Many insect pests with piercing and sucking mouthparts have become major economic pests of fruit and vegetable crops grown in Alabama. These insects are polyphagus, meaning that they feed on numerous plant species, such as grasses and broadleaf weeds, trees, agronomic crops, fruits, and vegetables. Major sucking insect pest species in Alabama include brown stink bug (*Euschistus servus*), southern green stink bug (*Nezara viridula*), green stink bug (*Acrosternum hilare*), and the leaffooted bug (*Leptoglossus spp*).

Stink bugs overwinter as adults in protected areas, such as woods, fencerows, brush piles, and structures. During warm days in the spring (60 to 65 degrees F), adults move out of protected areas to feed primarily on developing reproductive structures of winter grasses, weeds, and other plants. Leaffooted bugs have behavioral patterns similar to the behavioral patterns of stink bugs, although their hind legs have leaflike expansions.

Sucking insects pierce the skin of the plant part and inject saliva that interferes with cellular functions that may result in poor fruit set and ripening. The economic threshold for these insects is very low due to their probing behavior and high mobility from plant to plant. The landscape/farmscape of the home or farm surrounding the crop or garden is an important factor associated with stink bug migration patterns into fields, and damage hot spots occur along the crop border. Protective cover for these insects along the edge of woods and fencerows is preferred to crossing open fields—a factor to consider in trap crop placement.

Using the landscape/farmscape influence on stink bugs and leaffooted bugs can help the producer in the placement of alternative crops—trap crops—to attract and manage these insect pests. When given a choice, adult stink bugs and nymphs (immature stink bugs) have strong feeding preferences related to the plant species and growth stage from early seed development to early maturity. The objective of trap cropping is to manipulate the behavior of stink bugs by providing an attractive alternative to the main crop, thereby providing protection during the susceptible stage of the crop. This will often require using several trap crop species that can be planted at different times of the year and that will mature at different intervals during the growing season.
Potential crops for use as a trap crop for stink bugs and leaffooted bugs include triticale and wheat (early spring/summer seed stages), buckwheat, browntop millet, pearl millet, sorghum, southern peas, soybean, and sunflower (spring and summer seed stages). In small areas, it may be desirable to plant or place trap crops around the entire perimeter. For larger areas, consider strip trap cropping along vegetation corridors—areas adjacent to a forest edge or fencerow—to intercept stink bugs before they get to the farm crop. Using the width of your farm implement for soil preparation should be sufficient to allow one pass along the border either along the entire border or at intervals with gaps of 20 to 30 feet. Gaps can be used to separate fall-planted cool-season trap crops from spring-planted trap crops. Two implement passes can allow plant and row orientation along the entire length. The optimum distance between the trap crop and the farm crop is not known for all cropping systems. Stink bugs will leave the trap crop if quality of the food source is less desirable or less attractive than the farm crop.

Example of a Continuous Trap Cropping System

October 15 to November 15. First triticale or wheat planting (2 additional plantings at 2-week intervals)

April 1. Buckwheat (matures seed in 4 to 5 weeks; can be planted multiple times to fill gaps between other trap crop seed development)

April 1 to May 1. Sunflower (65 to 70 days from planting to flowering)

April 15 to July 15. Grain sorghum (60 to 90 days to flower), pearl millet (45 to 50 days to flower), and brown top millet (65 days to mature seed), sorghum silage (100 to 110 days)

Grain sorghum, pearl millet, and browntop millet can be cut or mowed (6-inch height) when seeds mature and are no longer attractive to target pests (ratooning). These will regrow and flower again in a shorter period of time than when first seeded.

Factor Affecting the Success of Trap Crops

Success of trap cropping is based on growing a desirable plant to attract the insect and, in the case of the stink bugs and leaffooted bugs, having the plant at a desirable stage for feeding. Suitable soils for trap crops are fertile and well drained. Soil pH should be 5.8 to 6.5, and soil nutrient levels medium to high (soil testing recommended). Individual nitrogen rates for production of the various crops mentioned above range from as low as 20 pounds per acre for buckwheat to more than 120 pounds per acre for sunflower. Nitrogen applications should be split into two or three smaller applications over the growing season (example: 75 pounds nitrogen per acre divided by 3 = 25 pounds nitrogen per acre per application). For a 6-foot-wide by 100-foot-long area (600 ft²), multiply the amount of fertilizer per acre by (0.014) to get the amount to apply.
Use of Mechanical or Chemical Pest Control Tactics

The trap cropping system for fruit and vegetable production is not a pesticide-free method, but trap crops can reduce grower dependence on insecticides. In the case of vegetables, multilocation small plot research in Alabama indicates success of a weekly insecticidal treatment for a perimeter trap crop, such as okra, after concentrating aphid and stink bug populations. Careful trap cropping layout can also improve effectiveness of the system—perimeter trap cropping with mechanical or insecticidal removal of pests could be more suitable for small, organic producers and backyard gardeners; large vegetable producers can use strip trap cropping plus insecticides to manage the bugs. Forage sorghum (NK-300) has been evaluated as a trap crop with great success. Application of fast-acting insecticides (synthetic pyrethroids) soon after detection of pest insects can help reduce the need for spraying the main crop. This is also true in case of trap cropping in peach production, requiring insecticide sprays within two weeks of stink bug presence in the trap crop. Also, during a drought year, nonirrigated peach trees will perform much better than a nonirrigated trap crop, increasing the pressure of stink bugs within the orchard. Organic pest management researchers in California have demonstrated the successful use of tractor-mounted vacuums to remove sucking insect pests from trap crops resulting in more than $700 per acre savings for strawberry producers.

Challenges to Trap Cropping System

Trap cropping is not the silver bullet solution to all insect pest problems. Producers must identify insect pests first and then design an optimum trap cropping system for their farms. Vegetable producers can use the perimeter trap cropping to prevent insects from flying over the maturing crops. Intercropping or strip trap cropping could be more suitable for growing plants that can tolerate low levels of pest infestations. Fruit and vegetable producers with limited production acres should not devote too much area under trap cropping. Research indicates that no more than 20 percent of the total farm area should be devoted to trap cropping. Trap crops should be planted in good soil to retain their effectiveness, and they must be planted early. This requires additional time and resources. Weather conditions, such as late freezes, hail, excessive rainfall, and drought, will affect the performance of the trap crop as well as the farm crop. Plant growth and flowering times can be adversely affected and will greatly affect the benefit of using trap crops for stink bug management. While conventional producers with access to rapid-acting insecticides will find it easier to adopt trap cropping, organic producers can use mechanical collection to remove insects from trap crops before they migrate to the main crop. Research and evaluations are continuing in Alabama, and timely updates will be provided in the future to crop producers. Producers are encouraged to contact regional Extension agents for updates or to design an optimal trap crop system for their needs.
For Further Information

- Alabama Cooperative Extension System publications for specific crop production
  https://store.aces.edu/ListItems.aspx?CategoryID=143

- University of Georgia Extension publications for specific crop production
  www.extension.uga.edu/agriculture

- Trap Crops for Managing Vegetable Insect Pests
  Alabama Cooperative Extension System
  Timely Information

- Trap Crops for Leaffooted Bug Management in Tomatoes
  Journal of the NACAA, Volume 5 (2)

- Trap Cropping System to Suppress Stink Bugs in the Southern Coastal Plains

- Control of Western Tarnished Plant Bug, Lygus hesperus, Knight (Hemiptera: Miridae) in California organic strawberries using alfalfa trap crops and tractor-mounted vacuums.

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For more information, call your county Extension office. Look in your telephone directory under your county’s name to find the number.

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