Welcome to the fall 2011 issue of the ROSE Review! It has been an exciting inaugural year for the Reduced-tillage Organic Systems Experiment (ROSE). We experienced just about every type of extreme weather you can imagine, including relentless rain in the spring, severe drought in the summer, then hurricane Irene and now more rain. We even had an earthquake in August!

Despite all of these challenges, some of our crops look absolutely fantastic and should produce very competitive yields! This year we saw some of the most impressive stands of organic no-till corn and soybean, but we also saw some of the most extensive insect crop damage, wiping out an entire research block.

We collected an impressive amount of samples and generated reams of data. Over the next several months we will be pouring over our data and will summarize our results, right here in the next issue of the ROSE Review.

In this issue, we report on the first year of our three-year cropping systems experiment, which is being conducted in Pennsylvania, Maryland, and Delaware. We are testing strategies for managing weeds and insect pests in cover crop-based organic rotational no-till corn and soybean.

In addition to news about the ROSE you will find information about our on-farm research, organic weed control, and the brown marmorated stinkbug.

By Matt Ryan, Penn State

Photographs: rolling hairy vetch/triticale cover crop in the Penn State ROSE (upper left, by Clair Keene); soybean in the BARC ROSE (upper right, Matt Ryan); and soybean emerging through rolled rye (background, Clair Keene).
Penn State ROSE Update

After a very wet spring in central Pennsylvania we were finally able to get into the field to roll and plant in late May. We rolled down the rye cover crop and no-till planted soybean, and rolled the hairy vetch/triticale cover crop and no-till planted corn. The rolled cover crop serves as a mulch to keep weeds from emerging. Because we wanted to test the effect of planting date on crop performance, weed emergence, and insect pests, we rolled our cover crops and planted soybean and corn on 3 different dates. Although biomass was surprisingly similar, cover crop regrowth decreased with each successive planting date (see figure below).

We planted two soybean and two corn varieties on each of the 3 planting dates: one variety that was planted on all dates (standard), and one with a relative maturity better suited to the planting date (variable). Planting dates and varieties (Blue River) are shown in the table below.

Wheat was harvested in early July, and yields were somewhat low (44 bu/a), most likely because it was seeded relatively late in the season. Liquid dairy manure (~4,000 gal/a) was spread on our wheat plots and plowed under in late July. These plots were planted to hairy vetch/triticale in a 50/50 mixture at 60 lb/a on September 1st.

High-residue cultivation was used in half of the corn and soybean plots to control between-row weeds that emerged through the cover crop mulch. Plots receiving this treatment were cultivated twice at about 6 and 7 weeks after planting. Weeds populations were surveyed one week after cultivation.

Although crops are looking good, there is a lot of work that still needs to be done yet this fall. Between harvesting and planting cover crops we have our work cut out for us. Look for a detailed report on the corn silage and soybean yields from this first year in the next issue of the ROSE Review.

By Mark Dempsey, Penn State

<table>
<thead>
<tr>
<th>Crop</th>
<th>Planting date</th>
<th>Variable</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soybean</td>
<td>May 26</td>
<td>29AR9 (2.9 grp)</td>
<td>2A12 (2.1 grp)</td>
</tr>
<tr>
<td></td>
<td>June 3</td>
<td>2A71 (2.7 grp)</td>
<td>2A12 (2.1 grp)</td>
</tr>
<tr>
<td></td>
<td>June 14</td>
<td>11A1 (1.1 grp)</td>
<td>2A12 (2.1 grp)</td>
</tr>
<tr>
<td>Corn</td>
<td>June 1</td>
<td>41R00 (100 day)</td>
<td>29D01 (90 day)</td>
</tr>
<tr>
<td></td>
<td>June 9</td>
<td>37B07 (95 day)</td>
<td>29D01 (90 day)</td>
</tr>
<tr>
<td></td>
<td>June 16</td>
<td>22A10 (85 day)</td>
<td>29D01 (90 day)</td>
</tr>
</tbody>
</table>
Beltsville ROSE Update

There has been a profusion of activity in ROSE at Beltsville (BARC) since early April. Insect sampling began prior to planting with pheromone trapping for black cutworm and true armyworm, pan traps for seedcorn maggot flies, and use of sprouted corn seed for baiting wireworms and other seed pests.

