

IOWA AGRICULTURAL EXPERIMENT STATION
ENTOMOLOGY SECTION

COMMON GARDEN INSECTS

By R. L. Webster

CUTWORMS

Cutworms are not easily reached because of their habits of hiding in the soil, but there are some measures one can take to reduce their damage.

The eggs from which cutworms hatch are laid by dull colored moths, usually in grasses and some time during September. The young cutworms go into winter partly grown and in spring are ready and hungry for cabbage and tomato plants when these are set out. They feed mostly at night, hiding all day in the soil. Cutworms mature in late May or June, transform to the intermediate pupa stage in the soil and the adult moth later emerges from this pupa. Most cutworms have but one generation in a year.

Cabbage and tomato plants in a small garden are frequently best protected by placing small paper collars around the stems. These are merely strips of stiff paper, about 3 inches high, placed partly below the soil and tied around the stems. After the time for damage is past the collars can be removed. The use of a poison bran mash, made as recommended for grasshoppers at the end of this circular, has been

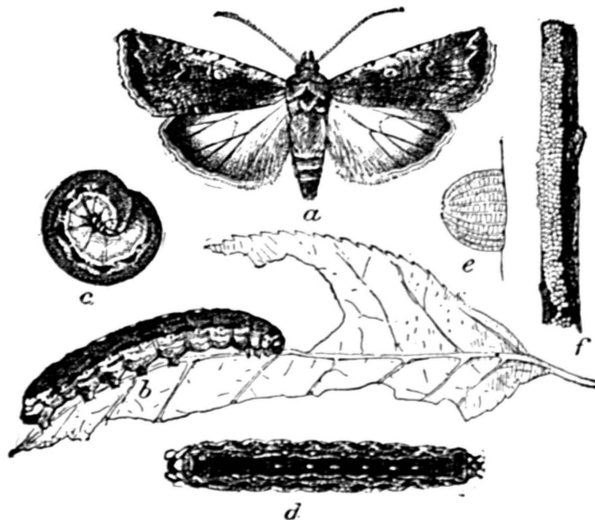


Fig. 1—The Variegated Cutworm: a, adult; b, c, d, full-grown larvae; e, f, eggs; all natural size except e, which is greatly enlarged. (From Howard, U. S. Dept. of Agr.)

very successful against cutworms. The mash is scattered about over the ground where cutworms are abundant, and they are readily attracted to it.

STRIPED CUCUMBER BEETLE*

The beetle is one of the most dangerous enemies of cucumber, squash and melon plants. The adults destroy the plants as soon as they get

above ground and the grubs feed on the roots of the same plants should they survive the injury from the beetles. Usually the eating of the leaves by the beetles is the injury noticed, altho the destruction of the roots by the larvae may be fully as serious. The plants are gradually weakened, finally wilt and die.

No single method of combatting this insect is completely efficient. The best single method is spraying the plants thoroly with lead arsenate paste, used at the rate of 3 to 5 pounds to 50 gallons of water.

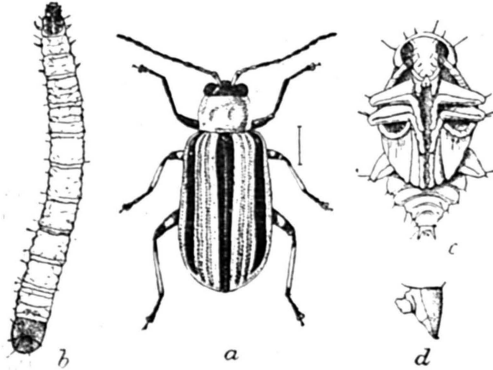


Fig. 2—The striped cucumber beetle (*Diabrotica vittata* Fab.): a, beetle; b, larva; c, pupa; d, side view of anal segment. All enlarged. (After Chittenden, U. S. Dept. Agr.)

Air slaked lime mixed with sulfur, tobacco dust and other similar preparations, thoroly dusted over the infested plants on the upper and lower leaf surfaces, does much good by hindering the activities of the beetles. This must be often repeated, since the beetles return to the plants as soon as the offensive substance is blown or washed away.

Where the beetles are known to be abundant, put in a few seeds of early squash around the edges of the garden. These serve as a trap crop and when the beetles begin to feed on them they should be sprayed with paris green or some other arsenical, thus destroying the insect before the main crop starts.

As most of the injury is done when the plants are very small, they are often protected with some kind of frame covered with mosquito netting or other thin cloth. A barrel hoop sawed in two and the pieces nailed together at right angles to each other at the middle makes a good frame. Make sure that no beetles are confined beneath the screen.

