EENY155

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Lesser Cornstalk Borer, *Elasmopalpus lignosellus* (Zeller) (Insecta: Lepidoptera: Pyralidae)[1]

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Distribution

This species occurs widely in the western hemisphere and is known from much of the southern United States. Despite its wide distribution, damage is limited principally to sandy soil, so it tends to cause injury in the coastal plain of the southeastern states from South Carolina to Texas.

Description and Life Cycle

There are three to four generations annually in the southeast, but in the southwest there are only three generations annually. Activity extends from June to November, with the generations overlapping considerably and little evidence of breaks between generations. Overwintering apparently occurs in the larval and pupal stage; diapause is not present. A complete life cycle usually requires 30 to 60 days.

Egg: The egg is oval, measuring about 0.6 mm in length and 0.4 mm in width. When first deposited, the egg is greenish, soon turning pinkish, and eventually reddish. The female deposits nearly all her eggs below the soil surface, adjacent to plants. A few, however, are placed on the surface or on leaves and stems. Duration of the egg stage is two to three days.

Larva: Larvae live in the soil, constructing tunnels from soil and excrement tightly woven together with silk. They leave the tunnel to feed in the basal stalk area or just beneath the soil surface, returning and constructing new tunnels as they mature. Thus, tunnels often radiate out from the stem of the food source, just below the soil surface. Normally there are six instars. During the early instars, larvae are yellowish green, with reddish pigmentation dorsally, tending to form transverse bands. As the larva matures, whitish longitudinal stripes develop, so that by the fifth instar they are pronounced. The mature larva is bluish green, but tends toward reddish brown with fairly distinct yellowish white stripes dorsally. The head capsule is dark in color, and measures about 0.23, 0.30, 0.44, 0.63, 0.89, and 1.2 mm in width, respectively, for instars one through six. Larval lengths are about 1.7, 2.7, 5.7, 6.9, 8.8, and 16.2 mm, respectively. Mean development time is estimated at 4.2, 2.9, 1.4, 3.1, 2.9, and 8.8 days for instars one through six, respectively. Total larval development time varies widely, but normally averages about 20 days.

Pupa: At larval maturity, the larva constructs a pupal cell of sand and silk at the end of one of the

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Figure 1. Mature larva of the lesser cornstalk borer, *Elasmopalpus lignosellus* (Zeller). Credits: John L. Capinera, University of Florida

tunnels. The cocoon measures about 16 mm in length and 6 mm in width. The pupa is yellowish initially turning brown and then almost black just before the adult emerges. It measures about 8 mm long and 2 mm wide. The tip of the abdomen is marked by a row of six hooked spines. Pupal development time averages about nine to 10 days, with a range of seven to13 days.

Adult: Moths are fairly small, measuring 17 to 22 mm in wingspan. Sexual dimorphism is pronounced. The forewing of the male moth is yellowish centrally, bordered by a broad dark band bearing purplish scales. In females, however, the entire forewing is dark, sometimes almost black, but also bearing reddish or purplish scales. The thorax is light in males, but dark in females. The hind wings of both sexes are transparent with a silvery tint. Adults are most active at night when the temperature exceeds 27 degrees C, relative humidity is high, and there is little air movement. Such conditions are optimal for mating and oviposition. Females produce about 200 eggs. Adult longevity under field conditions is estimated at about 10 days.

Weather

Lesser cornstalk borer seems to be adapted for hot, xeric conditions, and therefore tends to be more abundant and damaging following unusually warm, dry weather. Mack et al. (1993) used data from Alabama and Georgia to develop a predictive equation that forecasts the potential for crop injury and the need to monitor crops. It is based on the concept of "borer-days." Borer-days is calculated as

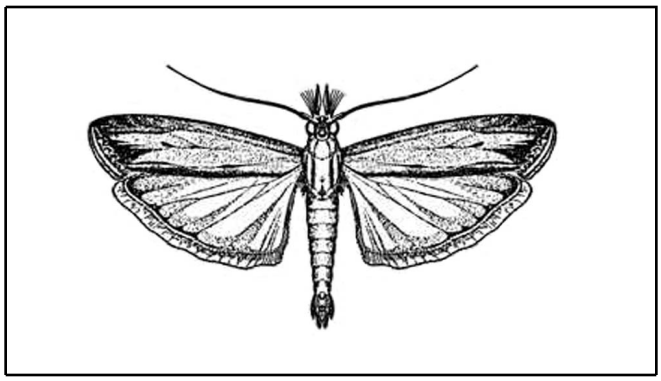

Figure 2. Adult moth. Credits: Elena Rhodes, University of Florida

the sum of days during the growing season in which the temperature equals or exceeds 35 degrees C *and* the precipitation is less than 2.5 mm, less the number of days in which the temperature is less than 35 degrees C *and* the precipitation equals or exceeds 2.5 mm. Thus, it is the sum of the number of hot, dry days less the number cooler, wetter days. If the number of borer-days equals or exceeds 10, damage is likely. If borer days equals 5-9 then damage is possible and fields should be scouted. The relationship between borer-days and larval abundance is nonlinear, and small increases in borer-days beyond 10 results in large increases in larval abundance.

