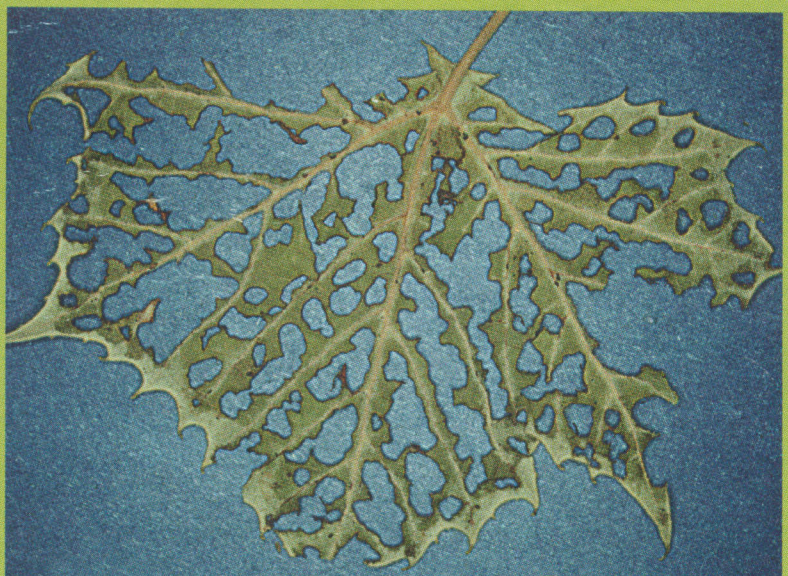

# THE SYCAMORE LEAF BEETLE

## A Guide to Recognition and Habits in Alabama

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# THE SYCAMORE LEAF BEETLE

## A Guide to Recognition and Habits in Alabama

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## INTRODUCTION

THE SYCAMORE LEAF BEETLE, *Neochlamisus platani* (Brown) [2], occurs throughout much of the eastern U.S. from northern Florida to Massachusetts west to Illinois, Colorado, and Texas (3). This distribution corresponds fairly closely with the natural range of American sycamore, *Platanus occidentalis* L. (2). Sycamore seems to be the most common host, but river birch (Betula nigra L.), hazel (*Corylus americana* Walt.), and elm (*Ulmus* sp.) have been reported as food plants (3).

The distributional map for the sycamore leaf beetle (3) documents its presence in each state adjoining Alabama; and, more recently, the species has been reported occurring in young sycamore plantations in Mississippi and Louisiana (5). However, there are apparently no previous records of its occurrence in Alabama. The bulletin "Leaf Beetles of Alabama" (1) lists several species of *Chlamisus* (=*Neochlamisus*), but does not include *N. platani*. Nevertheless, in recent years, the sycamore leaf beetle has been common and sometimes abundant on American sycamore in areas of east-central Alabama. Infestations and damage have been most noticeable and serious on young sycamore trees transplanted along streets and parkways in beautification and urban reforestation programs.

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[1] Associate Professor of Entomology

[2] Order Coleoptera; Family Chrysomelidae.

Adults and larvae feed on foliage. Feeding, when heavy, destroys much of the leaf except the veins (Photo 1) and drastically reduces the ornamental value of infested trees. Biological data for the sycamore leaf beetle are limited, and its habits in Alabama unknown. Consequently, research was conducted at the Alabama Agricultural Experiment Station to determine the life history and habits of the beetle infesting shade and ornamental sycamore trees.

## STUDY PROCEDURE

The studies were conducted during 1991-94 utilizing young sycamores transplanted along a parkway on the Auburn University campus. Trees were 2-3 m tall[3] when studies began. Research was primarily field oriented, but included limited laboratory studies. Field studies involved periodic inspection of trees to determine beetle presence and activity. Beginning in early March each year, trees were examined on alternate days until start of foliage development then daily thereafter for evidence of adult emergence, feeding, oviposition, and egg hatch. Following egg hatch, trees were inspected at 3-day to weekly intervals through the remainder of the season. Foliage and twigs of infested trees were examined closely, and data were recorded on: onset of spring activity; adult feeding habits; habits of ovipositing females; the egg-laying procedure; larval habits and development; pupation; and, general seasonal cycle. Life stages of the beetle were collected and identified, and typical damage noted. In laboratory studies, leaves with freshly laid eggs were collected and held until hatch. Following hatch larvae were supplied daily with fresh sycamore leaves as food. The beetle was carried through its cycle, and data on incubation period, larval development, pupation, and adult emergence and habits under laboratory conditions were recorded.

