extension
ALABAMA A&M & AUBURN UNIVERSITIES

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Cowpea Curculio Management in Alabama

Figure 1. Cowpea curculio *Chalcodermus aeneus* Boheman
Photo Credit: Natasha Wright, Cook's Pest Control, Bugwood.org

Figure 2. Cowpea curculio *Chalcodermus aeneus* Boheman

Cowpeas or southern peas (*Vigna unguiculata*) are a popular vegetable crop in the southern United States due to their high heat tolerance and rapid growth. In Alabama, southern peas frequently attract a multitude of insect pests; these include chewing insects, such as the cowpea curculio (*Chalcodermus aeneus* Boheman, figure 1) and caterpillars (various species), and sucking insect pests, such as stink bugs, leaf-footed bugs, aphids, and thrips.

Conventional insecticides and cultural control practices used by producers are helpful to manage a majority of the listed pests, except for the cowpea curculio. Cowpea curculio is notorious for its resistance or tolerance to popular insecticides such as the synthetic pyrethroids.

Entomologists at the University of Georgia have studied the cowpea curculio for many years, but the need for research in effective management strategies continues. Crop damage from the curculio and other pests can quickly reduce yields by 50 percent or more if pests are not controlled in a timely manner.

This article focuses on a review of literature and results from two years of cowpea curculio management studies completed by the Alabama Extension commercial horticulture team. It provides preliminary information about integrated pest management (IPM) strategies. Mention of product names and companies does not imply endorsement. Insecticide product names are mentioned as examples only; producers should check insecticide labels and compare products.

Curculio life cycle. This insect overwinters in the adult stage and begins emerging in April or May depending on the availability of suitable host plants. Adults are known to feed on cowpeas, snap beans, lima beans, and peas, along with weedy hosts such as evening primrose, moss verbena, wild bean, and sicklepod, among others. Adults are known to infest cowpeas and weeds simultaneously.

Adults feed directly on various plant parts and cause the most damage to the pods using their chewing mouthparts. Females create small feeding holes on pods and lay eggs inside them, which protects the larval stages from predation and insecticide exposure. One pod can have numerous feeding holes or stings, with numerous eggs hatching into larvae. This results in high crop damage and contamination, even with low numbers of adult curculios. The larvae are pale yellow and legless, since they spend all their time feeding and living inside the pea pods. In Alabama IPM studies, the peak larval activity and feeding injury occur about 2 weeks after the peak adult activity (figure 3). In other words, seed damage from larvae occurs rapidly and can lead to complete crop failure (figure 4). After completing four larval instars, larvae drop to the ground and develop a pupal cell. Adult curculios emerge after ten days of pupation.

You can find useful information on cowpea curculio biology in the University of Georgia Extension circular 1038 and the University of Florida publication EENY-223.

Key identification characters. Adults are very active in the morning and evening hours. They avoid the hot afternoons and may drop to the base of the plant for shade. Adults are black and oval, similar in shape to the cotton boll weevil and plum curculio. Numerous adults feed with their chewing mouthparts, which causes the most damage to the pods. Adults feign death when approached, making it challenging to scout. Adult emergence (first generation) can be sudden, with a rapid second generation that develops in a month. This creates tremendous pest pressure in the southern pea-producing areas of Alabama.

Curculio behavior. Adults prefer to walk from plant to plant, and they spread rapidly through the field. Curculios may first be seen on field edges, creating an edge effect. Due to their feigning behavior, crop scouts must look at the bottom of the plant for true insect counts. Adults can fly in order to infest new production areas, as seen in Alabama where curculios are spreading westward.

Scouting and monitoring. The best way to estimate population levels is to conduct direct crop scouting at weekly intervals or more frequently during production season. Use a beat sheet under the plant and shake off the adults for counts. Scout at numerous locations across the field and keep a record of curculio populations before and after insecticide applications to document successes.

Entomologists at the University of Georgia have developed a yellow pyramid trap that looks similar to and functions like the plum curculio trap (modified Tedder's trap). The pyramid trap was effective in the first detection of cowpea curculios in South Georgia.

During production season it is a good idea to directly check southern pea plants and weeds (e.g., sicklepod) located along the field edges. Scouting may become challenging, however, if aphids and other sucking pests make the plants sticky. Caterpillars also feed directly on peas and leave small, round holes on developing pods. Keep a record of all insect pests seen in the field and consult with a regional Extension agent to develop a site-specific IPM plan. Scouting accuracy improves with sampling size.

Lessons from IPM studies in Alabama. Results reported here should be considered preliminary, as our studies are ongoing. In Alabama, the cowpea curculio seems to be the most damaging south of Interstate 85, where most of the southern peas are grown and winters are warmer than in northern parts of the state. It may take several years for curculio populations to develop in a new production area, so producers need to rotate crops to avoid monoculture with the same variety of peas.

