Grasshopper
Order Orthoptera
Length, 3/4 in.
Various species migrate to all crops; when abundant, can destroy all vegetation.

Aphid or plant louse
Order Hemiptera
Length, 1/32 in.
Soft-bodied, sucking insects; red on underside of leaves and stems; curl or stunt leaves.

Fleahopper
Order Hemiptera
Length, 1/16 in.
Pale-green, soft-winged, jumping bug; attacks leaves and terminal buds with piercing, sucking mouth parts.

Spider mite
Order Araneae
Length, 1/60 in.
Found on underside of leaves; sucks sap, spins filmy web develops in hot, dry weather.
Bollworm or tobacco budworm
Order Lepidoptera
Wing span, 1 1/4 in.
Major pest; deposits eggs on growing tips, squares, bolls, where worms feed; also corn earworm, tomato fruitworm.

Stalk borer
Order Lepidoptera
Wing span, 2 in.
Caterpillar bores into stems, feeding on heart of plant; migrates about field.

Cutworm
Order Lepidoptera
Length, 1 1/4 in.
Eats off young plants at night; sometimes eats holes in leaves and devours plant.

Fall armyworm
Order Lepidoptera
Length, 1 1/4 in.
Inverted Y on head front; in outbreak years infestations may strip fields.

Armyworm
Order Lepidoptera
Length, 2 in.
Migrates to crops; yellow-striped species (not illustrated) is serious cotton pest in many areas.

Cotton leafworm
Order Lepidoptera
Length, 1 1/4 in.
Eggs deposited on underside of leaves; greenish worm with self-looing crawl strips leaves.

Tobacco hornworm
Order Lepidoptera
Length, 4 in.
Well-known tobacco pest, may defoliate plants; also tomato hornworm; adult, hawk moth, called tobacco fly.

Webworm
Order Lepidoptera
Length, 1 1/4 in.
Larva feeds under tent of fine webbing on foliage; many generations.
Tobacco splitworm moth
Order Lepidoptera
Wing span, 3/8 in.
Pinkish-white larva mines leaves, ruining them for use; also potato tuberworm.

Pink ballworm
Order Lepidoptera
Length, 1/5 in.
Moth lays eggs on cotton bolls, squares; pink worms eat out seeds in green bolls, stain fiber.

Lygus bug
Order Hemiptera
Length, 3/5 in.
Cotton pest; causes shedding of squares, blooms, young boll and deforms plants.

Rapid plant bug
Order Hemiptera
Length, 1/3 in.
Pierces terminal buds, leaves, bolls, stems; destroys young squares.

Tarnished plant bug
Order Hemiptera
Length, 1/5 in.
Feeds on plant sap; causes distorted, curly leaves; blasts young cotton squares.

Cotton stainer
Order Hemiptera
Length, 3/5 in.
Flat, narrow, long-legged bug, punctures bolls; causes yellow stain on cotton lint.

Conchuela or stink bug
Order Hemiptera
Length, 1/5 in.
Various shield-shaped bugs suck sap from buds; leaves, stems, bolls, causing them to shed.
Roundheaded apple tree borer
Order Coleoptera
Length, 3/8 in.
larva bores into tree; feeds on
twig, heartwood; young
trees show most serious effects.

Shot-hole borer
Order Coleoptera
Length, 1/16 in.
Beetle deposits eggs in twigs,
branches; larva tunnels with
grain of wood, exit holes look
like shot-holes.

Sinuate pear tree borer
Order Coleoptera
Length, 1/8 in.
Bronze adult feeds on foliage
flat-headed larva works beneath
bark, boring galleries.

Strawberry weevil
Order Coleoptera
Length, 1/4 in.
Eats strawberries, other
ants; feeds in buds and stems,
using fruit reduction.

Strawberry root weevil
Order Coleoptera
Length, 1/4 in.
Wingless adult lays eggs about
crowns; larva feeds on roots.

Plum curculio
Order Coleoptera
Length, 1/8 in.
Pest of stone fruits, apple; adult
feeds on fruit, foliage; grub
feeds inside fruit.

Cherry leaf beetle
Order Coleoptera
Length, 1/4 in.
Chrysomelid beetle; attacks
m., apple foliage also; larva

Peach bark beetle
Order Coleoptera
Length, 1/16 in.
Resembles shot-hole borer in
appearance and damage; larva

Grape flea beetle
Order Coleoptera
Length, 1/8 in.
Jumping beetle and brownish


Tile-horned prionus
Order Coleoptera
Length, 3 in.
Adult deposits eggs on bark; larva burrows in trunks and roots of trees and vines.