## RESULTS AND DISCUSSION

### DESCRIPTION OF LIFE STAGES

Adults (Photo 2) are small, robust beetles, 3.5 to 4 mm long. Color is yellowish bronze to reddish or brownish bronze. The body surface is "rough", the thorax and wing covers bear a number of ridges, humps, and tubercles. When at rest, beetles resemble somewhat the droppings of caterpillars. A detailed description of external structure of the adult beetle is provided by Karren (3).

The egg is not visible but is enclosed in a case made from fecal material secreted by the ovipositing female. Egg and case are attached to the leaf surface by a short stalk. The case (Photo 3) is bell-shaped, brown, and small—to the unaided

[3] One meter = 39.37 inches; one inch = 25.4 mm.

eye it may appear to be only a small spot on the leaf. Average dimensions of 20 cases measured in this study were: length, 1.4 mm; diameter at the cap end, 0.7 mm.

The larva (Photos 4 and 8) is a casebearer, and lives and develops within its case. When the larva moves about or feeds, the head and legs may be partially exposed, but it is largely the case that is visible on host foliage. Head and legs of larvae are black; larval cases (Photo 4) are brown to black, cylindrical at the base, and taper to the apex. Cases are constructed from fecal material; some cases may be partially covered with pubescence from the underside of the leaf. Dimensions obtained for 25 fully formed cases were: length 7-8 (avg. 7.4) mm; diameter at the base 3-3.5 (avg. 3.3) mm. LeSage (4) described *Neochlamisus* larvae as grub-like, white, J-shaped; body length given for fourth-instar sycamore leaf beetle larvae was 5.4-6.5 mm.

The full-grown larva pupates and transforms to the adult in the completed larval case (Photo 5). The prepupa is J-shaped; the body is pinkish orange and the head and legs are black. The pupa and callow adult are also pinkish orange. Adults remain in the larval case until fully colored before emerging.

## LIFE HISTORY AND SEASONAL CYCLE

The sycamore leaf beetle was common and abundant in 1991, less so in each successive year to become relatively scarce in 1994, the last year of the study. The general seasonal cycle determined from the accumulation of records throughout the study is illustrated in the graph (page 10). Emergence of adults from hibernation began at Auburn during the first half of April each year (April 2, 8, 15, and 2, 1991-1994, respectively). Adults began feeding promptly. The site of feeding was reported by Thompson and Solomon (5) to be leaf veins on the underside of leaves. However, in the studies at Auburn, overwintered adults were observed regularly feeding on the upper surface of leaves.

Oviposition began promptly; eggs were found on the first day that adults were seen in 1991-93 (April 2, 8, 15) and on the day after (April 3) in 1994. Karren (3) reported that oviposition began in Kansas in late May or early June. Thompson and Solomon (5) reported adults and eggs present in the Mississippi Delta when surveys began in late April, and that eggs were laid on the underside of leaves. At Auburn, females oviposited regularly on both lower and upper surfaces of sycamore leaves. Of 325 eggs for which the location was recorded, 180 (55%) were on the lower surface and 145 (45%) on the upper. Occasionally an egg was found on a leaf petiole or twig. Eggs were laid singly. The number of eggs per leaf was commonly one, sometimes two or three, with six the maximum number found on a single leaf.

Typically, most adults were skittish and quickly dropped from leaves if dis-

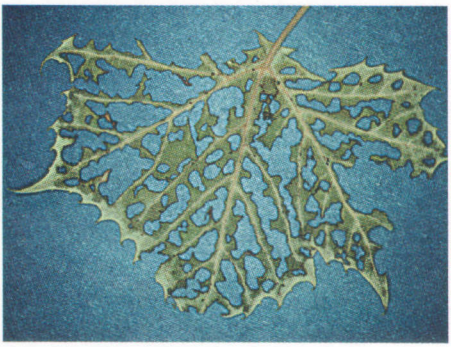

**Photo 1 -Sycamore leaves with typical damage caused by sycamore leaf beetle larvae.**

**Photo 2 -Sycamore leaf beetle adults.**

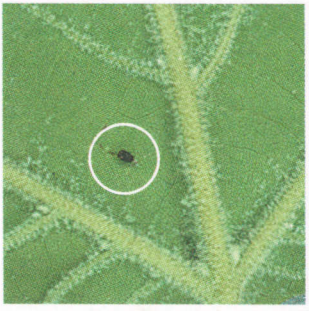

**Photo 3 -A typical egg case. The case is only about 1.5 mm long; at first glance it may appear to be only a brown fleck on the leaf.**

