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No.

Ohio Agricultural Experiment Station.

CIRCULAR NO. 142

WOOSTER OHIO, JANUARY 15, 1914

THE PERIODICAL CICADA OR SEVENTEEN-YEAR LOCUST

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A strong brood of the Periodical Cicada, commonly but erroneously, spoken of as the Seventeen-year Locust, is due over most of eastern Ohio in the summer of 1914.

So far as previous records can be relied on to indicate the area which will be visited by the insect the coming season, the following counties may expect it: Ashland, Athens, Belmont, Carroll, Columbiana, Coshocton, Crawford, Cuyahoga, Delaware, Erie, Fairfield, Gallia, Geauga, Guernsey, Harrison, Hocking, Holmes, Huron, Jackson, Jefferson, Knox, Licking, Lorain, Mahoning, Medina, Meigs, Monroe, Morgan, Muskingum, Noble, Perry, Pickaway, Pike, Portage, Richland, Ross, Sandusky, Scioto, Seneca, Stark, Summit, Tuscarawas, Vinton, Washington and Wayne.

The accompanying map, taken, slightly modified, from Bulletin 87 of this Station, shows the general distribution of the brood as recorded by State and U. S. government entomologists in 1897. An inspection of it indicates that infestation was general over most of these counties, but in some of those on the outer borders of the area, it was limited to certain districts. We respectfully request that friends and correspondents of the Station, who, this coming summer, find themselves within the range of the brood, take the trouble to inform us of the fact, and, if possible, send us specimens of the insect supposed by them to be the Periodical Cicada to confirm their report. Such reports, if sufficiently numerous and trustworthy,



Fig. 1. "The Periodical Cicada; side view of female to show beak, a, and ovipositor, b. (after Riley)." Bul. 71, New Series, Bureau Entomology, U. S. D. A.

will enable us to make any needed corrections of the map that was prepared in 1897, and may disclose to us the disappearance of the insects from some of the territory they formerly occupied. It is quite possible that they will have become very much thinned out, or will have disappeared entirely from some neighborhoods in which they were present in 1897.



Fig. 2. The shaded portion of the map indicates the approximate area over which the 1914 brood of the Periodical Cicada will appear.

CHARACTER OF DAMAGE

The chief damage by the Cicada is done by the adult females through their habits of egg-laying. The female is provided with a saw-like ovipositor and with this she makes incisions or cuts into

the twigs of trees and sometimes into the trunks of young trees. A row of these punctures is made longitudinally along the limb or twig, each being made double so that it consists of two pockets, each pocket containing a double row of eggs. The smaller twigs of such trees as oak, hickory and apple are preferred, but the twigs or stems of almost any tree or herbaceous plant may be utilized. The damage to large shade or forest trees is not usually excessive, though thousands of the insects may occupy a single tree. But in newly planted orchards, especially of apple,



Fig. 3. "Tip of ovipositor of Cicada, much enlarged; a, from above, b, from beneath, with dotted portion to show the alternating motion of the side pieces." Bul. 71, New Series, Bur. Entomology, U. S. D. A.

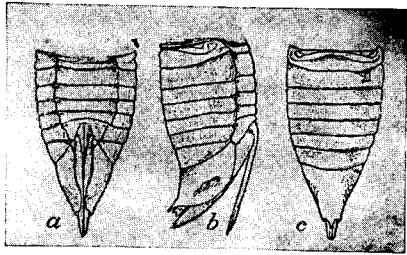


Fig. 4. "Abdomen of female Cicada showing ovipositor and attachments; a, ventral, b, lateral, and c, dorsal view." Bul. 71, New Series, Bur. Entomology, U. S. D. A.

or in those from one to three years old, the damage is likely to be serious and may be disastrous. Peach, pear and grape are also often seriously injured. Orchards surrounded by woods or located on recent clearings are most apt to suffer. The injured twigs are quite readily

broken off by the winds, either falling to the ground or remaining suspended during the remainder of the summer with the brown dry leaves still clinging to them.

Recovery from injury is usually approximately complete, in case of large trees, in two to three years. Young orchard trees, if otherwise healthy and in vigorous growth, generally heal in a few years so that the scars from the wounds can hardly be detected. But newly-planted trees, which have taken but little root at the time of attack, heal more slowly and may not wholly recover for many years. Borers are apt to seek entrance into the wood through such openings, and the woolly apple aphid is quite certain to collect in the fissures, thus formed, through the bark of its preferred host-trees.

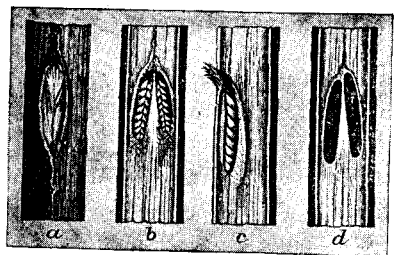


Fig. 5. "Egg nest of the Periodical Cicada: a, recent puncture, front view; b, same, surface removed to show arrangement of eggs, from above; c, same, side view; d, egg cavity exposed after eggs are removed, and showing the sculpture left by the ovipositor." Bul. 71, New Series, Bur. Entomology, U. S. D. A.

