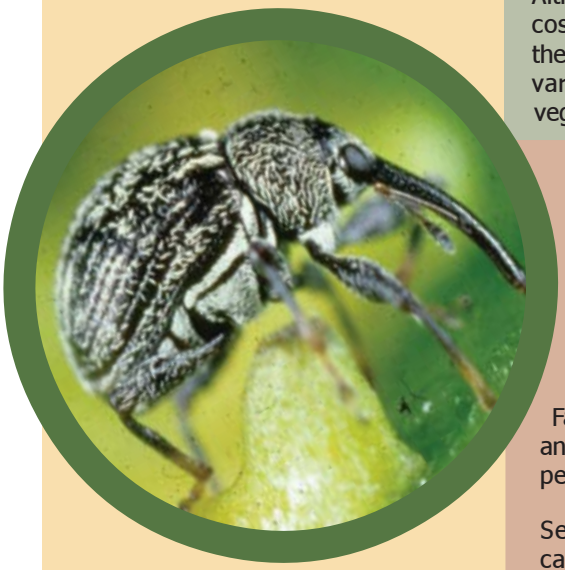
Action thresholds are levels of pest density or damage that result in consistently measurable losses in yield quantity or quality.

ACTION THRESHOLDS:

The cornerstone of IPM is knowledge of the pests attacking a crop and an understanding of the relationship of density of those pests to crop damage. Therefore, every IPM program is dependent upon periodic scouting to ascertain pest density and upon establishment of densities when treatment is warranted, i.e. thresholds.

Although thresholds based upon the economics of the crop and upon the cost of treatment have been developed for some pests of vegetables, these "economic" thresholds generally have not been used because of the variability and unpredictability of the ultimate market value of winter vegetables. Therefore, action thresholds have been utilized.



PEST OUTBREAKS:

All pests are attacked by a complement of natural enemies including insects, mites, viruses, fungi and bacteria. Natural enemies keep many, if not most, insects or mites under sufficient control so that economic damage is avoided. When these natural enemies provide insufficient control **(Figure 1)** or provide control only after serious damage has been inflicted **(Figure 2)**, an insect or mite becomes a major pest.

Favorable weather may permit insects or mites to increase to high densities and escape the controlling influences of natural enemies and, thus, become pests.

Why do we experience pest outbreaks?

- *Disruption of natural control*
- *Pesticide resistance*
- *Invasive species*
- *Secondary pest problems*
- *Weather*
- *Migration*

Secondary outbreaks of pests are caused by applications of broad spectrum pesticides that decimate natural enemies, thus allowing an insect or mite population to increase to damaging levels **(Figure 3)**.

When insects or mites develop resistance to pesticides applied for their control or for the control of other insects, not only do they escape the controlling effects of the pesticide, but they also escape the controlling effects of natural enemies which are not pesticide resistant and which are killed.

Non-native insects or mites may become pests when introduced into Florida without their natural enemies. Native natural enemies may eventually switch to the introduced insects and mites and exert some level of natural control.

Figure 1. Natural enemies provide insufficient control of the pepper weevil, *Anthonomus eugenii*. Photograph by: Skip Choate.

Figure 2. Natural enemies provide control only after serious damage has been inflicted by the beet armyworm, *Spodoptera exigua*. Photograph by: Dave Schuster.

Figure 3. *Liriomyza spp.* leafminers on tomato are an example of a secondary pest. Photograph by: James Castner.

Prepared by: Dr. David Schuster

WHY ALL GROWERS SHOULD SCOUT:

- Improve knowledge of pest presence and dynamics.
- Reduce pesticide costs.
- Reduce unnecessary pesticide applications.
- Reduce potential environmental contamination.
- Integrate biological control by conserving natural enemies.
- Reduce worker and consumer pesticide exposure.
- Improve knowledge of pesticide selection, timing and effectiveness.
- Better manage pesticide resistance.

SAMPLING FOR PEPPER:

- Select one vegetative bud per plant and count beet armyworm larvae, broad mites and aphids on young leaves.
- Select leaf from middle canopy and inspect for caterpillar eggs.
- Count thrips and *Orius* predators/10 flowers.
- Inspect flower buds and small fruit for pepper weevil feeding.
- Inspect fallen flower buds and fruit for pepper weevil larvae.

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HOW TO SCOUT:

- Place yellow sticky traps (whiteflies, leafminer, aphids) and pheromone traps (pepper weevil, tomato pinworm, tomato fruitworm, beet armyworm) around field perimeter and check twice weekly.
- Map field in two acre grids **(Figure 4)**.
- Select 6-10 contiguous plants in each grid twice weekly.
- Observe each plant for flying insects.
- Inspect each plant for caterpillars (focus on new damage), true bugs, predators, etc.

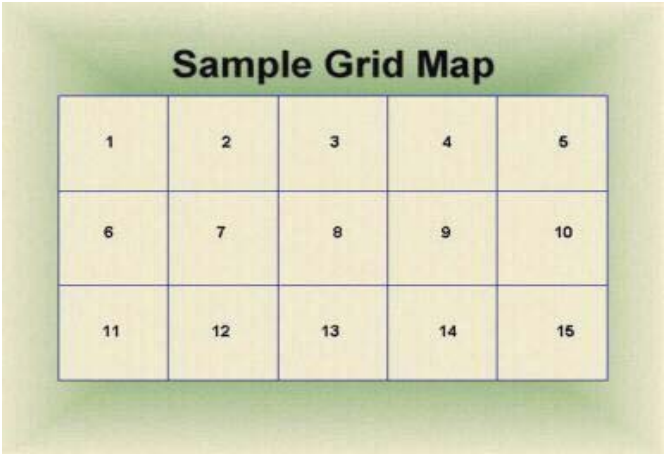

Figure 4. Fields can be divided into two-acre segments for sampling. Courtesy of: UF/IFAS.

Sampling for Tomato:

- Inspect whole plant or select terminal leaflets of 3rd or 7th leaf.
  - ➔ Count whitefly nymphs on whole plant or terminal leaflet.
  - ➔ Count aphids, caterpillar eggs and leafminer larvae on whole plant or terminal 3 leaflets.
- Select lower leaf and inspect for mites and count tomato pinworm larvae
- Count thrips/10 flowers.
- Inspect 10 fruit for caterpillar and true bug damage.