**Photo 4 -Late-stage larvae with cases. Leaf pubescence on cases provides some camouflage for larvae (See Photos 8 and 9)**

**Photo 5 -Clockwise from top left: Completed larval case (the pupal case ); and prepupa, pupa, and newly formed adult with case removed.**

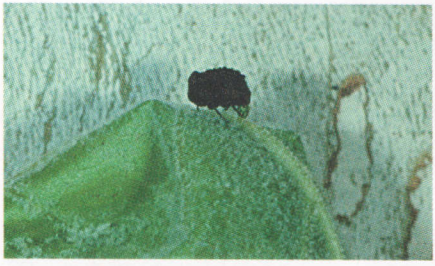

**Photo 6 -Ovipositing females engaged in construction of the egg case. The case is greenish while being formed but soon hardens and turns brown. Each case is attached to the leaf by a short stalk.**

**Photo 7 -Early stage larvae and cases. The egg case serves as the beginning of the larval case. Cases are enlarged as larvae grow, and in late-stage larvae, the egg case becomes the tip.**

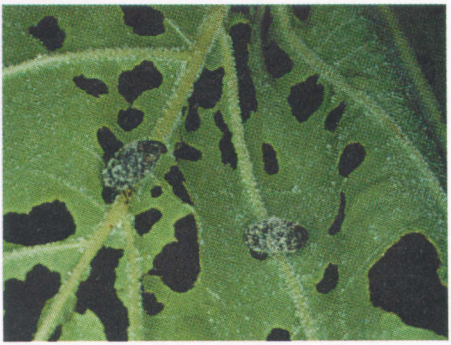

**Photo 8 -Late-stage larvae as commonly seen feeding or resting on the under surface of sycamore leaves. Larvae with cases coated with pubescence may sometimes be overlooked.**

**Photo 9 -Late-stage larvae resting on a sycamore twig. On twigs larval cases sometimes resemble buds.**

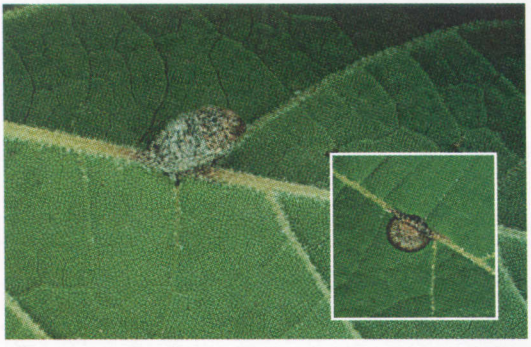

**Photo 10 -Full-grown larval case sealed and attached to the leaf in preparation for pupation. Inset - typical dead spot on the opposite surface of the leaf at the point of case attachment.**

**Photo 11 -New-brood adult and basal section of the case from which it emerged.**

turbed. However, egg-laying females usually remained in place, affording the opportunity to witness the process of oviposition and case construction. The process was as described by Karren (3) for the Chlamisinae in general. The egg was attached to the leaf surface by a short stalk, then enclosed in a case made by depositing bits of fecal material around the egg (Photo 6). In this process, the case was rotated with the hind legs, thus the attaching stalk was twisted. When the egg was completely encircled, the case was then capped across the top. The entire process usually required 15-20 minutes. The primary egg-laying period extended to about the first week of June, but some oviposition was witnessed in mid-and late June.