Pigeon tremex or horntail
Order Hymenoptera
Length, 1 1/8 in.
Long ovipositor pierces tree to deposit eggs; larva infests maple, elm, fruit, other trees.

Blackberry leaf miner
Order Hymenoptera
Length, 1/4 in.
Sawfly mines leaves of blackberry; two broods annually; important in Northeast.

Pear-slug
Order Hymenoptera
Length, 1/8 in.
Sluglike larva of black sawfly; feeds on leaves of pear, cherry, plum, apple, other plants.

Plum web-spinning sawfly
Order Hymenoptera
Length, 1/4 in.
Pest of plum and cherry trees; larva weaves foliage together for feeding.

Grape seed chalcid
Order Hymenoptera
Length, 3/16 in.
Deposits eggs on grape skin infests wild grape seed, sometimes cultivated varieties.

Mexican fruit fly
Order Diptera
Length, 3/16 in.
Larva works inside fruit; attacks citrus in Rio Grande Valley of Texas.

Cherry fruit fly
Order Diptera
Length, 3/8 in.
Yellow, black fly; larva develops inside fruit, leaving no outside evidence until nearly full-grown.

Apple maggot or railroad worm
Order Diptera
Length, 1/4 in.
Dark-brown, yellowish-white adult; maggot mines irregular winding tunnels in fruit;
**European red mite**
Order Anasarca
Length: 1/30 in.
Sucks apple, pear, peach, plum, prune, causing discolored leaves, at times defoliation.

**Clover mite**
Order Acarina
Length: 1/30 in.
Swarms on fruit trees, herbaceous plants in dry seasons; overwinters in egg stage on bark; known to invade houses.

**Citrus thrips**
Order Thysanoptera
Length: 1/30 in.
Yellowish; infests leaves and fruit of oranges, grapefruit, other citrus plants.

**Pear thrips**
Order Thysanoptera
Length: 1/15 in.
Sucks yellowish-brown; infests blossoms, leaves of pear, plum, apple, other plants.

**San Jose scale**
Order Homoptera
Length: 1/12 in.
Yellow, moist-appearing, circular insect, concealed beneath a scale; disfigures fruit; weakens or sometimes kills trees.

**Red-spotted apple leafhopper**
Order Homoptera
Length: 1/5 in.
One of many leafhoppers attacking apple trees; spot fruit, mottle leaves, drain tree of vitality.

**European peach aphid**
Order Homoptera
Length: 1/12 in.
Sucks sap of peach in some s; sucks sap from fruit, causes serious gall-like swellings on roots; prefers apple.

**Weevy apple aphid**
Order Homoptera
Length: 1/10 in.
Attacks aerial parts and roots of tree; causes serious gall-like swellings on roots; prefers apple.

**Pear psylla**
Order Homoptera
Length: 1/10 in.
Sucks sap from foliage, other tree parts; lowers tree vitality.
Grape phylloxera
Order Homoptera
Length, 1/24 in.
Complicated biology; injures roots and foliage with galls, causes tissue disintegration.

Yellow-necked caterpillar
or walnut worm
Order Lepidoptera
Length, 2 in.
Moth larva that feeds on foliage of orchard, walnut, other trees.

Red-humped caterpillar
Order Lepidoptera
Length, 1 1/4 in.
Larva of striking appearance sometimes defoliates apple and nursery trees.

Grapevine amphion
Order Lepidoptera
Wing span, 2 in.
Hawk moth; yellowish-green or chocolate-brown horned larva feeds on grape, woodbine.

Grape root borer
Order Lepidoptera
Length, 2 in.
Clearwing moth lays eggs on leaves; larva bores in roots for about two years.

Red-banded leaf roller
Order Lepidoptera
Wing span, 3/4 in.
Early larvae roll leaves and slight webs; later generate attack fruit.

Apple leaf skeletonizer
Order Lepidoptera
Wing span, 3/8 in.
Late summer and early fall injury to trees by dark-green, active caterpillar feeding in web.

Oriental fruit moth
Order Lepidoptera
Length, 3/8 in.
Attacks peach, apple, other fruit trees; early larvae tunnel twigs; later ones feed in fruit.

Grape berry moth
Order Lepidoptera
Wing span, 5/8 in.
Larva spins silken web on grape clusters; feeds in destroys grape berries.
**Fall cankerworm**
Order Lepidoptera
Wing span, 1/2 in.
Male moth, wingless female; larva feeds on fruit and other trees; spring cankerworm is similar species.

