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ENTOMOLOGY SERIES

TIMELY INFORMATION
Agriculture & Natural Resources

Trap Crops for Managing Vegetable Insect Pests

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Pest management is creative

Number one problem with vegetable production in southeastern United States is insect pest that come in variety of shapes, sizes, and colors. Caterpillar pests of vegetables have long been the major issue for vegetable producers and home gardeners, e.g., diamondback moth, squash vine borer, hornworms, and armyworms. Those insects can cause one hundred percent crop loss if control measures are not taken. Sucking insect pests, e.g., stink bugs (Fig.1) and leaffooted bugs, are emerging problems in home garden vegetable production. Stink bugs typically become a problem in the garden mid- to late-season and heavy infestation may cause fruit and flower drop affecting plant yield (Fig. 2). It can be difficult to manage caterpillars and stink bugs with currently available general use pesticides that may give rise to insecticide resistance and cause nontarget effects. An alternative method to combat insect pests in the backyard is by the use of trap crops in home or commercial settings, since the choice of insecticidal control for the homeowners is narrow.

Trap cropping: A case of fatal attraction!

A trap crop is an attractive host plant that attracts insects away from the main crop during a critical time period. The basic principle of trap cropping is that insects have preference for host plants and will move to a preferred host given a choice. Insects are highly attracted to reproductive stages of host plant over the vegetative stages and trap cropping uses this attraction to good use. Generally, the trap crop is considered 'sacrificial' because it protects the valuable main crop when pest populations exceed normal levels. The target insect must be controlled in the trap crop with timely insecticidal applications or by mechanical removal. Since the 1930s, there have been many reported cases of successful trap cropping for management of various insect pests resulting in great reduction in the use of pesticides. The benefits of trap cropping include reduced dependence on insecticides, low cost of trap crop seed, conservation of natural enemies, and better crop and environmental quality. Remember, trap cropping is not a 'silver bullet' solution to all our pest problems because it does require more pest management skills and the knowledge of insect behavior. Also, not all insects can be controlled with trap crops.

Benefits of trap cropping:
Better quality of main produce
Attract beneficial organisms
Enhance biodiversity
Reduce dependence on insecticides

Applications of trap cropping technique

There are two ways you can use trap cropping: 1. One may use the same plant cultivar as a main crop and a trap crop. The trap crop is planted much earlier than the main crop in order to serve as food for the insects, and 2. The main crop and trap crop are entirely different species. Research has shown that hot cherry peppers trap crop can protect bell peppers by reducing damage from many insects, including pepper maggots. Early planted tomatoes can serve as trap crops for the multiple pests to protect a patch of desirable tomatoes.

Blue hubbard squash or other susceptible variety can be used as a trap crop to attract and retain cucumber beetles, squash vine borers, and squash bugs. Some trap crops for stink bug management that can be used in home gardens include buckwheat, okra, green bean, sunflower, and sorghum; these trap crop seeds are inexpensive and readily available at local feed-and-seed stores. Sunflower appears to be attractive to leaffooted bugs as well but it has to be planted very early in order to be blooming by the time the bugs begin to migrate in high numbers.

Trap cropping is management intensive because insects must be removed manually (e.g., by hand-collection and drowning) or killed with insecticides (synthetic or biological formulations) as soon as the bugs appear in low numbers. Scout the trap crop continuously; do not wait for the populations to increase over time. If the bugs are not controlled early, then this strategy will backfire and cause more problems because the traps crop will then serve as 'nursery crop'! Past research on caterpillars suggests that no more than 20% of the total production area in large garden or field may be dedicated to trap cropping in order to be economically justified. Trap crop should always be planted on good ground so that it remains healthy and attractive to the target pest/s.