In the field, egg hatch and larval activity began each year in April (April 12, 16, 18, 29 in 1991, 92, 94, and 93, respectively) 8 to 15 days after eggs were first found (see graph). In the laboratory, eggs hatched in 8 to 11 days. Newly hatched larvae did not completely exit the egg case; the case was carried along and served as the starter for the larval case (Photo 7). Larvae hatching from eggs laid on the upper surface of leaves generally moved promptly to the lower surface. Larvae fed primarily on the lower surface on tissue between leaf veins (Photo 8). As larvae grew, they enlarged cases by adding fecal material to the egg case. By the end of May, larvae of all sizes, newly hatched to fully grown, could be found on infested trees. The usual number of larvae per leaf was one (on 185 of 200 leaves examined), but occasionally two to five.

Larvae were present into the last half of August. They were found primarily on the underside of leaves, but occasionally were observed on the upper surface (Photo 4) and on small twigs (Photo 9). Larval cases on twigs resemble buds and may be easily overlooked.

Pupation began in the field in late May (1991) and early June (1992, 93), 37 to 47 days after egg hatch was first observed (see graph). In the laboratory, larvae completed development and pupated in 25 to 36 days (average of 30 days for 17 larvae). The pupation process followed that outlined by LeSage (4) as common among most species of *Neochlamisus*. The full-grown larva ceased feeding, and sealed and attached the base of the larval case to the host plant; sealed cases were commonly found on the lower surface of the leaf (Photo 10). Leaf tissue at the point of attachment died, leaving a small, circular brown spot visible on the opposite surface (Photo 10). Prior to pupating, mature larvae apparently reversed position from that of feeding to face the apex of the case. In each of more than 30 fixed cases examined, the head of the form present (prepupa, pupa, or new adult) faced the apical end of the case.

Emergence of new-brood adults began in the field mainly in early July, 27-29 days after start of pupation (see graph); however in 1991, some scattered emergence was noted as early as June 17. In the laboratory, new adults emerged in 17-

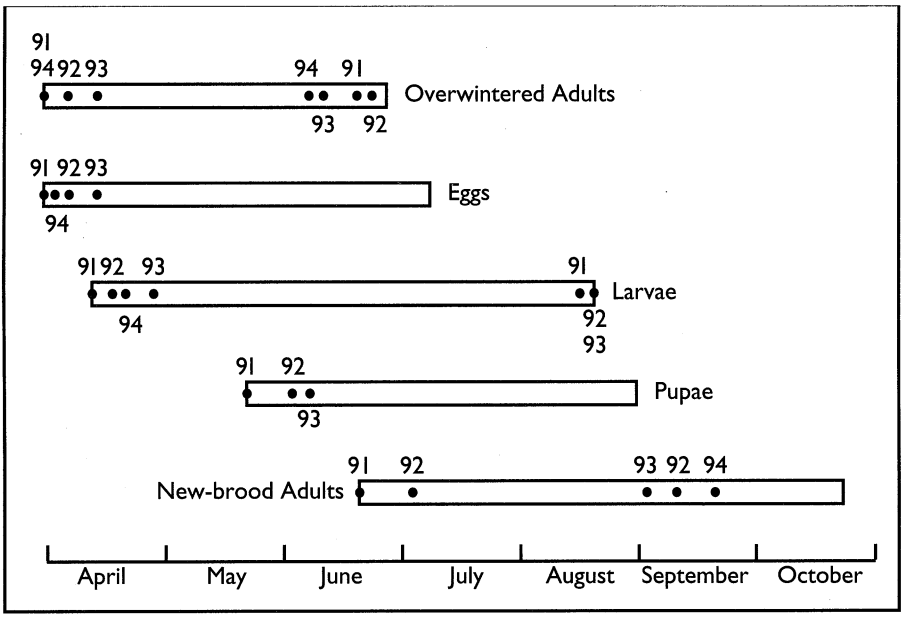


**Figure 1 -Seasonal cycle of the sycamore leaf beetle in east-central Alabama, 1991-94. Solid black dots at beginning of each life-stage bar signify the onset of that stage in each corresponding year indicated. Dots at the end of bars designate as follows: Overwintered parent adults - last dates oviposition was witnessed; Larvae - last dates active larvae were observed; New-brood adults - last dates adults were observed in the field. New-brood adults hibernate through winter, thus are inactive from September/October until April.**

22 days. In the process of emerging, the adult cut through the case at a point about one-half to two-thirds the length from the base and exited from the open apical end; the basal section of the case remained sealed to the leaf (Photo 11). Empty cases were the primary indicator of presence of new adults. New-brood adults were observed to feed on tissue between leaf veins (Photo 11), and often were found resting on the underside of the leaf at junctures of midrib and veins. Adults were observed on foliage until September 2, 9, and 21 in 1993, 92, and 94, respectively, and until October 20 in 1991. The time that adults moved from trees into hibernation in the field appeared to be influenced by the availability of foliage suitable for food. In the laboratory, several new-brood adults fed and lived for four to six months when supplied regularly with green sycamore foliage.