**Pistol casebearer**
Order Lepidoptera
Wing span, 1/2 in.
Brown worm enclosed in curved, silken case eats holes in leaves, buds, and fruits of apple, pear, cherry, plum, other trees.

**Codling moth**
Order Lepidoptera
Wing span, 3/4 in.
Most important pest of apple; larva feeds in fruit until full-grown.

**Fall webworm**
Order Lepidoptera
Wing span, 1/2 in.
Pale-yellow, black-spotted, hairy caterpillar feeds in dirty-white, loosely-woven web on tree leaves.

**Orange-dog**
Order Lepidoptera
Wing span, 6 in.
Larva feeds on orange tree, prickly ash foliage; red, pro-
Everyone who has planted flowers, shrubs, or grass about a home knows that insect pests are an important problem. Insects left uncontrolled may make gardens almost barren, and flowers are often lost to insects before a pest's presence is realized.

Thus, the more known about such adversaries and what to do about them, the more successful the gardener.

Many of the insects that feed on vegetables and other crops migrate into flower gardens. If your flower pests are not found in this chapter, refer to the section on general feeders—or chapters on crop pests—where you may find them or a close relative.

---

**Florida fern caterpillar**
Order Lepidoptera
Length: 1 1/8 in.
Cutworm that attacks foliage in southern states as do many cutworms and armyworms.

**Spanworm or inchworm**
Order Lepidoptera
Length: 1 in.
Type of looper; feeds on foliage; harmonizes with environment.

**Yellow woolly bear**
Order Lepidoptera
Length: 2 in.
A common, hairy caterpillar feeds on foliage, buds, and flowers.

**Stalk borer**
Order Lepidoptera
Length: 3 in.
Typical caterpillar tunneling stems; infests buds, feeds on leaves, eats plant heart.

**Grasshopper**
Order Orthoptera
Length: 2 1/2 in.
Brown, green, or gray, mottled, jumping insects strip leaves, eat tender stems.

**Slug**
Order Hymenoptera
Length: 1 3/5 in.
Adult, sawfly; larva, false cappillar, skeletonizes foliage, leaving slimy secretion.
Lesser bulb fly
Order Diptera
Length, ½ in.
Blackish-green, resembles wasp; wrinkled maggots infest bulbs, specially damaged ones.

Narcissus bulb fly
Order Diptera
Length, ½ in.
Yellow-black, hairy adult resembles bumblebee; maggots bore into bulb.

Japanese beetle
Order Coleoptera
Length, ½ in.
Greenish-brown; skeletonizes and feeds on foliage; grub feeds on plant roots.

Rose curculio
Order Coleoptera
Length, ¼ in.
Light-red snout beetle; adult and grub feed on buds and fruit.

Potato flea beetle
Order Coleoptera
Length, 1/16 in.
Jumping, hard-shelled, black adult; feeds on underside of leaves, eating many small holes.

Rose chafer
Order Coleoptera
Length, ¼ in.
Fawn-colored, cylindrical beetle attacks buds and blossoms; grub develops on roots.

Margined blister beetle
Order Coleoptera
Length, ½ in.
Peculiar, active, elongate blister beetle; feeds on blossoms, leaves.

Cucumber beetle
Order Coleoptera
Length, 1/8 in.
Striped and spotted adults feed on home, buds, and flowers.

Millipede
Class Diplopoda
Length, 1 in.
Hard-shelled, active, many-legged畅通无阻.
Flower Thrips
Order Thysanoptera
length, 1/15 in.
Yellow specks seen on many plants; injure leaves, blossoms.

Gladiolus thrips
Order Thysanoptera
length, 1/30 in.
Brown with white band; hibernate in corms; suck plant sap; deform blossoms.

Greenhouse whitefly
Order Homoptera
length, 1/80 in.
Snow-white adult and pale-green nymphs cover many plants; suck sap, destroy vigor.

Oystershell scale
Order Homoptera
length, 1/6 in.
Typical armor scale attacking trees, flowers, shrubs; reduces vigor or kills plant.

Aphid or plant louse
Order Homoptera
length, 3/32 in.
Sucks sap; weakens and distorts plant; leaves coat of honeydew; spreads plant diseases.

Root aphid
Order Homoptera
length, 1/10 in.
Infests roots and buds, especially of aster; attracts ants to feed on its honeydew.