CABBAGE WORMS

The only completely successful way to fight cabbage worms is to begin as soon as the plants are set out and spray repeatedly with some arsenical poison at intervals of a week or ten days until the cabbages have begun to head. Where this is done by all the growers in one locality, the worms never do much damage. The amounts recommended are given herewith.

**Diabrotica vittata* Fabr.

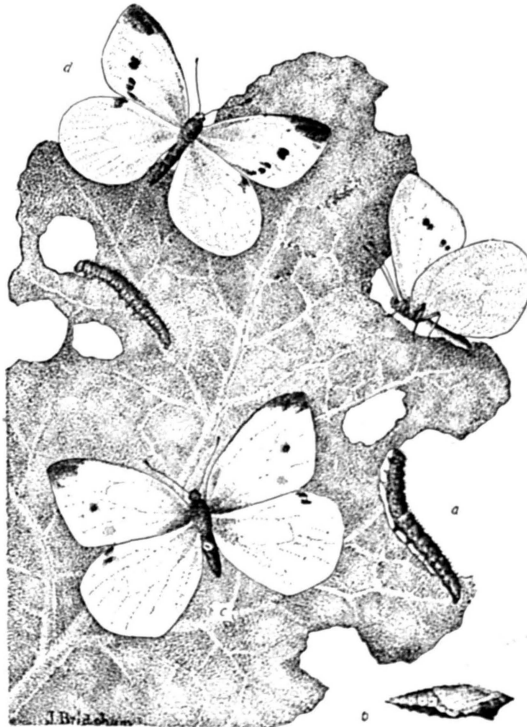


Fig. 3—The cabbage butterfly (*Pontia rapae* Linn.): a, larva; b, chrysalis; c, male butterfly; d, female butterfly. (After C. M. Weed).

Paris green	$\frac{1}{3}$ lb.
Soap	3 lbs.
(or resin-lime mixture $2\frac{1}{2}$ gal.)	
Water	50 gal.

Lead arsenate may be used in place of paris green. If lead arsenate paste is used 2 pounds are required, if powdered lead arsenate is used only 1 pound is needed.

Because of the smooth leaves of cabbage plants a "sticker" is necessary in using arsenical solutions. The resin-lime mixture, which is used only as a "sticker", is made as follows:

Pulverized resin.....	5 pounds	Fish oil.....	1 pint
Concentrated lye.....	1 pound	Water	5 gallons

Place the oil, resin, and one gallon of water in a kettle and heat until the resin is softened; add the lye solution made as for hard soap; stir thoroly, add remainder of water and boil for about two hours, or until the material will mix with cold water and make a clear, amber-colored fluid. Add enough boiling water to make the 5 gallons. This is the stock solution and is used with paris green or lead arsenate as given above.

On a small scale, dusting the plants with paris green and flour, one

part of paris green to twenty parts of cheap flour, is effective. Air slaked lime may be used in place of flour and powdered lead arsenate may also replace the paris green. It is not usually considered safe to apply an arsenical after the plants are headed.

Pyrethrum or hellebore are the only substances that can be used with absolute safety after cabbages are heading. Treatment with either of these substances at that time is more or less unsatisfactory.

GARDEN PLANT LICE

Probably the simplest material to use in combatting plant lice is a soap solution. Ivory soap or the common white laundry soap may be used at the rate of one pound of soap to ten gallons of water. For small quantities, four ounces of soap to a ten quart pail is sufficient. The soap is cut into fine pieces, dissolved by boiling, then diluted with water.

The material should be applied to infested foliage by means of a small spray pump or similar outfit. Thoro work is necessary for only those insects actually hit with the spray are killed. The material kills by contact since these plant lice feed with their beaks inserted in the plant tissue and cannot be reached by any material that would be taken into the stomach.

"Black leaf 40" is a very satisfactory material for use against plant lice. This is a tobacco extract containing 40% nicotine and may be diluted as much as 1 part in 1,000 parts of water for the plant lice. Where the spraying is thoro, this strength is sufficient. A fine nozzle on a rod slightly bent at an angle should be used for this work. The spray must be forced up into the curled leaves where the aphids are at work.

Kerosene emulsion is often used, tho there is some danger of burning foliage with this. It is made as follows:

Kerosene	2 gallons
Hard soap	$\frac{1}{2}$ pound
Water	1 gallon

This makes the stock solution. The soap is dissolved by boiling in water and is then churned up with the kerosene, until the two are emulsified into a white, creamy mixture. This stock solution is then diluted with water, while still warm, to the required amount. For plant lice this should be diluted one part with 10 parts of water.

THE STALK BORER*

This insect bores into stalks of potato, tomato, corn, wheat, oats, bluegrass, and also a large number of ornamental plants, such as dahlias, asters, lillies, etc.

There is no means of combatting this borer after it gains admittance to the stalk, except by cutting out the insect. Wherever a plant is seen to wilt this should be removed and burned, so as to destroy the worm before it can mature.