The first year of our small plot tests at the Wiregrass Research and Extension Center (Headland, AL, 2014) was challenged by the sudden emergence of a large number of curculios in this new field. In 2015 we observed a more gradual emergence of adults, with two overlapping generations (figure 3).

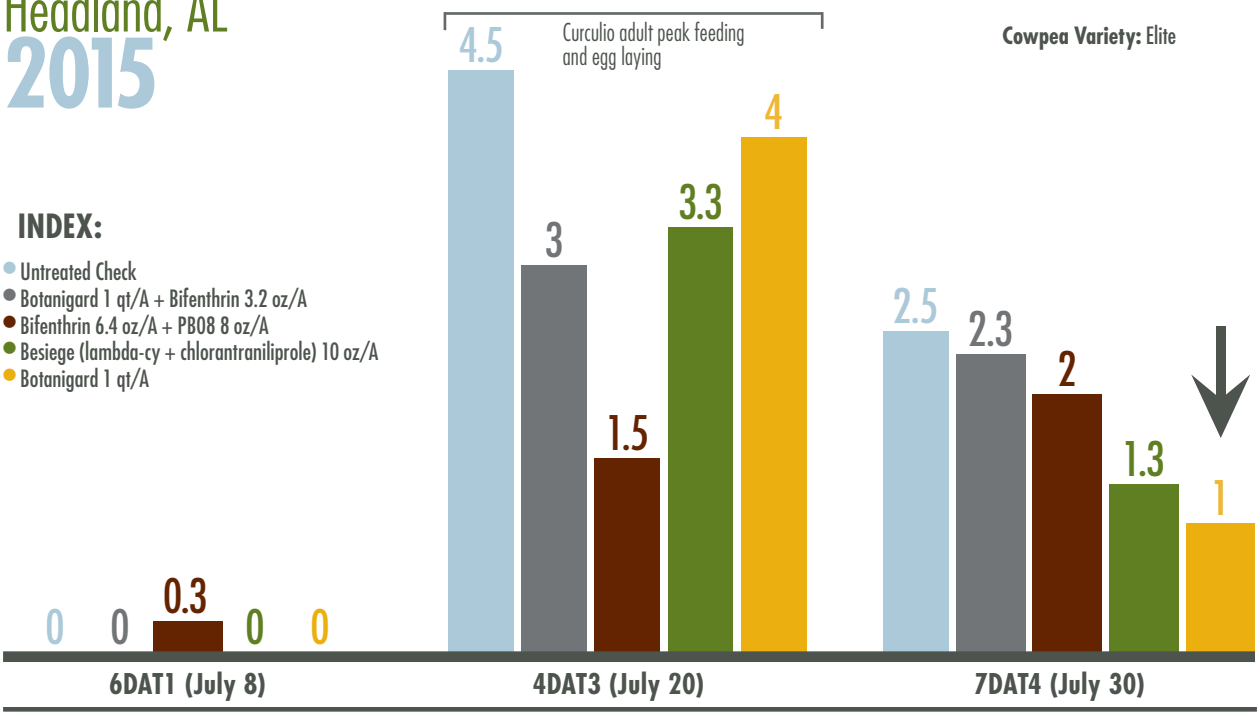
Five foliar insecticides were evaluated in an attempt to prevent pod damage with treatments starting a week before flowering and continued weekly insecticide applications. All insecticides were applied five times using a backpack sprayer. Test materials included a new premix insecticide (Besiege), synthetic pyrethroid (bifenthrin), synergist (PBO-8), microbial insecticide (Botanigard), and a tank mix (Botanigard + bifenthrin). Untreated check plots did not receive any insecticide applications. Test plots with the Elite southern pea variety were scouted once every week, and pod samples were collected for assessing external and internal pod damage. Weekly insecticide applications in July (at flowering stage) appeared to delay curculio establishment, with the greatest benefit accrued from several bifenthrin and synergist applications (figure 3). Microbial insecticides may be effective in suppressing adults (figure 4), but they are slow-acting and require complete plant coverage during routine spray.

Seed-damage assessments showed a sudden increase in pod feeding as a result of control failure. Peak larval feeding injury on pods was seen about 2 weeks after the highest recorded adult curculio counts on plants. An average of forty feeding holes or stings on pods was associated with 86 percent internal seed damage in the