Long-tailed mealybug
Order Homoptera
length, 1/6 in.
Covered with waxy or mealy excretion; sucks sap, exuding sticky honeydew on foliage.

Greenhouse pillbug or sowbug
Order Isopoda
length, 1/6 in.
Fat-bodied and segmented; related to crayfish; feeds on roots and tender stems.

Spider mite
Order Acarina
length, 1/80 in.
Minute pests suck juice from plants, discoloring foliage; sometimes spins web.
Insects destroy more forest trees than do fires. Both insects and forests are ancient, geologically speaking; and it is natural that the number of insect species attacking trees should be large. Many insects attack many kinds of trees; others attack only specific kinds of trees. Some insects are root-feeders; others bore into bark. There are those that suck sap, or feed on leaves; others tunnel in trunks; and still others feed on seeds and seedlings, thus reducing reforestation.

Forests destroyed by insects no longer protect birds and game. Their natural beauty and recreational facilities are lost. And most important to man is the loss of valuable timber.

It seems amazing that there are any trees at all, once the many insect species and large number of individuals that affect each tree are known. This section can illustrate only a representative group of these insect pests.
Buffalo treehopper
Order Homoptera
length, 3/4 in.
Peculiar-shaped, light-green adult slits bark, depositing eggs; nymph feeds on vegetation.

Scurvy scale
Order Homoptera
length, 3/4 in.
Pear-shaped, armor scale; lives on tree bark, sucking sap.

San Jose scale
Order Homoptera
length, 1/16 in.
Disk-shaped specks on tree bark; decreases vigor, causes thin foliage.

Periodical cicada or 17-year locust
Order Homoptera
length, 3/4 in.
Adult punctures trees and shrubs, depositing eggs; nymph lives from 13 to 17 years on root sap.

Sycamore lace bug
Order Homoptera
length, 3/8 in.
Adult and spiny nymph feed on under surface of leaves, sucking sap.

Boxelder bug
Order Hemiptera
length, 3/8 in.
Bright-red and black adult; sucks sap from leaves and new growth of boxelder or ash.

Tree cricket
Order Orthoptera
length, 3/4 in.
Delicate, slender, greenish; lives in weeds, trees, bushes; punctures twigs and branches to deposit eggs.

Monterey pine engraver
Order Coleoptera
length, 1/8 in.
Bark beetle; lays eggs in inner bark tunnels, where larva develops, feeding on sap wood.
Alder flea beetle
Order Coleoptera

Larva and larva feed on and eat leaves of alder, map, and willow.

Cypress webber
Order Lepidoptera

Adult moth; caterpillar burrows through cypress leaflets.

Pitch nodule moth
Order Lepidoptera

Wing span, 3/4 in.
Adult larva bores stems, twigs, and branches of lodgepole and ponderosa pine.

Maple collar borer
Order Lepidoptera

Wing span, 1 in.
Adult, crenate wing moth; larva feeds in maple.

Fir cone moth
Order Lepidoptera

Wing span, 1 in.
Adult; larva feeds on cones of pine, Douglas fir, balsam fir, and spruce.

California oakworm
Order Lepidoptera

Length, 1 in.
Feeds on leaves of oak, chestnut, and blue gum; grows up to be a moth.

Gypsy moth
Order Lepidoptera

Length, 1 in.
Destructive forest insect; feeds on foliage and terminal shoots; adult is a moth.

Spruce budworm
Order Lepidoptera

Length, 3/4 in.
Adult; larva defoliates many shade and forest trees.

Forest tent caterpillar or forest armyworm
Order Lepidoptera

Wing span, 1 1/2 in.
Adult; larva defoliates many shade and forest trees.
Oak timber or ambrosia beetle
Order Coleoptera
Length: 3/4 in.
Female tunnels oak; grows ambrosia fungi for food; keeps larva under protective care.

Bark beetle
Order Coleoptera
Length: 3/4 in.
One of most destructive insects attacking coniferous trees; mines under bark; transmits fungi.

Locust borer
Order Coleoptera
Length: 3/4 in.
Black and yellow beetle; larva tunnels phloem and wood destructive to black locusts.

Poplar and willow borer
Order Coleoptera
Length: 1/8 in.
Inout weevil, coloration matches tree bark; larva tunnels wood to feed.

Sugar-maple borer
Order Coleoptera
Length: 1 in.
Adult slits bark, deposits eggs; larva may tunnel around tree, killing it.