<table>
<thead>
<tr>
<th>Crop</th>
<th>Planting date</th>
<th>Variable</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soybean</td>
<td>May 3</td>
<td>38C9 (3.8 grp)</td>
<td>29AR9 (2.9 grp)</td>
</tr>
<tr>
<td></td>
<td>May 13</td>
<td>34A7 (3.4 grp)</td>
<td>29AR9 (2.9 grp)</td>
</tr>
<tr>
<td></td>
<td>May 25</td>
<td>2A71 (2.7 grp)</td>
<td>29AR9 (2.9 grp)</td>
</tr>
<tr>
<td>Corn</td>
<td>May 13</td>
<td>53R57 (104 day)</td>
<td>25A16 (87 day)</td>
</tr>
<tr>
<td></td>
<td>May 24</td>
<td>39B17 (96 day)</td>
<td>25A16 (87 day)</td>
</tr>
<tr>
<td></td>
<td>June 3</td>
<td>22A10 (85 day)</td>
<td>25A16 (87 day)</td>
</tr>
</tbody>
</table>

The first planting date of corn had significant vetch re-growth and was re-rolled 12 days after planting. After corn and soybean emergence, plant damage assessments and stand counts were conducted, emergence traps to monitor seedcorn maggot were installed, and pitfall and sentinel traps were used to monitor predaceous insects. Marie Raboin, one of the technicians at BARC, declared preparing the sentinel traps, “to be officially the

ROSE Entomology Update

This summer was the first full implementation of arthropod sampling in the ROSE. It was a very busy season. We learned that even though our focus is on early season pests, sampling for those pests, their damage, and natural enemies starts early and is still happening because of the successive planting dates!

We started in early April with pan trapping for seedcorn maggot flies. Soon after, we started pheromone trapping to detect flights of black cutworm and true armyworm moths, two pests associated with abundant plant residue. Baiting for wireworms in corn plots happened shortly before planting in May. Planting of corn and soybean brought crop damage assessments, and placement of seedcorn maggot fly emergence traps. June brought pitfall trapping for soil-surface active pests and natural enemies as well as sentinel trap assays to assess predation potential of those natural enemies. Sampling for insects started to slow down in mid-July, in time to start monitoring for soybean aphid, and to sample soil for soil-dwelling insect pathogens.

Because 2011, being an odd-numbered year, was forecast to be a “hot” year for soybean aphids, we implemented regular monitoring. However, large aphid populations never materialized. Soybean aphids overwinter on buckthorn, then migrate to soybeans in early summer, where their populations increase before they fly back to buckthorn for the winter. It may be that our prolonged wet, cool spring may have reduced the numbers of aphids flying from their overwintering sites to soybean fields. We’ll be keeping our eye out for them in future years. With all the sampling that we completed this summer, it’s no surprise that we’ll spend the remainder of the year, and the early spring, going through all of our preserved arthropod samples to determine populations.

By Mary Barbercheck and Christina Mullen, Penn State
weirdest thing I have ever done." This involved using double-sided tape to attach waxworms (often used for fish bait) to index cards which were then stationed in the field plots to find out the effect of different ROSE treatments on insect predation.

Stands of both corn and soybeans are excellent for all planting dates. There has been very little stand loss to seedling pests and our corn seed bait results confirmed very low wireworm and other seedling pests. Although significant numbers of seedcorn maggot flies were caught, the warm spring, and corresponding warm soil temperatures and rapid seedling emergence, discouraged larval damage.

