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Jigsaw report #1: Pests, as in weeds, insects and diseases

Field-day visitors learn about organic no-till, interact with researchers on worst problems, best answers.

By Greg Bowman

SLIDESHOW: Organic No-till field day, Part I

Participants in the 2008 Rodale Institute field day got to interact with one another and eight researchers in discussion groups at the end of the information-packed event. Joining Rodale Institute staff to interact with participants were specialists from Penn State, Virginia Tech and the USDA Agricultural Research Service Beltsville facility.

The day included wagon tours of the 333-acre farm and in-field talks by resident and visiting specialists presenting new findings on the cover-crop roller-crimper system of organic no-till planting, including emphasis on cover crops and cultural weed management.

The final sessions of **the day's program**, titled "Organic No-till: New farming strategy for the 21 Century," took place in the Institute's flagship research Farming Systems Trial®. Matt Ryan, the Institute's agroecologist and doctoral student at Penn State, led an interactive "Jigsaw" exercise in which small groups rotated between four wagons to share information on weed management, soil fertility, pest management and cover crops with crop and soils systems experts.

"The exercise was a new activity for us and we were not sure how it would go," Ryan said. "But a number of farmers commented that they really enjoyed the discussion and they learned a lot from one other. One of the best things about the exercise was that farmers identified problems that may not have been covered in the field day presentations."

Group members named their leading problems and questions in the opening moments of the sessions, then spent the balance of their time together discussing possible answers, with input and clarifying questions from the agricultural specialists. (Coverage includes the two pest-related sessions this week, with soil fertility and cover crops in our next update.)

Weed sessions

Tilling, cutting and out-competing were suggested as ways to manage Canada thistle, the leading weed problem identified in the jigsaw discussions.

Thistles are a problem in these ways, participants said:

- Patches seem to move around from year to year, even with hand clipping.
- They seem to thrive in no-till and reduced-till fields, due to lack of regular deep disturbance and/or cutting.
- They trouble plantings of Christmas trees, vegetables, small grains and corn.

Thistle management practices include:

- Planting alfalfa, cutting it regularly (every month or so), and leaving it in for two or more years. Irrigating encourages robust alfalfa growth, which seems to out-compete thistle.
- Mustard plantings

- Summer fallow with timely cultivation, to gradually weaken thistle plants.
- Clipping heads or stalks persistently, about once every 30 days.
- Burning leaves with a propane torch (rather costly and time-consuming at the field level, admittedly)
- Rotational tillage with a moldboard plow, which turns up the deep roots of thistle without breaking them up so they can dry out and die.
- Where proper fencing is available, goats and pigs will eat thistle. Painting on some molasses on the plants boosts hogs' interest in munching them down and digging up the roots.
- The fungus *Pseudomonas syringae pv. Tagetis* is showing up on thistle in eastern Pennsylvania, and researchers are working to determine if it can become an effective biocontrol.

General weed-management techniques found successful were:

- Black plastic and even roofing tin for non-organic mulches.
- Fast-growing, vigorous cover crops such as cereal rye and sudan grass often can out-compete weeds. Turnips sown in the spring among sunflowers also serve this weed-smothering function. Let the turnips grow, mature and die, then till them under. A smother crop mix of buckwheat/oats sown between rows of pumpkins can shade out weeds until the vines grow together.
- Creating mowed weed buffers of 6- to 12 feet wide prevents weeds from getting established, surviving then spreading into field edges.
- Beetles, grasshoppers and rodents present in biodiverse crop rotations combine to eat significant amounts of weed seeds.
- Shifting your crop rotation relative to crop selection and crop sequencing allows you to keep weeds on the defensive by constantly changing the growing environment.
- At the large garden scale, covering transplants with glass canning jars to allow flame weeding without damaging the transplants, using 15 jars at a time and moving them as needed to another section.

Insect and disease sessions

Compared with the weed discussions, participants cited a wider variety of insect and disease issues that were more crop-specific when they stopped at the "pest" wagon. Alfalfa weevils and leafhoppers, Colorado potato beetle and ground hogs were the most often-mentioned problems.

Other crop attackers listed were: virus on pumpkins, cutworms in corn, cucumber beetle on squash, flea beetles in vegetables, fungus on Christmas trees, mites on apples, Japanese beetles on Roundup Ready soybeans, and much bigger pests such as deer, birds and groundhogs.

There was general agreement on the long-term organic answers to these challenges. For insect pests, develop a multi-year, multi-crop rotation designed to interfere with the life cycle of your most serious pests, increasing biodiversity with species that provide alternative food supply during crucial times for beneficial insects. For diseases, work to improve soil health and biological vitality and to identify and manage insect vectors (carriers) of viral diseases. In both cases, selecting pest-resistant varieties and growing them with cultural practices that keep them as healthy as possible are key recommendations. (When use of a product is needed for organic or biologically based Integrated Pest Management, check the new **ATTRA Ecological Pest Management Database**.)

Specific recommendations discussed:

Alfalfa pests: modify cutting schedule if you reach threshold levels, seek resistant or tolerant varieties, plant a grass mix, correct boron and calcium soil balance, plant alfalfa on looser, less-acid soils or use lime for correct pH of 6.5 to 7.5. One grower said leafhopper was a pest in the early years of transition, but is no longer a problem.

Colorado potato beetle: companion planting (such as string beans with eggplants) or heavy mulch to

prevent larvae from crawling down the stalk and reaching soil to complete their life cycle.

Cucumber beetles: use reflective mulches, apply stylet oil, plant radish as a trap crop (sacrificed to destroy the pests before they mature), introduce beneficial nematodes for limited scale due to cost, select resistant/tolerant varieties (**ATTRA guide** for this pest is quite helpful.)

Vine-crop diseases: Identify and manage insect vectors as above, avoid manual transmission by washing hands in a skim milk solution. (**Details**)

Flea beetles: row covers and not much else. Mild winters prepare the way for flea beetle infestations, and the increasing popularity of susceptible greens (arugula, for instance) are attracting more flea beetles. Trap crops that are highly attractive to the pests can warn growers of their presence to take protective measures on their cash crop, perhaps via early harvest.

Deer: Laying chicken wire flat on the ground or using electric fencing may keep deer away if more lethal means of herd reduction are to be avoided. One participant found that baiting the fence with peanut butter smeared on pieces of tinfoil wrapped around an electric wire at about 29 inches from the ground was effective. Human hair and dried blood were noted as techniques that may work on some deer for a time.

Groundhogs: Trapping and killing these rodents is the default approach when high populations are causing serious damage.

One participant uses a refractometer to sample the nutritional uptake and relative sugar level of plant tissue, measured in Brix units. A high Brix reading for a plant indicates that the plant will be less likely to attract insects and more likely to resist pathogens. Another asked whether there are data available relating crop-specific Brix readings with susceptibility to specific insects and pests.

Next update: Jigsaw Part 2 - soil fertility and cover crops

Greg Bowman *is communications manager for the Rodale Institute.*