White-pine weevil
Order Coleoptera
Length: 1/8 in.
Adult deposits eggs in pine and spruce bark; larva tunnels shot-holes in twig bark.

Chestnut weevil
Order Coleoptera
Length: 3/16 in.
Long, curving beak bores in nut, deposits eggs singly; maggotlike larva feeds on kernel.

Wood-boring beetle larva
Order Coleoptera
Length: 3/8 in.
Hard-headed, strong-jawed larva develops from egg on bark may live in tunnels several years.
Leopard moth
Order Lepidoptera
Wing span, 3 in.
Striking adult; larva burrows heartwood of elm, maple, many deciduous and fruit trees.

Bogworm
Order Lepidoptera
Wing span, 1 in.
Male moth; female remains in bag; larva feeds in spindle-shaped bag on deciduous and evergreen foliage.

Fall cankerworm
Order Lepidoptera
Wing span, 1 1/4 in.
Male moth; female wingless; operculum larva defoliates seed and fruit trees.

Fall webworm
Order Lepidoptera
Wing span, 1 1/4 in.
Hairy caterpillar spins dirty-white web on shade trees and shrubs, feeding on foliage.

White-marked tussock moth
Order Lepidoptera
Wing span, 1 in.
Male moth; wingless female larva skeletonizes shade and fruit trees, scars fruit.

Brown-tail moth
Order Lepidoptera
Wing span, 1 in.
Caterpillar serious pest of deciduous and fruit trees; nerpling hairs dangerous on man.

Catalpa sphinx
Order Lepidoptera
Wing span, 3 in.
Gray moth; larva, ravenous foliage-feeder of catalpa tree, sometimes used as silkworm.
INDEX

Modern agricultural chemicals are helping immeasurably in the fight against insect pests. Consult your county extension agent or entomologist for current information about insect control.

| Amphion, grapevine | 48 |
| Ant | 3 |
| Argentine | 16 |
| black carpenter | 16 |
| cornfield | 37 |
| imported fire | 24 |
| little black | 16 |
| little red | 16 |
| Pharaoh’s | 16 |
| velvet | 11 |
| Ants or termites | 16 |
| Aphid | 5, 42, 52 |
| clover | 38 |
| corn leaf | 28, 37 |
| corn root | 30, 37 |
| European peach | 47 |
| grain | 38 |
| potato | 30 |
| root | 52 |
| turnip | 30 |
| woolly apple | 47 |
| Armworn | 7, 26, 36, 39, 43 |
| fall | 26, 43 |
| forest | 56 |
| Bagworm | 57 |
| Bee, carpenter | 9 |
| Beefly | 12 |
| Beetle, ambrosia | 55 |
| Asiatic garden | 28 |
| asparagus | 33 |
| bark | 55 |
| bean leaf | 33, 40 |
| black carrot | 18 |
| black lady | 12 |
| blister beetle, ash-gray | 34 |
| margined | 51 |
| Nuttall | 34 |
| Nuttall | 34 |
| carpet | 18 |
| cannon | 13 |
| carrot | 35 |
| cherry leaf | 45 |
| cigarette | 18 |
| Colorado potato | 33 |
| confined flour | 19 |
| convergent lady | 12 |
| cucumber | 51 |
| darkling | 42 |
| drug-store | 18 |
| eyed click | 2 |
| flea beetle | 42 |
| alder | 56 |
| grape | 45 |
| potato | 33, 31 |
| smartweed | 34 |
| spinach | 34 |
| striped | 28, 37 |
| striped cabbage | 34 |
| giant stag | 2 |
| giant water | 34 |
| harlequin | 31 |
| lighting | 2 |
| Lygus | 44 |
| negro | 31 |
| old-fashioned potato | 34 |
| potato | 33 |
| predaceous flower | 13 |
| rapid plant | 44 |
| rice stink | 38 |
| spined soldier | 13 |
| squash | 31 |
| stink | 30, 44 |
| sweetane | 54 |
| tarnished plants | 27, 30, 44 |
| toad | 4 |
| Bumblebee | 9 |
| Butterfly, cabbage | 6 |
| California tortoise-shell | 8 |
| clouded sulphur | 6 |
| monarch | 6 |
| mourning-cloak | 7 |
| roadside | 6 |
| tiger swallowtail | 6 |
| viceroy | 6 |
| zebra swallowtail | 8 |
| Cabbageworm, imported | 32 |
| Cadelle | 18 |
| Cadillac | 3 |
| Calico back | 31 |
| Cankerworm, fall | 49, 57 |
| Casebearer, pistol | 49 |
| Caterpillar, alfalfa | 39 |
| black swallowtail | 32 |
| Florida fern | 50 |
| forest tent | 56 |
| red-humped | 48 |
| salt-marsh | 27 |
| velvetbean | 32 |
| woolly hear | 6, 32 |
| yellow-necked | 48 |
| zebra | 32 |
| Centipede | 15 |
| Chafer, rose | 51 |
| Chalcid, black and yellow | 10 |
| clover seed | 40 |
| grape seed | 46 |
| Chigger | 23 |
| Cicada | 5 |
| periodical | 54 |
| Cloverworm, green | 39 |
| Cockroach | 5 |
| American | 15 |
| German | 15 |
| oriental | 15 |
| Colaspis, grape | 35, 37 |
| Corethra | 44 |
| Cricketer, field | 26 |
| house | 15 |
| Jerusalem | 14 |
| mole | 29 |
| Flower               | Melon or onion | Pear | Tick, American dog | Cattle | Fowl | Sheep | Walkingsick | Wasp, braconid | Minute trichogrammatid | Small braconid (stinging) | Aphid | Sphexid digger | Wingless | Webworm | Boll | Chestnut | Clover leaf | Pea | Pod | Red | Rice | Rice water | Southern cowpea | Strawberry | Strawberry root | Sweet potato | Vegetable | White-pine | Whitefly, greenhouse | Wireworm | False | Woolly bear, yellow | Worm, railroad | Walnut | Yellow jacket |
|---------------------|----------------|------|--------------------|--------|------|-------|------------|--------------|-------------------|--------------------------|-----------------|---------------|-----------|---------|-------|----------|-----------|-----|-----|-----|-----|---------|----------------|------------|--------------|-------------|-----------|-------------|------------|-------------|----------------|---------------|--------|-----------------|---------------|--------|--------------|
| flower              | melon or onion | pear | tick, american dog | cattle | fowl | sheep | walkingsick | wasp, braconid | minute trichogrammatid | small braconid (stinging) | aphid | sphexid digger | wingless | webworm | boll | chestnut | clover leaf | pea | pod | red | rice | rice water | southern cowpea | strawberry | strawberry root | sweet potato | vegetable | white-pine | whitefly, greenhouse | wireworm | false | woolly bear, yellow | worm, railroad | walnut | yellow jacket |