BARC has been fortunate this year to be getting rain, however we needed to irrigate in early June. Cultivation began on 6/22/11 and each planting date was cultivated twice, except for the first planting date which was cultivated once. BARC fabricated a poultry litter injector over the past six months which was only used in the third planting date; fabrication was completed after the acceptable side-dress date for planting dates one and two. We applied poultry litter (2 tons per acre) by hand for planting dates one and two, and injection for planting date three. We have been monitoring the effect of cultivation on weed populations in corn and soybean by counting weeds within two weeks post cultivation and by collecting weed biomass. Weed counts began on 7/1/11 and have been completed for the first two planting dates. Weed biomass collection was completed for wheat in late June (6/27-29/11), and the first planting date of corn and soybean in mid July (7/18-20/11). Wheat was harvested on 7/11/11 and the plots were moldboard plowed on 7/20/11. Wheat yields will vary across the field because in the fall there was considerable herbivory by geese.

By Lauren Young, USDA-ARS

Birdseye view of the ROSE plots at BARC. Photograph by George Meyers.
Maryland On-Farm Research

Aaron and Betsy Cooper own and operate Cutfresh Organics, a 108 acre farm in Allen, MD. Cutfresh Organics is part of a larger 600 acre farm that has been in the family for over 150 years. Currently they manage 15 acres of certified organic land with an additional 93 acres in transition. Their primary commodities include snap beans, soybeans, corn, and small grains.

Field trials were initiated in 2010 at Cutfresh Organics with a fall planting of hairy vetch and cereal rye. Our intention was to plant soybean into cereal rye and corn into hairy vetch using the similar cover crop-based organic rotational no-till system as in ROSE. As we moved into spring, it became clear that the cereal rye cover crop was going to be too thin to be used in the no-till system and it was removed from the experiment.

In late spring, prior to hairy vetch flowering, Gary Zimmer presented at the Maryland Organic Grain and Forage Conference on the role of tillage in field crop production. Mr. Zimmer is the founder of a consulting company, Midwestern Bio-Ag, and author of several books on biological farming. Gary’s presentation included a discussion on shallow tillage for incorporating green manures prior to seedbed preparation for a cash crop, which sparked interest in Aaron to compare this approach to the cover crop-based organic rotational no-till system.

The on-farm trial at Cutfresh Organics includes a shallow till vs. no-till comparison replicated three times in 4.6 m wide by 43 m long plots. Hairy vetch biomass was measured in two 0.5 m² quadrats for each experimental unit. Hairy vetch biomass was very consistent across the site and averaged 5200 kg ha⁻¹. Within the shallow till approach, hairy vetch was incorporated with a rotovator to a 10 cm depth, allowed to mellow for a week and followed with an additional rotovating prior to cultimulching and planting. The tilled treatment included rotary hoeing and between row cultivation. The rolled approach included a single roll/plant and no supplementary cultivation.

Cropping system evaluations and comparisons will be difficult in this first year of the trial as there was poor crop stands across the entire experiment. While weed seed banks were quite low at the site and weed control very effective for both systems, seed and seedling herbivory severely damaged the crop populations. Damage was significantly worse in the no-till system, but both treatments were strongly affected. While we did not directly identify the responsible insects, injury across the entire site was comparable to corn injury in another BARC experiment which Dr. Weber identified as Southern corn root worm. Field management history and surrounding land use may have contributed to the insect damage in this year’s experiment. The previous two crops in our corn field included Sudex and corn and the surrounding land use included grass strips that are part of an EQUIP program. The lack of crop rotation and optimal grass habitat for herbivores may have resulted in high seed and seedling feeding herbivores.

A field day was held at Cutfresh Organics on August 1. The tour included field trials associated with the ROSE OREI grant and an additional OREI grant focused on fertility management in organic corn.

By Steven Mirsky, USDA-ARS

Bill Curran and Steven Mirsky examining soybean plants in the BARC ROSE plots. Photograph by Matt Ryan.
NC Research News

Roller-crimper research in North Carolina is focusing on comparing cover crops, planting dates, and row spacings. In corn, winter pea/rye mixtures are being compared with hairy vetch/rye mixtures (see photograph below). Pea and hairy vetch were determined to be the best legumes for the corn system in North Carolina after several years of trialing multiple species and cultivars of legumes. In addition to the two mixtures, two planting times are being tested; immediately after rolling versus waiting several weeks to allow rainfall to replenish soil moisture. So far, weed control has been excellent in all plots due to abundant cover crop growth this year. Crop stand continues to be the big issue with this system with skips due to lack of row closure. Next year we intend to try 15” rows to compensate for stand issues.

