THE PERIODICAL CICADA

Richard J. Quinton

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The periodical cicada or 17-year locust will appear in Connecticut in late May of 1962. If undisturbed, the adult females will lay their eggs in twigs and small branches, thereby causing injury to young trees. The adult cicadas will die by early July. The young larvae will drop to the ground, burrow in, and feed on small roots for 17 years.

Few insects have aroused more curiosity and wonder than the cicada. Its activities have long been surrounded by vague speculation. Allusions to this insect are numerous in classical literature. The cicada has been depicted in the art of many civilizations and appears in ancient myth and folklore.

The etymology of the word cicada is dubious and reflects some of the mystery that has surrounded the insect. The word "bug" may have come from a Celtic name meaning "ghost" or "goblin." Reference may well have been to the cicada whose sudden appearances and mysterious habits have long intrigued man's imagination. Although the word "cicada" itself is Latin, its ultimate derivation may also have been Celtic.

Modern taxonomists have embodied this early enigmatic image in the present designation of the periodical cicada. They have assigned to this insect the generic name *Magicicada,* magical or enchanted cicada.

Different types of cicadas are found in many parts of the world, but the periodical cicada is peculiar to the United States. There are two races, distinguished by the length of the life cycle. The 13-year race does not occur in Connecticut, but the 17-year race has regularly recurred since time unknown, certainly since 1724 when the first written record was made.

In each race there are a number of distinct broods that emerge in different years and are distinguished on that basis. Seventeen broods of the 17-year race are recognized, but only two of them occur in Connecticut. Their distribution in the State is shown in Figure 1. Brood XI, which will emerge in 1971, is of small size and is limited to parts of Hartford County. Brood II will issue in 1962 and will be seen in parts of Hartford, New Haven, and Middlesex counties. The local abundance of the periodical cicada is limited to well defined areas. Cicadas usually occupy high ground and do not breed at the lower levels. There seems to be little tendency for the species to disperse.

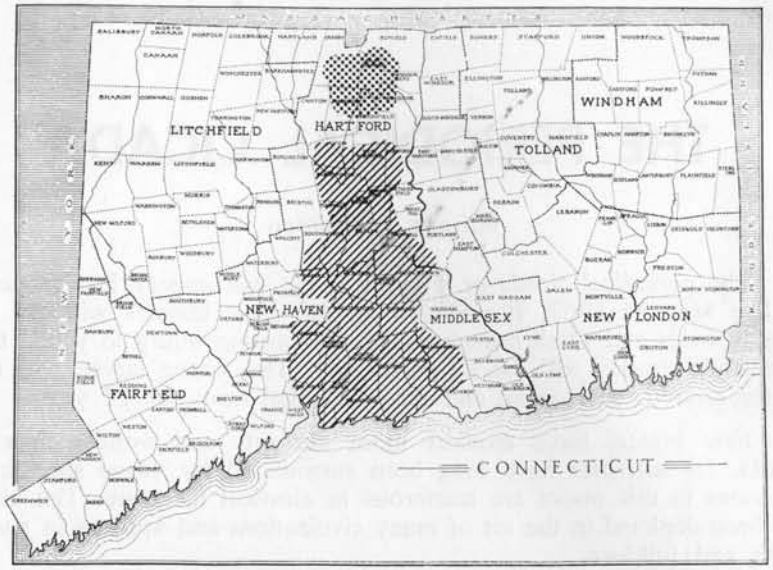

FIGURE 1. Distribution of the periodical cicada in Connecticut. Brood II will appear in 1962 in the area shaded. Brood XI will appear in 1971 in the smaller area in Hartford County.

The periodical cicada or 17-year locust should not be confused with the common cicadas which are present in Connecticut each year. These common cicadas are familiar to everyone, by sound if not by sight. Also called "harvestmen" or "dog-day cicadas," they are never abundant and are not injurious. Their shrill songs are always heard during hot, humid weather in late summer. Two of the seven species of common cicada occurring in Connecticut are shown in Figure 2. The adults are green and black. The periodical cicada, also shown in Figure 2, is black marked with orange. It has distinctive red eyes. This cicada is essentially a June insect, and its singing is most evident at that time. As with all cicadas only the male sings. The shrill sound is produced by two drum-like membranes located at the base of the abdomen just back of the legs. The song is notably distinct for each species.

Life History and Habits

Adult periodical cicadas begin to appear during late May at about the time orchardists are applying the first cover spray. Large numbers of cicadas appear within a few days of first emergence. Adults are seen throughout June and disappear early in July.

