

Managing insect pests on a whole farm basis

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Whole farm management is not a new idea. Developing cropping and pest management strategies for the farm unit instead of field-by-field has been discussed for many years. Despite this, the basics of pest management are sometimes overlooked. Recognizing the relationships between weed and insect pests and the crops is a good place to begin whole farm pest management.

Weeds are the most critical pest group. Not only are they direct crop pests through competition for space, nutrients, water and light, they also are alternate hosts or reservoirs for insect and disease pests. Weeds can hurt the crop even if they are not growing in the fields.

The following examples illustrate the weed/insect pest relationship.

1) In 2007, a patch of jimson weed growing in a field border harbored five insect pests – three species of caterpillars – corn earworm, yellow striped armyworm and tomato hornworm and two species of stinkbug – a brown stinkbug, *Euschistus* species, and the invasive brown marmorated stinkbug. With the exception of the brown marmorated stinkbug, all of these species were feeding and reproducing on the jimson weeds without any apparent harm to the weeds.



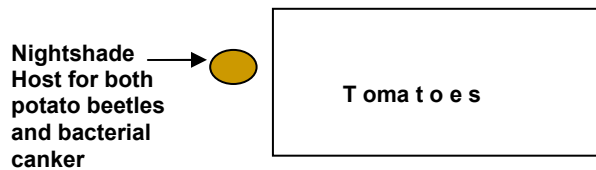
Euschistus stinkbug on a jimson weed seed pod (l) and a corn earworm larva in a seed pod (r).

2) If weeds are allowed to grow in pepper and tomato fields, they become pests and act as reservoirs for insects. Eastern black nightshade belongs in the same plant family as peppers and tomatoes, so many of the insect pests that attack these crops also feed on the nightshade. The growth habit of nightshade in a pepper field is shorter and has a greater density of foliage, making insecticide coverage more difficult. As a result, green peach aphid populations can build up on nightshade in peppers even though few aphids are on the peppers. The aphids can easily re-infest the peppers from the nightshade.



Nightshade in a row of peppers (l) and green peach aphid on the leaf underside (r).

3) In 2006, a NJ farmer was experimenting with weed control in tomatoes and initially did not apply an herbicide. A patch of eastern black nightshade supporting a vigorous population of Colorado potato beetle was found within two feet of the end of the tomato rows. The nightshade also tested positive for bacterial canker. About the time the nightshade was found, several canker infested tomato plants were found. While it could not be proved that the canker infection came from the nightshade, its close proximity to the tomatoes implies that it could have been the source of the infection. Further, the potato beetles would have provided an excellent means of spreading the bacteria from the nightshade to the tomatoes.



Other examples of weed/insect associations are:

- Aphid transmission of plant viruses. Certain broadleaf weeds harbor viruses that are picked up by winged aphids that then disperse to broadleaf crops. Aphids that have been feeding on Johnsongrass can vector a virus from herbicide treated Johnsongrass to corn. Clean up weed populations along farm drives, field margins and around buildings to help reduce host plants for aphids.
- Eastern black nightshade is an alternate host for pepper weevil, which is a sporadic pest of peppers in New Jersey. Elimination of nightshade on farms with peppers will help reduce the risk of a pepper weevil infestation.

-Queen Anne's lace, curly dock, buckhorn and related weeds are the alternate hosts for carrot weevil and the presence of these weeds in areas where carrots and parsley are being grown is conducive to increased damage from the weevil.

-Carrot beetles, relatives of June beetles, feed on the roots of common ragweed. When large common ragweed plants are allowed to exist in sweet potato fields, the carrot beetles will also feed on nearby sweet potato roots.

Unfortunately, crops such as small grains and alfalfa often act like weeds in that they may harbor pests of vegetables and fruit crops. For example, small grains (wheat, barley, and rye) are fed upon by thrips and stinkbugs with little apparent harm to the grain. However, when the grain matures thrips and stinkbugs leave the grains and search for other host plants where they may become pests. Harvesting alfalfa forces both tarnished plant bug and potato leafhopper out of the alfalfa field and both will readily infest nearby crops sometimes causing significant damage to potatoes and snap beans and other crops.

Reduction of insect pest pressure in our crops can begin with good weed management not only in fields but along field borders and lanes. Farmers should be aware of the connection between weeds and insect crop pests. Once whole farm pest management begins, management of crop pests should be easier and perhaps less costly.