FIGURE 3

Curculio Counts on Southern Peas

Headland, AL
2015

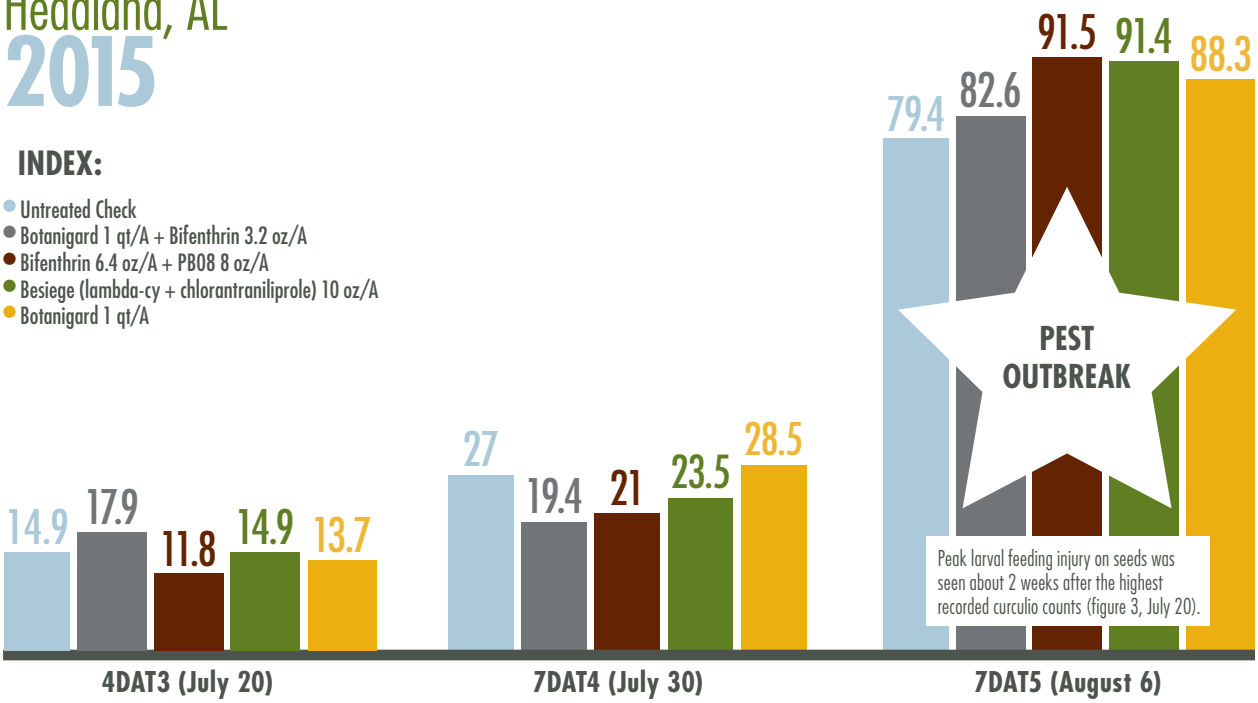


Adults may become active in May and June if southern peas are available early in the season.
Repeat weekly treatment at flowering stage delayed pod infestation in late July.
DAT = days of treatment

FIGURE 4

Percent Seed Damage from Larval Feeding

Headland, AL
2015



Pre-bloom and bloom treatments appear to delay seed damage by the first generation of curculios.
Seed damage in test plots averaged 85% in August due to control failure.
DAT = days of treatment

Sample Size = 20 Pods Per Slot

test plots (figure 4). Since larval feeding inside the seed is difficult to control with insecticides, adult curculios appear to be the only target to prevent crop losses. Repeated insecticide applications in test plots controlled most of the other chewing and sucking insect pests, except aphids in the microbial insecticide-treated plots (results not shown).

Insecticide tests in Georgia have suggested significant reduction in stings on Purple Hull and Cream Eight varieties with Besiege and cyfluthrin (Baythroid) even after nine applications. Cowpea curculio research in Alabama will continue to expand with collaborative input from producers.

Overall IPM recommendations. IPM recommendations are based on field experiences and research data available from Alabama and Georgia. Producers should keep in touch with Extension agents for updates. A cowpea curculio management video is available on the Alabama vegetable IPM website.

- Plant southern peas carefully in relation to other crops. The White Acre pea variety seems to be more resistant to curculio than the Pinkeye Purple Hull variety (University of Georgia observation).
- Fall tillage and field sanitation may be helpful to slow population buildup (pupae live in soil), although we have not evaluated these methods in Alabama. Keep weeds under check at all times.
- Start insecticide treatments ahead of pod formation, preferably targeting the first generation of adults before flower initiation. Apply insecticides frequently at 3- to 5-day intervals depending on the insecticide label. Avoid overusing insecticides if you do not have curculios.
- Add a synergist (at the high rate) with synthetic pyrethroid insecticides to improve control. Watch for spider mite outbreaks that can be induced by using synthetic pyrethroids in hot, dry weather.

Alabama Extension IPM Resources

- Cowpea Curculio in Alabama: Lessons from the Field Part 1: video, www.aces.edu/anr/ipm/Vegetable/cowpeacurculio.php, and PowerPoint presentation, http://goo.gl/WCrnuK.
- Alabama Vegetable IPM Facebook page: www.facebook.com/Alabama-Vegetable-IPM-110601312341489.
- IPM Communicator e-newsletter: www.aces.edu/ipmcommunicator.
- 2016 Southeastern U.S. Vegetable Crop Handbook: http://goo.gl/RL8BkI.

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