Soybean continues to be the system that works well with the roller-crimper. With high seeding rates, stand has not been an issue and weed control is excellent on sites with enough rye. We had originally thought that 30” or wider rows were necessary so that between-row cultivation was still possible with a high residue cultivator like the ones made by Sukup and KMC. We routinely have found cultivation unnecessary and farmer feedback from the last two years indicated other row spacings should be considered. This year we have an experiment with three row spacings and two planting dates. The dates are either roll and plant same day or roll and wait for additional rain before planting. The row spacings are 7.5”, 15” and 30”. In theory, the smaller row spacings should help shade out weeds faster. Stand in both the 15” and 30” are excellent, while the 7.5” is patchy, but still likely sufficient. The only issue we have faced with soybeans in this system is a much higher tendency for lodging. Soybean lodging has occurred late in the season in most years, but has not affected yield. It has, however, slowed combine speeds considerably and remains an issue of concern with our growers. Weeds also slow combine speeds and soybeans are the crop with the most weed control problems using clean tillage.

By Chris Reberg-Horton, NC State

Planting corn into winter pea/rye (left), hairy vetch/rye (right) in North Carolina. Photograph by Chris Reberg-Horton.
Pennsylvania On-Farm Research

Elvin and Charlotte Ranck and family own and operate Charvin Farm located near Mifflintown, Juniata County. The Rancks planted a cover crop of hairy vetch, crimson clover, and spelt last fall that really thrived in early 2011 with all the precipitation that fell in the region. Extended periods of wet weather delayed the planting of crops on the farm, which subsequently pushed back the tillage and planting operations at this field. Those plots designated for tillage were plowed in late May and disk harrowed in early June. The remaining cover crop was rolled on June 10. No-till planting was attempted the same day; however, it was soon realized that the row closure system on the farm’s older John Deere no-till planter was not adequate for general no-till conditions.

The thick cover crop mulch restricted seed furrow closure and an alternative to the rubber press wheel system was needed. A six-row set of Martin spiked closing wheels on a newer JD planter were identified as a possible temporary “fix” for the above challenge. The entire closing wheel assembly (mounting brackets, closing wheels, and down-pressure springs) were removed, transported to Charvin Farms, and mounted on the older planter. While the resulting row closer experienced with the Martin units was much better than that afforded by the rubber press wheels, some seed furrows were not completely closed. Down-pressure on the spiked closing wheels reduced the down-pressure available to the double disk openers on the planter units. Additional ballast on each planter unit helped to maintain planting depth, but even more weight per unit was needed. The field was planted on June 13. The area received several small showers during the following 1.5 weeks, but field conditions were rapidly becoming dry at that time.

Germination of corn in the rolled/no-till plots was uneven. It was deemed that most of the problem was due to seed placement, lack of uniformly closed furrows, and lack of moisture. However, the stands in the tilled fields were not much better. A close inspection of both tilled and no-till plots revealed that many seeds had germinated but had not produced a viable shoot prior to onset of seed decay. Seed size was generally small, and seed quality and seedling vigor are suspected to be primary causes of the poor stands. The stands were so thin in areas that the decision was made to abandon the comparison test; a heavy disk harrow was used on the entire site prior to replanting of the field to more corn for silage.

By Ron Hoover, Penn State

Lodged rye cover crop at the Penn State ROSE in May. Surprisingly, much of the rye stood back up prior to rolling. Photograph by Bill Curran.