After emergence from the ground the pupae climb up tree trunks or other supports. There the final molt takes place. Prior to emergence pupae may construct earthern cones above ground. Newly issued adults

are pale-colored but rapidly change to the mature black. Egg laying begins in about a week and proceeds most actively during clear, sunny weather. The eggs are laid in the wood in rows of punctures, each of which contains about two dozen eggs. From 400 to 600 eggs are deposited by each female. The eggs hatch in 6 to 7 weeks. Cory and Knight (1937) reported that the eggs did not appear to hatch in the dead or dry wood resulting from twig breakage.

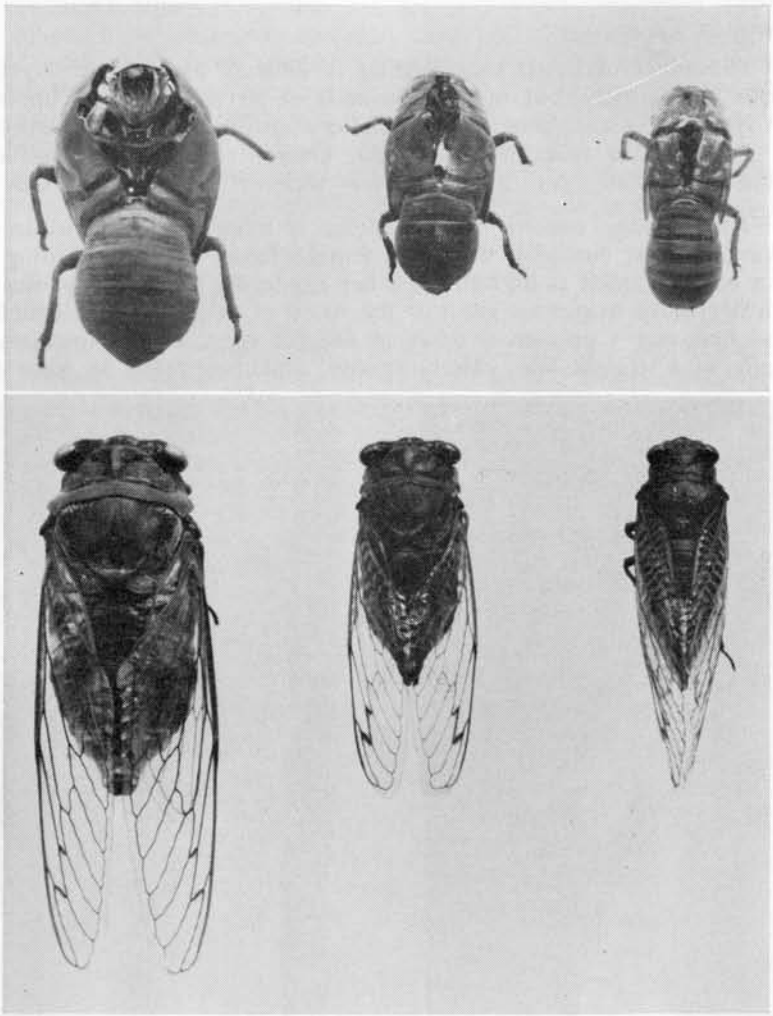

FIGURE 2. The periodical cicada, *Magicicada septendecim* (L.), at right, is shown with two of the common cicadas seen every year; center *Tibicen auletes* Germ.; at left *Tibicen canicularis* Harris. Empty pupal cases of these three cicadas are shown in corresponding order. All are about life size.

The young larvae are active and soon drop to the ground and burrow below the surface. At depths down to 2 feet they feed on small roots by sucking plant juices. The initial feeding site seems to be permanent for the duration of the 17-year development period. The larvae of the 1962 brood will emerge in 1979, spend their few days in the sun as pupae and adults, and thus keep in motion the strange and marvellous biological clock that governs the periodical cicada.

Injury to Trees

The effect of larval root feeding is difficult to evaluate. Nymphal counts vary greatly, but many thousands of larvae may feed upon the root system of a tree. Some commercial orchardists feel that normal crops are produced in spite of the cicada. Others suggest that production declines, especially during the last few years of the larval period.

The damage caused by the adults is more evident. Cicadas are sucking insects; but only the adult female feeds, and her feeding has never been regarded as harmful. It is her egg laying habit that is injurious. With her sharp ovipositor she rips the wood of twigs, and the splintered wood becomes a protective covering for her eggs. These punctures are usually in a straight line, closely spaced, and there may be from 5 to

