

PLUM CURCULIO

Donn Johnson

Department of Entomology
University of Arkansas
Fayetteville, AR 72701

Russell F. Mizell III

Department of Entomology & Nematology
University of Florida
Quincy, FL 32351

Dan Horton

Department of Entomology
University of Georgia
Athens, GA 30602

Plum curculio, *Conotrachelus nenuphar* (Herbst), is a native American insect found east of the Rocky Mountains in the United States and Canada. Its original hosts included wild plum, crab apple, cherry, and similar plants. It is the key fruit-attacking insect pest of peaches and other stone fruit in the southeastern United States. Plum curculio is also a pest of pome fruit and blueberries.

DESCRIPTION

Adult plum curculios (Figure 1) are small brownish-black snout beetles, about 1/4 inch (4-6 mm) long, mottled with lighter gray or brown markings. The mouthparts are at the end of a moderately curved snout that is about one-fourth the length of the body. Their backs are roughened and bear two prominent humps and two smaller humps. Larvae are slightly curved, yellowish-white, legless, brown-headed grubs, about 3/8 inch (6-9 mm) long when fully grown (Figure 2).



Figure 1. Adult plum curculio.

PLANT INJURY

Both the adult and larval stages of the plum curculio damage fruit. On nectarines and plums, adult damage consists of tiny circular feeding punctures or small crescent-shaped oviposition wounds made by females immediately adjacent to egg-laying punctures. On peaches, it is more common to see a 1/8-inch area of shiny fuzz. Teasing away the fuzz will expose a feeding or oviposition scar, possibly an oval white egg or brown larval tunnel into the flesh. These feeding and oviposition sites cause conspicuous scarring and malformation as the fruit develops and can provide entry for the brown rot fungus. Feeding damage by adults appears obscure in April but, as the fruit enlarges, plum curculio feeding looks like the injuries caused by catfacing insects or cold. The larvae tunnel and feed in developing fruit, usually boring to the pit. Most peaches infested by plum curculio early in the season drop prematurely. Female curculios will deposit eggs whenever fruits are available, but they prefer small, young peaches or peaches within two weeks of harvest. Larger peaches, infested after pit hardening begins, generally stay on the tree until ripe, but these wormy fruit are of no value due to the flesh damage and/or presence of the grubs.



Figure 2. Larval plum curculio.

SEASON HISTORY AND HABITS



Figure 3. Egg deposition by plum curculio on peach. "Silvering" of the fruit surface is pre-harvest thrips injury. Image by J. A. Payne.

Plum curculio overwinters as an adult in ground litter or other protected places, both in and around orchards, particularly in nearby woods or fence rows. Overwintered adults become active when mean temperatures reach 50° to 60°F for three to four days, and begin moving toward orchards when the maximum temperature reaches 70°F for two or more days. This series of temperature events often takes place shortly before or as peaches bloom, especially in the middle and upper South. Plum curculio are reluctant fliers when it is cool. Most adults probably walk to the trees when temperatures are under 70°F, whereas flight may be more commonly seen when temperatures exceed 70°F. Initially, overwintered adults feed on succulent buds, foliage, and blooms. A pre-oviposition period following emergence from hibernation may vary from six to seventeen days, depending upon temperature. As the most mature peaches reach shuck split, the female

begins depositing eggs singly in a hole that she eats in the fruit. On peach, feeding and egg-laying sites often appear as shiny areas of disturbed fuzz on the fruit. On nectarines, plums, and sometimes on peach, the round feeding scars and the crescent-shaped egg laying scars will be evident (Figure 3). The egg hatches in two to twelve days; the average is about five days. The larva feeds in the fruit for eight to twenty-two days. The full-grown larva tunnels out of the peach, enters the soil and constructs a small earthen cell, usually one to three inches below the surface. After about two weeks (12 to 16 days) in the soil, the larva transforms into a white pupa, then to an adult. First generation adults usually emerge about four weeks (30 to 35 days) after larvae enter the soil. The complete life cycle, from egg to emerged adult, requires five to eight weeks, depending upon climatic conditions. In the Southeast, there are usually two generations and possibly a partial third generation each year.

Emerging overwintered adults may deposit eggs (first generation eggs) as soon as young peaches reach shuck split. Emergence and oviposition may continue for a period of six to eight weeks following shuck split. The next adult emergence (first generation adults) usually occurs from late May through July. These adults begin egg laying (second generation eggs) in early June. Second generation larvae may be found in peaches at harvest time. Second generation adults normally appear in late July or August. Both first and second generation adults feed on foliage or fruit until cool weather, when they seek overwintering sites.

Annual variations in the seasonal history of the plum curculio occur, depending upon weather conditions. The overwintering populations may be made up mostly of second generation adults. A portion of second generation adults may mate and produce a partial third generation.

CONTROL

Plum curculio is the key fruit-infesting insect pest of southeastern peaches. Its lengthy emergence and egg-laying periods mandate diligent control, but existing control programs work well and plum curculio is seldom damaging in well-managed orchards. Adult populations are suppressed in the spring by well-timed applications of effective insecticides. Keeping the orchard floor closely mowed after harvest affords less protective cover to adults that overwinter in the orchard. Destruction of nearby plum thickets, abandoned peach blocks, and other alternate hosts is suggested to reduce plum curculio migration into orchards from outside sources.