There is only one brood of these insects a year and they commonly reach maturity in the middle of August. They sometimes pupate in the stalk, especially in the case of large, hollow stalks like those of the potato and tomato, but sometimes burrow a short distance into the ground for pupation. The adult is a moth of a wood brown color, sprinkled with yellowish dots. It is one of the night fliers. The eggs are laid in the early spring on the stalks attacked.

**Papaipema nitela* Guen.

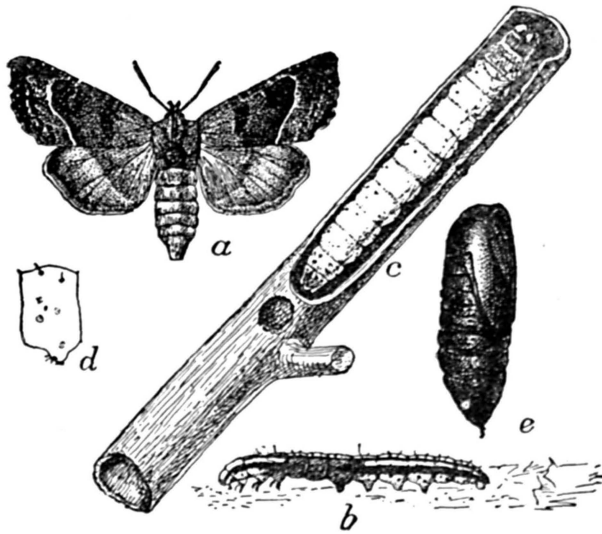


Fig. 4—The stalk-borer (*Papaipema nitela* Gn.): a, adult; b, half-grown larva; c, mature larva in burrow; d, side of one of its segments enlarged. (From Chittenden, U. S. Dept. Agr.)

This insect frequently becomes abundant enough to do serious damage to potato and tomato plants; rarely it becomes a somewhat serious pest in corn fields. No practicable remedies other than the hand picking to decrease future injury have been suggested.

THE COLORADO POTATO BEETLE*

The Colorado potato beetle, in both the grub and the adult stage, causes damage by feeding on potato foliage. Where abundant, plants may be entirely defoliated and even the stalks gnawed. This insect is well known to most people, both as the reddish, fleshy grub and as the striped, hard backed, adult beetle.

The yellowish eggs are deposited by the beetles in bunches on the leaves. The ravenous grubs are reddish, with small dark heads. Going into the soil when mature the larvae transform to the intermediate pupa stage, from which they emerge as adult beetles.

Life History. Wintering over in the adult stage, the beetles are often plowed or spaded up in spring. Usually they are found above ground by the time potato plants are up. During late May and early June eggs are deposited on potato foliage. These hatch in about a week, by which time they are full grown. Since the beetles do not deposit all their eggs at one time, the larvae, or young grubs, may be and the hungry grubs at once attack the leaves, feeding for 2 or 3 seen almost continuously during the season. On maturing, the larvae enter the soil and change to pupae from which the beetles emerge in about 2 weeks. It takes 4 or 5 weeks in summer from the time the eggs are deposited until the adults come from the soil. In central Iowa the larvae are abundant during all of June, but they decrease in num-

**Leptinotarsa decimlineata* Say.



Fig. 5—Colorado potato beetle. Enlarged 3 times

bers as the grubs mature. In July the beetles again become abundant and these deposit eggs in late July and early August. Larvae are again common during August and adult beetles come out in late August and during September. In October these beetles enter the soil where they spend the winter.

Control Measures. Potato plants should be sprayed with an arsenical poison as soon as they are well above ground. By so doing many adult beetles will be killed before depositing large numbers of eggs. Many wait until the grubs are actually stripping the plants before taking action. The wisest plan is to begin spraying early.

Paris green is most widely used. Lead arsenate sticks better to foliage, tho it is slower in action. Either poison may be used with bordeaux mixture. Lead arsenate, 2 to 3 pounds to 50 gallons of water, or paris green one-half pound to 50 gallons of water is recommended. If paris green is used, about a pound of freshly slaked lime should be added to the solution to prevent burning of foliage. Paris green may be used dry, mixed one part to twenty parts of cheap flour or air slaked lime and dusted on the leaves. Because of the high price of paris green it is likely that arsenate of lime (calcium arsenate) will be used largely in place of paris green. It may be used, in dry form, at approximately the same strength as paris green. It should be used with lime, as recommended for paris green.



Fig. 6—Colorado potato beetle. Mature larva enlarged 3 times. (Drawn by W. O. Ellis.)

THE SQUASH BORER*

Much damage is caused to squash and pumpkin vines by the borer. This insect occasionally attacks cucumbers, but not usually if any squash or pumpkins are grown nearby. This is a difficult insect to combat when it becomes abundant and no entirely successful measure is known. As many as 40 borers have been found in a single vine.