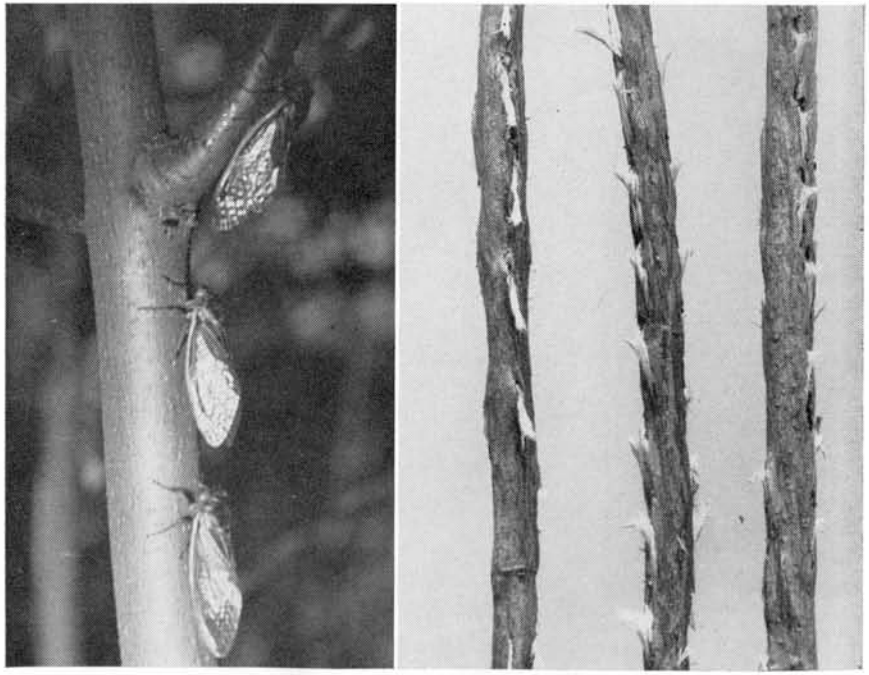

FIGURE 3. At left, adult periodical cicadas; at right, twig injury caused by female cicadas.

20 or more on a single twig. Where there are many punctures, a twig may be so weakened that it breaks readily under stress of high winds or developing fruit. Broken branches usually hang, the leaves turning brown. This flagging is conspicuous on forest and orchard trees following an attack by the cicada.

The extent of injury reported varies greatly. Earlier writers, Marlatt (1907) and Britton (1911), felt that oviposition wounds rarely resulted in permanent injury. Cutright and Parks (1949), Hamilton (1953), and others have observed, however, that young trees were sometimes ruined and older trees severely damaged. Breakage and die-back of smaller branches may be extensive, especially on young trees. Much of the season's wood growth may be destroyed, leaving little chance for the formation of fruit buds the following year. Scars heal rapidly on fast growing trees but may remain several seasons on those making poor growth. Breakage of fruit-bearing branches may cause some crop loss, particularly in peaches.

Control Measures

In the past, precautionary measures for reducing injury were the chief means of fighting the cicada. These methods involved changes in orchard management and included the following practices: (1) Avoiding or minimizing pruning operations during a cicada year; (2) deferring the planting of orchards as well as budding or grafting operations; (3) stimulating rapid growth by cultural practices or use of fertilizers.

Measures to prevent oviposition are now considered important. This can mean either killing the adults or excluding them from trees. Enclosing young trees in netting has long been practiced (Marlatt, 1907). Cost generally restricts this method to trees under 3 years old. In addition to netting, Gossard (1914) suggested wrapping the trunks of small trees with paper.

Killing the adults by contact sprays is, however, the only available means for protecting entire bearing orchards. Tests conducted on broods other than those that occur in Connecticut have demonstrated the effectiveness of several insecticides. Woodside (1948) and Cutright and Parks (1949) found that TEPP (tetraethyl pyrophosphate) was very active against the cicada. TEPP is highly toxic, and its usefulness is limited by lack of residual properties. Sprays at intervals of 3 to 4 days or less were indicated by these authors. In commercial orchards in Pennsylvania, Asquith (1954) found that the number of TEPP sprays needed depended on the incidence of reinfestation from adjoining woodlands.

Recently, Graham and Krestensen (1957) found Sevin to be highly effective against Brood XIV in Maryland. Sevin, in addition, has long residual effectiveness. At 2 pounds per 100 gallons, complete control

of cicadas was obtained for 3 weeks. Following this work, Asquith (1957) used Sevin at 1 pound. The initial kill was essentially the same as at 2 pounds, but the residual effectiveness was not measured. The fruit thinning effect of Sevin when applied at 1 or 2 pounds before second cover may be a disadvantage in the earliest cicada sprays. The effectiveness of Sevin at rates lower than 1 pound has not been demonstrated.

Sprays are ordinarily applied to the foliage, but ground and trunk sprays may be useful. In addition, where conditions permit, spraying woodlands bordering orchards would be helpful. Ground equipment may be used; or, in severe infestations, spray application by aircraft may be considered. Authorization must be obtained for this type of operation. It has been noted that cicadas do not begin to lay eggs for about a week after emergence. Therefore, spraying is best delayed until several days after first appearance of the cicadas.

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