Plum curculio control programs are intense. Sprays provide a protective barrier to prevent overwintering adults from laying first generation eggs. Sprays for plum curculio control are normally initiated at shuck split. Two or possibly three additional sprays at 10- to 14-day intervals are needed to assure control of the overwintered population. Sprays targeting the overwintered plum curculio generation also provide control of oriental fruit moth and suppress stink bugs moving into the orchard. If the egg-laying adults are not effectively controlled, additional applications will be necessary to prevent wormy fruit from second generation larvae that mature from early June through harvest. In infested orchards, special attention should be given to mid- and late-season cultivars by applying insecticide sprays at six, four, and two weeks before harvest.

An improved knowledge of plum curculio biology is allowing greater refinement of control efforts. Once maximum daily temperatures reach 70°F for two consecutive days from February to early March (Florida or Georgia) or March to early April (Alabama, Arkansas, Oklahoma, South Carolina, North Carolina), begin accumulating daily degree days (DD). At pink stage, position two to four pyramid traps per block in the outer row of peach trees adjacent to woodlots or fence rows (Figure 4). At petal fall, begin checking pyramid traps twice weekly for plum curculio adults. At the same time, inspect 100 fruit along the orchard perimeter for plum curculio feeding damage. After accumulating 50 to 100 DD (about shuck split), growers should expect to start catching plum curculio adults in pyramid traps or see the first feeding damage on fruit. An insecticide application is recommended if the traps exceed 0.1 adults per trap per day or if damage exceeds 1%. Adult emergence can also be monitored by jarring peach trees along the perimeter over a ground sheet or beating tray. Jar trees in the early morning when the plum curculio adults are less active and more easily dislodged. Migration of adults into the orchard continues from 50 to 500 DD, so this is the period when fruit should be protected by insecticide sprays (most of March in Florida and southern Georgia, most of April in the central Georgia and more northern areas). Summer adults emerge from the soil after 1,000 DD (from sometime in late May through harvest).



Figure 4. Pyramidal weevil trap for monitoring plum curculio.

REFERENCES

- Calkins, C. O., M. D. Huettel and M. McKoy. 1976.** Spatial and temporal distribution of oviposition by plum curculio, *Conotrachelus nenuphar*. FL Entomol. 59: 205-210.
- Chandler, S. C. 1950.** Peach insects of Illinois and their control. IL Nat. Hist. Surv., Circ. 43. 63p.
- Davidson, R. H. and L. M. Peairs. 1966.** Insect pests of farm garden and orchard. 6th Ed. John Wiley and Sons, Inc. New York, NY. 675p.
- Ellis, H. C. 1976.** Plum curculio. GA Coop. Ext. Serv. Leaflet 252.
- Forsythe, H. Y., Jr. and F. R. Hall. 1972.** Control of the plum curculio in Ohio. J. Econ. Entomol. 65: 1703-1706.
- Johnson, D. T. 1994.** A workable peach IPM program. Proc. OK & AR Hort. Industries Show 13: 41-45.
- Johnson, D. T., B. Lewis and K. Striegler. 2001.** Insect monitoring results from peach IPM demonstration orchards in the southern USA. Proc. OK & AR Hort. Industries Show 20: 23-24.
- Johnson, D. T., P. G. Mulder, JR., B. D. McCraw, B. A. Lewis, B. Jervis, B. Carroll and P. J. Mcleod. 2002.** Trapping plum curculio, *Conotrachelus nenuphar* (Herbst) (Coleoptera: Curculionidae) in the Southern USA. Environ. Entomol. 31(6): 1259-1267.
- King, D. R. and H. F. Morris. 1957.** The plum curculio in east Texas. J. Econ. Entomol. 50: 516-517.
- Lienk, S. E. 1980.** Plum curculio. NY Agr. Exp. Stn., Tree Fruit IPM Insect Identification Sheet No. 3. 2p.
- Mizell, R. F., D. L. Horton, C. E. Yonce, W. L. Tedders and J. A. Payne. 1993.** Plum curculio trapping trials in southeastern peaches. Proc. 69th Cumberland-Shenandoah Fruit Workers Conference.
- Mulder, P. G. 1997.** Use of trapping to monitor peach insect populations in Oklahoma orchards. Proc. OK & AR Hort. Industries Show 16: 121-124.
- Mulder, P. G., B. D. McCraw, W. Reid and R. A. Grantham. 1997.** Monitoring adult weevil populations in pecan and fruit trees in Oklahoma. OK Coop. Ext. Serv., Ext. Facts F-7190.
- Prokopy, R. J., M. Marsello, T. C. Leskey and S. E. Wright. 1999.** Evaluation of unbaited pyramid traps for monitoring and controlling plum curculio adults (Coleoptera: Curculionidae) in apple orchards. J. Entomol. Sci. 34: 144-153.
- Quaintance, A. L. and E. L. Jenne. 1912.** The plum curculio. USDA Bur. Entomol. Bull. 103. 250p.
- Sarai, D. S. 1969.** Seasonal history of the plum curculio in the Missouri Ozarks. J. Econ. Entomol. 62: 1222-1224.
- Snapp, O. I. 1963.** Insect pests of the peach east of the Rocky Mountains. USDA Agr. Info. Bull. 272. 32p.
- Wylie, W. D. 1954.** The plum curculio on peaches in Arkansas. AR Agr. Exp. Stn. Bull. 542. 42p.