The adult insects of both sexes thrust their needle-like bills through the bark and imbibe the sap of both orchard and shade trees. While the damage, thus inflicted, is believed to be small, it is obvious that it is not desirable to have large numbers of them sucking the sap from newly transplanted trees, especially in times of drouth.

The larvae of the Cicada dwell underground for seventeen years, and during practically all of this time gain their nourishment by sucking sap from the rootlets of trees or herbaceous plants. So far as known, but little damage is done to either plants or roots by this kind of feeding. The insects grow so slowly that the drain they make upon the plants attacked is hardly perceptible.



Fig. 6. A two-year-old apple tree with twigs breaking badly, following injury by Cicadas.

LIFE HISTORY AND HABITS

The adult insects may be looked for in Ohio in late May or early June. Under normal conditions they are most likely to appear numerous during the last week in May, but the bulk of the brood may come a little earlier or a little later than this,

according to seasonal conditions. The brood usually lasts for five or six weeks, disappearing rather suddenly and very completely during early July.

The female is believed to lay from 400 to 600 eggs in the course of her life-time, depositing them in nests of from 14 to 20 eggs each. The number of nests made in a single twig varies from 4 or 5 to 15 or 20, and as many as 50 have been found in one single line. The eggs do not hatch until six or seven weeks after deposition. Sometime in late July or in August, the young escape from the twigs and drop to the earth; then bury themselves at once, entering the soil

through the first surface crack or fissure encountered. Entrance may be gained at the base of some plant. When safely hidden, each seeks a small rootlet and constructs a cell, at first not larger than a bird-shot, in which it lives, sucking nourishment from the rootlet through its beak. The skin is moulted at long intervals, four larval and two pupal stages being passed in the course of its seventeen years of underground development.

When about mature, the pupae burrow upward to the surface and emerge through small, round holes about the size of a man's little finger. They usually penetrate nearly to the surface sometime in April, but only an occasional specimen actually issues before being fully ripe for transformation to the adult. A few emerge from their burrows and hide beneath logs, stones, etc., awaiting favorable conditions for changing to their final form.

Under some conditions, not well understood, the pupae adopt the general habit of making mud-cones or chimneys above the ground by continuing upward and capping their holes several weeks before the time of issuing. These structures are variously known as Cicada "huts," "cones," "towers," "roofs," "turrets," and "adobe dwellings." They measure from 2 to 3.5 inches in height, and often cover many acres of space. When conditions are in all ways propitious, the pupae swarm from the ground with a rush and there is an immediate scramble that each insect may be the first to ascend the nearest weed, bush or tree. Emergence from the holes begins soon after sunset, and the pupae continue ascending for some hours, though the great rush is over by 9 or 10 o'clock. In about an hour after ascending and settling on a suitable support, the skin splits down the middle of the back of the pupa, and gradually the Cicada extricates itself from the pupal shell which remains fastened to its support, and by the morrow the adult is a well-hardened insect. Many thousands, as many as 20,000 to 40,000 pupae, may ascend from under a single, good-sized tree. Only the male Cicadas sing.

PREVENTIVES OF DAMAGE AND REMEDIES

Since the chief damage done by the insect is inflicted on young orchard trees, all precautionary measures that can be taken to protect such trees, or to reduce damage done to them, are important. Such trees may have the trunks and larger limbs wrapped with paper to prevent egg-deposition, and the unprotected upper limbs and twigs should be either enclosed with mosquito netting as complete protection, or else liberally sprayed with Bordeaux mixture or lime-sulfur wash as partial protection. Some excess of lime in these

