



Trap Cropping in Vegetable Production: One Tool for Managing Pests

What is SARE?

Since 1988, the Sustainable Agriculture Research & Education (SARE) program has been the go-to USDA grants and outreach program for farmers, ranchers, researchers and educators who want to develop innovations that improve farm profitability, protect water and land, and revitalize communities. To date, SARE has awarded \$225 million for more than 5,500 initiatives.

The Southern Region

The Southern region SARE program is made up 13 states and two U.S. territories: Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, Puerto Rico, and the U.S. Virgin Islands.

The region is administered by a host consortium consisting of the University of Georgia and Fort Valley State University with staff located at the University of Georgia-Griffin campus, Fort Valley State University, and the Kerr Center for Sustainable Agriculture in Oklahoma.

Southern SARE funds several different grant programs, and each type of grant benefits a different constituency. First there are the "big grant" programs for research and education and for professional development. Then there are the smaller grants for farmers and the professionals who work directly with them, as well as funding opportunities for graduate students and communities.

Grants are understood to be the chief lubricant in the development of new approaches and new ideas in sustainable agriculture. The program also emphasizes outreach and the dissemination of project results so that the grant program will have the widest possible benefit.

To date, SSARE has awarded \$55 million for more than 1,000 initiatives.

Learn more about SARE by visiting <http://www.southernsare.org>



Rows of sorghum and sunflower line the edge of a crop field in Muscle Shoals, AL. The trap crops protect tomato plants from the leaf-footed bug, says Alabama Cooperative Extension entomologist Ayanava Majumdar. Photo credit: Candace Pollock, Southern SARE

Managing crop pests on a farm can be challenging, especially for organic growers or those who simply choose to use fewer insecticides or no chemical applications at all.

One proven practice of cultural pest control is trap cropping, a technique that uses plants attractive to insect pests to lure them away from the cash crop.

Trap crops provide many benefits, including increasing crop quality, attracting beneficial insects, enhancing biodiversity and reducing insecticide use.

Trap crops can be planted around field perimeters or inter-planted with the cash crop. A trap crop's effectiveness depends on what pest you are trying to manage and how desirable the host is for those pests.

This fact sheet showcases several Southern SARE-funded research studies that have explored trap cropping and its effectiveness in controlling a variety of pests in some of the more popular vegetable crops grown in the Southern region.

Leaf-footed Bugs

If you grow tomatoes in the South, chances are you have dealt with your fair share of leaf-footed bugs. Leaf-footed bugs damage crops similarly to stink bugs by using sucking mouthparts to feed on crop fluids.



Leaf-footed bug nymphs on sunflower
Alabama Cooperative Extension IPM

Alabama Cooperative Extension specialists have been studying leaf-footed bug management in tomatoes since 2010. Extension entomologist Ayanava Majumdar has found that the sorghum variety NK300 and Peredovik-type sunflower, when planted around a perimeter, make for effective trap crops in controlling the leaf-footed bug in tomatoes.

During a 2012 study, large tomato plots (approximately 300 feet x 50 feet) were surrounded on two sides by staggered plantings of trap crops. The trap crops were separated by a distance of six to 10 feet from the closest tomato plants.

According to Majumdar, staggered planting dates of the trap crop provided food continuity to the leaf-footed bugs and prevented them from infesting the tomato crop.

Other findings from Majumdar's research include:

- The trap crops, planted two weeks ahead of the main crop, are highly attractive to leaf-footed bugs. The reproductive structures of the trap crops are the main attractor.
- Use multiple trap crops. Leaf-footed bugs are attracted to seed heads as the seeds mature. As the sunflowers die, leaf-footed bugs will migrate to the sorghum and will stay there the rest of the season if conditions are favorable.
- Stagger trap crop plantings to keep pests busy.
- Trap crops also provide a habitat for beneficial insects, such as lady beetles, spiders and syrphid flies.

Harlequin Bugs

The harlequin bug, similar to the stink bug, is a pierce-sucking insect that feeds on the leaves of cole crops, leaving white blotches and making the crops unmarketable. Heavy feeding

pressure can cause the plants to wilt and die.

A Virginia Tech study (**GS09-081: Trap Cropping for Management of Harlequin Bug in Cole Crops**) used mustard (*Brassica juncea* 'Southern Giant Curled') as a border-row trap crop to control the harlequin bug in collards (*Brassica oleracea* 'Champion'). The results indicated that the mustard provided effective control of the harlequin bug in collards, keeping feeding damage below 25 percent. Researchers also reported that a mustard trap crop is likely to be effective in controlling the harlequin bug in other cole crops, such as broccoli, cabbage, Brussels sprouts and cauliflower.

Anna Wallingford, a graduate research assistant in the department of entomology, said that mustard is an ideal trap crop because the male harlequin bug responds to mustard odors in the air,



Harlequin bug Photo credit: Candace Pollock, Southern SARE

suggesting the bug uses a series of complex olfactory cues to find host plants. Once the male finds a desirable host, he releases an aggregation pheromone that attracts additional individuals to the host plant, she said.

Stink Bugs

Stink bugs feed on a wide range of vegetable crops throughout the growing season. To combat the pest's wide palate, University of Florida researchers

tackled stink bug management by exploring a mixture of plant species as trap crops to ensure continuous food availability (**OS06-029: Development and Implementation of a Trap Cropping System to Suppress Stink Bugs in the Southern Coastal Plain**).