The parent form of the squash borer is a clear-winged moth, which looks something like a large wasp. These moths place their eggs on the various food plants about the time these start growth in the spring. The young borers hatch in a week or so, tunnel into the stems and mature in about a month. Full grown larvae are about an inch long, stout, white, with a small black head.

Mature borers leave the stems and enter the soil where they form earthen cells. Herein the intermediate pupa stage is formed and the adult moth emerges from this. In Iowa these moths deposit eggs for a second generation of borers which attack plants in late summer.

**Mellitis satyriniformis* Hbn.

Since the borers work inside the stems, they cannot be reached by any insecticide treatment. One of the most useful measures is early planting of a catch crop of squash upon which the moths will lay their eggs. The plants can then be destroyed. When the injury is seen before the vine wilts too badly, the borers should be cut out and the injured place buried in wet soil. New roots will form at this point.

All infested vines should be raked up and destroyed as soon as the crop is gathered, to catch any borers still within. Since the insects winter in the soil they can be reached by frequent light harrowing in the fall. This kills many and brings others to the surface so deep plowing in spring will bury them and the moths be unable to emerge. Rotation of crops is also of value.

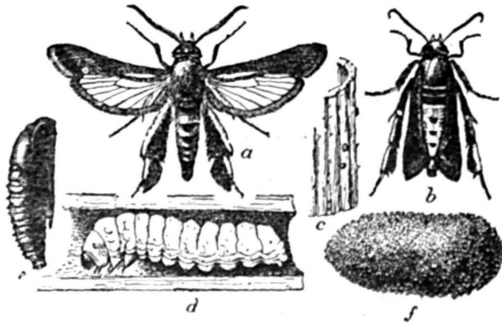


Fig. 7.—The squash borer (*Melittia satyriniformis* Hbn.): a, male moth; b, female with wings folded at rest; c, eggs shown on bit of stem; d, full-grown larva in vine; e, pupa; f, pupal cell. (After Chittenden, U. S. Dept. Agr.)

BLISTER BEETLES

Several kinds of blister beetles, sometimes called "old fashioned potato bugs" are common in Iowa and often seen in gardens. Occasionally they cause severe damage. One common species (fig. 8) is black, another is yellow-brown, striped with black.

Blister beetles are gregarious; they are found usually in droves. Frequently one may encounter them in great numbers in a place one day, and the next day be unable to find a single individual in the same location.



Fig. 8.—Black blister-beetle. Enlarged 3 times. (Drawn by W. O. Ellis.)



Fig. 9.—Black blister-beetle. First stage larva (*triungulin*.) Enlarged.

The beetles eat foliage of various kinds, such as beans, potatoes, etc., occasionally causing considerable damage. Where the injury threatens to be serious, foliage should be sprayed with an arsenical, such as paris green or lead arsenate. One-half pound of paris green is sufficient for 50 gallons of water. If lead arsenate is used, 3 pounds to 50 gallons of water is necessary.

Some of these blister beetles have a very interesting life history, since in their larval or grub stage they are beneficial insects. The young of certain of these beetles feed on grasshopper eggs, and are very important natural enemies of grasshoppers.

GRASSHOPPERS

When grasshoppers become abundant they are likely to cause severe damage to garden crops. One of the most important measures for grasshoppers is the poisoning method, used with success in Iowa in 1917. The poison bran mash was made according to the following formula:

Wheat bran.....	25 pounds
Paris green or white arsenic.....	1 pound
Lemons or oranges.....	6 finely chopped fruits
Low grade molasses.....	2 quarts
Water	2½ gallons

The dry bran and poison should be mixed in a large box with a hoe. The molasses is then dissolved in the water and to this is added the lemons or oranges, pulp, peel and all. This is stirred into the poison bran and mixed until a good mash is obtained. Only sufficient water is necessary so that the mash will hold together when pressed in one's hand. Tomatoes or cut muskmelons may be substituted for the oranges and lemons.

This poison bran mash should be scattered broadcast over the ground where the grasshoppers are abundant. A mash made according to the above formula, should cover 4 or 5 acres, at a cost of about 40 cents an acre for materials. It is best applied late in the afternoon or very early in the morning. To be effective the mixture must be moist; it does not attract grasshoppers after becoming dry. Heavy dews, however, will renew its effectiveness. In one trial of this material, used at Traer, Iowa, in August, 1917, 33 dead grasshoppers were counted per square foot, according to observations made by E. V. Walter, who conducted the work for the Iowa Experiment Station.

Poultry may be poisoned by eating this mash, and it should be used with caution when chickens run at large. There is practically no danger of poisoning stock.