**Handle All Insecticides With Respect**

Insecticides have an excellent safety record. Never hesitate to use recommended insecticides; just be sure to use them properly and safely. Here are some basic safety rules:

1. Read the label.
2. Observe and follow all directions and all cautions on the label.
3. Store pesticides away from children, animals, and irresponsible persons.
4. Always keep chemicals in original and labeled containers.
5. Dispose of empty containers safely.

All insecticides can be poisonous to man and livestock. The residue resulting from dusting or spraying crops may persist for days or weeks after application. State agricultural authorities recommend periods of time which should elapse between application and harvest to avoid residue problems. These recommendations are important and should be consulted. When insecticides are used on food or forage crops, farmers should familiarize themselves with the residue tolerances, and make sure that spraying or dusting schedules and residue-removal procedures, if any, are arranged to eliminate the possibility of residues exceeding those permitted by law. Consult your county extension agent or entomologist for current recommendations and avoid insecticides which have been outlawed or banned from use in your state.
HOW INSECTS GROW UP

Insects thrive because they are able to adapt themselves to the world as they find it. This is clearly shown in their ingenious ways of reproduction. Most insects grow from egg to adult by means of one of two schemes, i.e., gradual growth or complete change. The eggs are deposited near a food supply, and for most insects the growing-up process occurs without help from the parents.

The grasshopper is an example of gradual growth. The egg hatches, and the tiny insect resembles the adult minus fully developed wings. Through a molting process, the insect sheds its hard skin several times as it grows from the young nymph to the adult.

The familiar butterfly is an example of complete change or metamorphosis. From the egg comes the caterpillar, which when fully grown transforms into a pupa or cocoon stage, from which later emerges the pretty butterfly seen flitting about.
Published by
THE NORTH CAROLINA
AGRICULTURAL EXTENSION SERVICE

North Carolina State University at Raleigh and the U. S.
Department of Agriculture, Cooperating. State College Station,
Raleigh, N. C., George Hyatt, Jr., Director. Distributed in
furtherance of the Acts of Congress of May 8 and June 30,
1914.