Trap crops can be arranged in various spatial patterns and the choice of design will depend on target pest, pest pressures, and garden or farm size. Extremely mobile insects such as cucumber beetles are more difficult to manage with trap cropping than the slow moving insects, e.g., Colorado potato beetle. Some of the spatial arrangements include: perimeter trap cropping (PTC), row trap cropping (RTC) and strip trap cropping (STC). By far, PTC is most popular trap cropping arrangement used by farmers. Perimeter trap crops (Fig. 3) can be planted on four sides of the main crop in sufficient density in order to provide a physical barrier to mobile insects. For example, sorghum and sunflower can be effective as PTC when planted in 2-3 wide rows; the developing heads of those trap crops may get covered with stink bugs. RTC is a type of intercropping where rows of trap crop (Fig. 4) alternate with several rows of the main crop, e.g., buckwheat can be planted as a row trap crop for stink bug control. Buckwheat (densely planted) is also suitable for sheltering natural enemies and pollinators in the garden. If the direction of insect migration into the garden is known, then gardeners may plant the many rows of trap crop across the path of the pest in order to arrest their movement and remove insects in a timely manner from the trap crop.

If land is limited, trap cropping can also be done by planting a dense mixture of trap crop seeds in several large pots and insects can be manipulated by moving the pots to intercept insects. Trap cropping becomes easier with experience and gardeners should maintain records for their own benefit.

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FIGURES

Figure 1. Brown stink bug (*Euschistus servus*) feeding on okra using its piercing and sucking mouthparts, Baldwin County, Alabama (2010). Image source: Ayanava Majumdar, ACES.
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Figure 2. High leaffooted bug infestation caused fruit drop in this eggplant field.
Image source: Ayanava Majumdar, ACES.

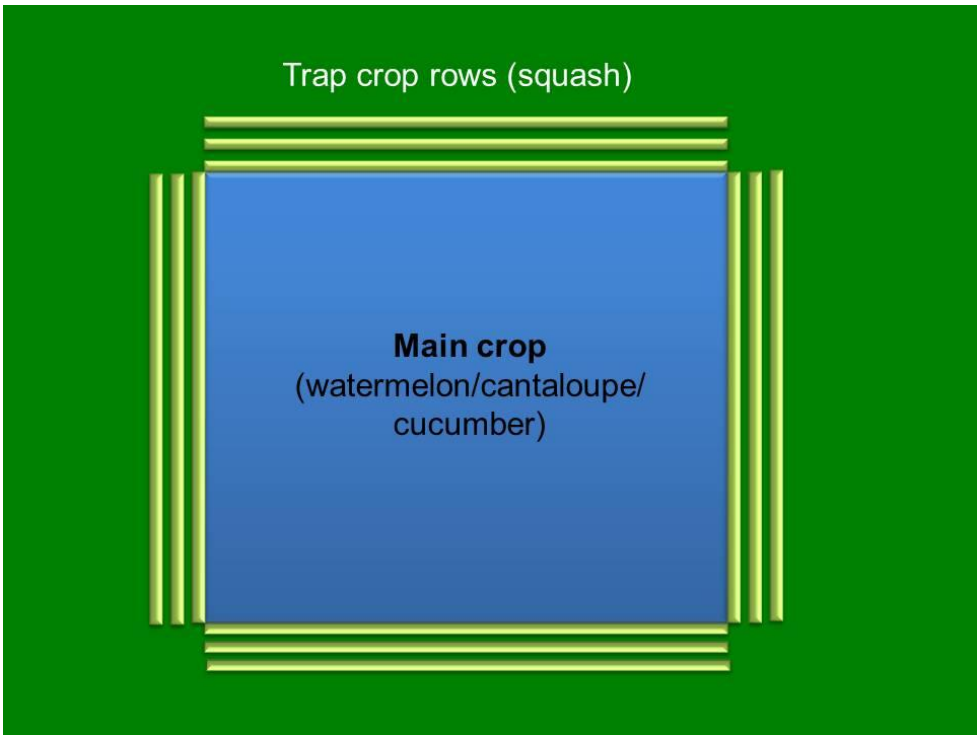

Figure 3. A conceptual illustration of perimeter trap cropping system with squash trap crop surround a field of main crop. This system can attract over 65% of cucumber beetles and squash bugs.
Image source: Ayanava Majumdar, ACES.


Figure 4. Row trap cropping of buckwheat (center plot) between rows of a main crop. Sunflowers in the summer can also serve as a trap crop for stink bugs and leaffooted bugs.
Image source: Ayanava Majumdar, ACES.