Host Plants

Lesser cornstalk borer damages several crops grown in the southeast, although legume and grass crops are most often damaged. Mostly it is a pest of peanut, sorghum, and soybean. Among vegetable crops injured are bean, beet, cabbage, cantaloupe, corn, cowpea, lima bean, pea, pepper, sweet potato, tomato, and turnip. Field crops injured are corn, chufa, millet, oat, rice, rye, sorghum, peanut, soybean, sudangrass, sugarcane, and wheat. It also infests crabgrass, *Digitaria sanguinalis*, wiregrass, *Elusine indica*; and Johnsongrass, *Sorghum halepense*.

Damage

The larval stage causes damage when it feeds upon, and tunnels within, the stems of plants. Normally the tunneling is restricted to the basal region of stalks, including the belowground portion, and girdling may occur. In affected plants wilting is one of the first signs of attack, but buds may wither,

and stunting and plant deformities are common. Plant death is not uncommon, and infested areas of fields often have a very thin stand.

Figure 3. Lesser cornstalk borer, *Elasmopalpus lignosellus*, larva showing stem tunneling by larva. Credits: James L. Castner, University of Florida

Figure 4. Soil tubes formed by the lesser cornstalk borer, *Elasmopalpus lignosellus* (Zeller). Credits: University of Florida

Figure 5. Entrance to the gallery of a lesser corn stalk borer, *Elasmopalpus lignosellus* (Zeller). This entrance is usually seen in conjunction with a sandy, silken tub from the entrance to the soil below. Credits: James L. Castner, University of Florida

Figure 6. Lesser cornstalk borer, *Elasmopalpus lignosellus*, damage to soybean. Note wilting due to stalk feeding by larvae. Credits: James L. Castner, University of Florida

Management

Sampling

The egg stage is difficult to sample because eggs are small and resemble sand grains. Eggs can be separated by flotation, however. Larval populations are aggregated, and can be separated from soil by sieving or flotation (Mack et al. 1991). Adults are attracted to light traps, but are difficult to monitor with this technique because the moths of lesser cornstalk borer are difficult to distinguish from many other species. This is especially true of the females, which are less distinctive than the males. Pheromone traps have been used successfully to monitor adult populations, and adults can be flushed from fields by beating the vegetation. Adult pheromone trap catches and flush counts are correlated (Funderburk et al. 1985). Adult and larval counts are often highly correlated, indicating that flush counts can be used to predict the abundance of larvae in subsequent weeks.

Insecticides

Insecticides applied for suppression of lesser cornstalk borer are usually applied in a granular formulation in the seed furrow or in a band over the seed bed. Liquid formulations can also be applied, but it is important that they be directed to the root zone.

Insect Management Guide for Vegetables (http://edis.ifas.ufl.edu/MENU_IG:Vegetables)

Insect Management Guide for Field Crops (http://edis.ifas.ufl.edu/MENU_IG:Field_Crops_and_Pastures)

Cultural Practices

Modified planting practices have long been used to minimize crop loss. Populations tend to increase over the course of a season, so some damage can be avoided by early planting. Tillage and destruction of weeds are recommended prior to planting because this helps to destroy larvae that may be present in the soil and might damage seedlings, the stage most susceptible to destruction. However, crop culture that uses conservation tillage (i.e., retention of crop residue at the soil surface) experiences less injury from lesser cornstalk borer feeding because the larvae feed freely on crop residue and other organic matter, sparing the young crop plants (All et al. 1979).

Natural Enemies

Several natural enemies of lesser cornstalk borer are known, though they are not thought to be major determinants of population trends. Smith and Johnson (1989) constructed life tables for populations in Texas, and identified survival of large larvae as the key element in generation survival, but the causative factor remains unidentified. The predominant parasitoids are *Orgilus elasmopalpi* Muesebeck and *Chelonus elasmopalpi* McComb (both Hymenoptera: Braconidae), *Pristomerus spinator* (Fabricius) (Hymenoptera: Ichneumonidae), and *Stomatomyia floridensis* Townsend (Diptera: Tachinidae) through most of the range of lesser cornstalk borer. Other parasitoids sometimes present include *Bracon gelechiae* Ashmead (Hymenoptera: Braconidae), *Geron aridus* Painter (Diptera: Bombyliidae), and *Invreia* spp. (Hymenoptera: Chalcididae). Parasitoids rarely cause more than 10% mortality.

Among the predators thought to be important mortality factors are a ground beetle, *Plilophuga viridicolis* LeConte (Coleoptera: Carabidae), *Geocoris* spp. bugs (Hemiptera: Lygaeidae), and larval stiletto flies (Diptera: Therevidae).

Pathogens are commonly present in lesser cornstalk borer populations. The most important pathogen appears to be a granulosis virus, but a *Beauveria* sp. fungus, microsporidia, and mermithid nematodes also have been found (Funderburk et al. 1984).

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