In the field, the period of activity of the overwintered parent adults appeared to overlap the start of emergence of new-brood adults. In years when the beetle was abundant, adults could usually be found fairly regularly, and there seemed to be no

well-defined, extended period of adult absence to mark the end of the parent brood and beginning of the new. The primary egg-laying period ended in about the first week of June, but some scattered oviposition was witnessed to the end of June. Empty pupal cases noted on foliage in late June - early July indicated that new-brood adults were present; however, no corresponding renewal of oviposition was observed. Therefore, it appears that egg-laying witnessed in late June was by laggard overwintered adults, and probably marked the end of parent adult activity. New adults apparently did not mate and oviposit, but overwintered in hibernation and laid eggs the following spring.

Thompson and Solomon (5) reported the possibility of two broods of *N. platani* in the Mississippi Delta. However, according to Karren (3), North American species of Chlamisinae apparently produce only one larval brood each year. From evidence obtained in this study, it appears that in Alabama only one generation of sycamore leaf beetle occurs each year.

## DAMAGE AND IMPORTANCE

Historically, occurrence of the sycamore leaf beetle in mixed natural forest stands in Alabama has gone unnoticed. However, on shade and ornamental sycamore the beetle is sometimes a serious pest. Both adults and larvae feed on leaves, but it is the larval stage that consumes the most foliage. Theoretically, heavy infestations could destroy sufficient foliage to reduce tree vitality and contribute to loss in growth or dieback in crowns; however, healthy trees usually recover without serious permanent injury. The most common and serious damage attributed to the sycamore leaf beetle is the destruction of the aesthetic value of ornamental trees. Larvae seem to prefer to feed on young leaves. These leaves are generally found at the end of branches in the periphery of the crown, thus feeding damage is highly conspicuous.

Light infestations of sycamore leaf beetle do not usually warrant control. Heavy infestations, particularly on young trees with limited foliage, may so mar crowns that control may be desirable. For recommendations on control of sycamore leaf beetle on shade and ornamental trees, contact the County Extension Office or appropriate extension personnel.

## SUMMARY

The sycamore leaf beetle is a pest of shade and ornamental sycamore trees. Adults and larvae feed on foliage. Heavy feeding results in unsightly crowns and reduces the aesthetic value of trees.

In east-central Alabama, hibernating adults emerged during the first half of April. Adult feeding and oviposition began promptly. The primary egg-laying period was

April, May, and the first week of June, but some oviposition continued until the end of June. Eggs were laid singly on both upper and lower surfaces of leaves. Each egg was enclosed in a small, brown, bell-shaped case made of fecal material secreted by the female. Egg and case were attached to the leaf by a short stalk.

In the field, eggs hatched in 8-15 days, with hatch beginning in the last half of April. Larvae fed on the underside of leaves for 37-47 days (in the laboratory, larvae completed development in about 30 days), and were present in the field until late August. Larvae fed and developed in a case made by adding fecal material to the egg case. The completed larval case was brown and cone-shaped, 3-3.5 mm in diameter at the base and 7-8 mm long. Pupation occurred in the finished larval case sealed at the base to the leaf. New-brood adults emerged in 27-29 days (18-22 days in the laboratory), with emergence in the field beginning in late June - early July. Adults were present into September and October. New-brood adults apparently did not oviposit following emergence, but overwintered and laid eggs in the following spring. Thus, it appears that only one generation occurred each year.

The sycamore leaf beetle is an important pest because of damage caused to foliage of shade and ornamental sycamore. Feeding by heavy infestations can destroy much of the foliage in the periphery of crowns. Healthy trees usually survive and recover, and from this standpoint, control of the beetle is not usually necessary. However, when damage is severe, control to preserve the ornamental value of trees may be desirable. For control recommendations, contact the County Extension Office or appropriate extension personnel.

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