The project presented a broader recommendation of a trap cropping system regardless of farm philosophy or farm size, using triticale, sorghum, millet, buckwheat and sunflower to cover a spring-to-fall season and attract all major stink bug pest species.

Researchers provided the following recommendations in the study:

- For early spring cash crops, plant triticale in the fall by staggering several planting dates in October and early November. Several cultivars may be established to provide a range of plant heights and maturity dates. Crimson clover and hairy vetch may also be planted at the same time within the plots to attract beneficials in the spring. Triticale surmounts the limitations of cool spring soil conditions that prohibit growth of sorghum and millet and the staggered plantings provide a hedge against total loss of the trap crop from unpredictable spring freezes. Because sunflower and buckwheat can withstand cooler soil temperatures, these two species can also be added to the spring trap crop in early spring.

- For the summer to fall period, sunflower, buckwheat, sorghum and millet are recommended species for the trap crop. For sorghum and millet, planting several commercially available cultivars with a range in maturity dates is recommended. To increase their efficacy, sorghum and millet can be mowed following first seed maturity, which will induce a

second round of seed formation.

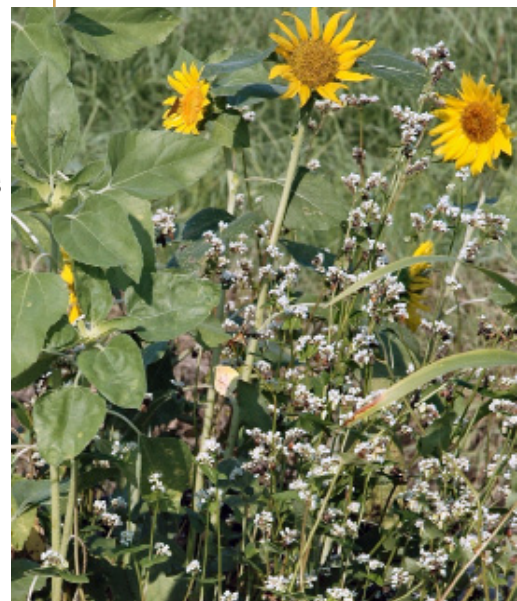
A farmer-led project in Texas found that planting black-eyed peas as a trap crop helped to protect pecan orchards against stink bug feeding damage (**FS95-021: Pecan IPM Using Black-Eyed Peas as a Trap Crop**). When the growers compared the average dollar losses from stink bugs between the trap-cropped sites and the non-trap-cropped sites, they found that the non-trap-cropped sites sustained more losses associated with stink bugs than did the trap-cropped orchards. In the 1995 study, the growers determined for every dollar they spent establishing and maintaining the trap crops, they prevented \$9.01 in kernel damage from stink bugs.

Cucumber Beetles

A newly developed project led by Alabama Cooperative Extension entomologist Ayanava Majumdar is exploring the use of Baby Blue Hubbard and New England Hubbard squashes as trap crops to control cucumber beetles in a squash cash crop.

Early results indicate that the trap crops had nearly 47 times more cucumber beetles than the main crop. Said Majumdar, one speculation for the strong preference is that cucumber beetles appear to be attracted to the prolific growth of the Hubbard squash trap crops.

Alabama Cooperative Extension Service has released a Trap Crop Training Module to educate farmers on the basics of trap cropping and how to use trap crops on their farm.



Sunflower and buckwheat make for good trap crops during the summer/fall growing season. Photo credit: Russell Mizell, University of Florida



*Cucumber beetles on a squash flower
Alabama Cooperative Extension IPM*



Alabama IPM specialist Ayanava Majumdar (left) shows Muscle Shoals, AL farmer Steve Carpenter his squash trap crop study. Photo credit: Candace Pollock, Southern SARE

Do Your Homework

While not all insects can be controlled with trap crops, overall trap crops appear to be a good alternative pest management strategy on small-to-medium-scale farms. However, a trap cropping system is management intensive and needs prior planning that accounts for pest species, pest pressures, and farm layout. Good knowledge of insect life cycles and migration patterns may also be needed. Working with your local Extension specialist is a good first step in planning a trap cropping system.

Trap cropping is not a silver bullet solution to all pest problems, but can be an effective tool against insect pests when farmers take the time to research and implement the required steps.

Additional Resources

Alabama Cooperative Extension System: Trap Crops for Managing Vegetable Insect Pests (http://www.aces.edu/timelyinfo/entomology/2011/February/feb_14_2011.pdf)

Alabama Cooperative Extension System: Trap Crop Training Module (<https://sites.aces.edu/group/commhort/vegetable/SitePages/trapcropmodule.aspx>)

eXtension: Stink Bug Management Using Trap Crops in Organic Farming (<http://articles.extension.org/pages/61596/stink-bug-management-using-trap-crops-in-organic-farming#.Uh5C0LykD7c>)

Southeast Farm Press: Trap Crops Help Control Sucking Insect Pests in Tomatoes (<http://southeastfarmpress.com/vegetables/trap-crops-help-control-sucking-insect-pests-tomatoes>)

Southern SARE: Trap Crops for Leaf-footed Bug Management (<http://www.southernsare.org/SARE-in-Your-State/Alabama/State-News/More-Alabama-News/Research-Update-Trap-Crops-for-Leaf-Footed-Bug-Management>)

University Tennessee Extension: Trap Crops, Intercropping, and Companion Planting (<https://extension.tennessee.edu/publications/Documents/W235-F.pdf>)

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