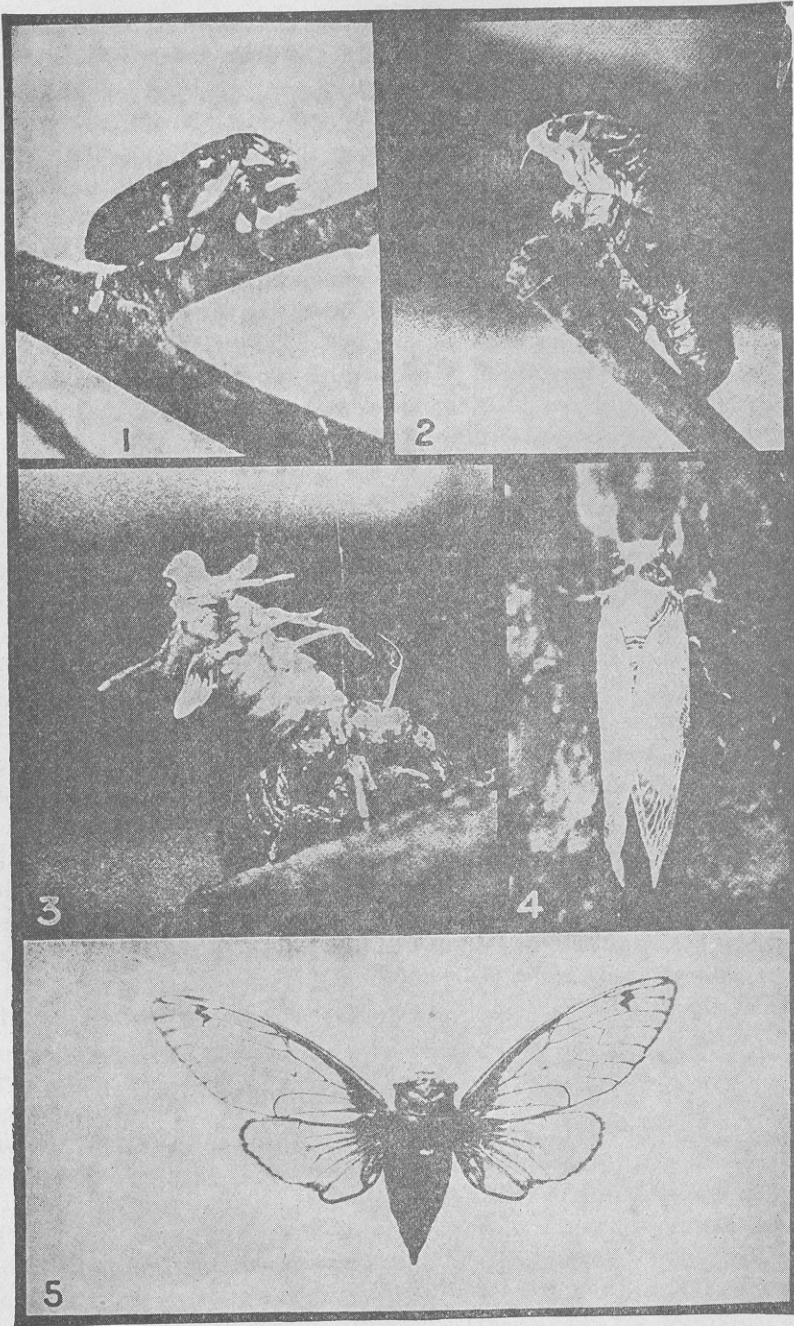


Fig. 7. "The transformation of the emerged Periodical Cicada. 1—Pupa ready for transformation. 2—Adult beginning to issue from pupal shell. 3—Adult nearly free from pupal shell. 4—Freshly transformed adult, the coloring immature. 5—Adult, several hours after transformation, the coloring mature. About natural size." *Bul. 71, New Series, Bur. Ent., U. S. D. A.*

sprays is probably desirable. Ill-smelling, repellent sprays, such as fish-oil soap and carbolized mixtures, have been proven practically valueless. It is probably best to omit all pruning of young trees during the winter and spring preceding the appearance of a strong brood, since all the wood available is needed to secure as much distribution as possible of the eggs. The surplus damaged wood can be cut out and burned while it contains the unhatched eggs, or this may be done the following winter. Trees planted out just preceding the appearance of a brood, must, of course, be cut back, but the trunks and bases of the limbs can be wrapped with paper and the reduced top enclosed in mosquito netting. Well-grown or old trees, supplied with an abundant growth of new wood, if so located that they are specially liable to attack, may be pruned lightly, or not at all, before the coming of the insects. All protectors of paper, netting, or spraying mixture, should be on the trees by the 20th of May, or first of June, to anticipate the arrival of the insects.

Hand collecting of the insects has been resorted to by some large nurseries to protect the young trees from injury, and where thoroughly carried out, day by day, from the first appearance of the insects until they disappear, is a measure of considerable effectiveness, though quite expensive. Persian insect powder, otherwise known as pyrethrum, blown from a powder gun on the newly emerged adults, kills practically all that it hits, but is of no use against the pupae. A water solution of pyrethrum may be made by mixing a little milk with water, then stirring into it all the insect powder it will hold, and this can be very effectively applied with a spray pump. This aqueous solution of pyrethrum is of some value against pupae as well as adults. Kerosene emulsion, diluted with eight parts of water, is the most efficient spray that has been used on the pupae, and it is also of considerable value against the adults. These spraying and dusting operations are carried on most effectively at night, when the brood is just emerging, or in the early morning while the insects are still sluggish and soft after transforming. Obviously, measures to prevent damage to the trees will be in all respects more effective, inexpensive, and satisfactory than attempts to kill the insects in any stage.

There is no satisfactory method for killing the larvae or pupae in the soil. The extent of infestation practically precludes consideration of bisulfide of carbon, naphthalene, tobacco dust, or other substances commonly employed against subterranean insects.

*Persons desiring fuller information regarding the details of this insect's life-history and distribution by broods, are respectfully referred to Bulletin 71, New Series, Bur. Entomology, U. S. D. A., from which the information for this Circular has been largely gathered. However, it is believed that the main facts here recorded and the recommendations made will be found to fit Ohio conditions.