The same soybean variety (BR 2A12) planted early (right) produced less vegetative growth than when it was planted later (left) in the Penn State ROSE. Photograph by Mary Barbercheck.
Effectiveness of Vinegar and Matran for Annual Weed Suppression in Organic Cropping Systems

Natural product herbicides have the potential to play a role on organic farms by reducing reliance on tillage and cultivation and replacing hand weeding operations. Although natural product herbicides may offer a useful addition to the suite of weed management tools available to organic growers, information is limited to guide their optimal use. Two herbicides that have received attention from both the research and farming communities for weed control in organic crops are vinegar or acetic acid and Matran EC, a clove and wintergreen oil-based product manufactured by EcoSmart Technologies. A number of studies have been conducted over the last several years testing the effectiveness of these and other natural product herbicides for control of annual weeds in organic systems. Results have been highly variable due to a number of factors including application rate, timing of application, target species, and environmental conditions at the time of application.

From 2006 to 2008, Penn State participated in a study that evaluated vinegar and Matran EC for control of some annual weeds. A total of 20 field trials were conducted in 7 states across the US evaluating the same treatments. In order to ensure some uniformity, seeds of brown mustard ‘Florida broadleaf’ were sown at each location to serve as a surrogate weed. When the brown mustard reached the 3 to 4 leaf stage, the different herbicide treatments were applied. Fleischmann’s 30% white grain vinegar was diluted to 5, 10, 15 and 20% concentrations of acetic acid and applied at 70 gallons per acre (GPA) with 0.1% Yucca extract as an adjuvant. Matran EC was applied at 5, 10, 15 and 20% concentrations at 35 GPA with 2.5% Humasol (derived from leonardite) as an adjuvant. An untreated control plot was included for comparison. Visual ratings of control were made by each researcher at 5 and 15 days after treatment. In addition, air temperature, relative humidity, and percent cloud cover at the time of application were recorded.

The results showed that the effectiveness of both vinegar and Matran EC varied widely across trials. Relative humidity was positively correlated with the performance of both products; for each 1% increase in relative humidity, control increased by between 0.5 and 1% for the intermediate application rates. Temperature and cloud cover had no statistically significant effect on performance. However, our results suggest that higher temperatures may increase effectiveness of vinegar, but decrease the effectiveness of Matran EC. At the highest rates tested, vinegar was more effective than Matran EC at controlling brown mustard and hairy galinsoga, but product efficacy did not differ for the other weed species (Table 1). Averaged across all trials, species ranked as follows from most susceptible to least susceptible: brown mustard > common lambsquarters > redroot pigweed > common purslane > annual grasses.

This study helps explain some of the variation that has been reported with the use of natural product herbicides but also reveals that additional research is needed. Both vinegar and Matran EC have potential to control small broadleaf weeds, but because of inconsistent performance and cost, these herbicides and similar products have not been widely adopted by organic farmers.


<table>
<thead>
<tr>
<th>Treatment</th>
<th>Rate (%)</th>
<th>Brown Mustard</th>
<th>Pigweed species</th>
<th>Common Lambsquarters</th>
<th>Common Purslane</th>
<th>Hairy Galinsoga</th>
<th>Giant Foxtail</th>
<th>Large Crabgrass</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vinegar</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>42</td>
<td>19</td>
<td>24</td>
<td>1</td>
<td>12</td>
<td>4</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>65</td>
<td>35</td>
<td>48</td>
<td>7</td>
<td>40</td>
<td>8</td>
<td>28</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>74</td>
<td>52</td>
<td>66</td>
<td>34</td>
<td>68</td>
<td>16</td>
<td>28</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>83</td>
<td>67</td>
<td>79</td>
<td>50</td>
<td>86</td>
<td>28</td>
<td>32</td>
<td></td>
</tr>
<tr>
<td>Matran EC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>28</td>
<td>26</td>
<td>29</td>
<td>2</td>
<td>10</td>
<td>7</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>56</td>
<td>51</td>
<td>62</td>
<td>37</td>
<td>14</td>
<td>10</td>
<td>26</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>66</td>
<td>63</td>
<td>75</td>
<td>49</td>
<td>28</td>
<td>19</td>
<td>28</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>74</td>
<td>63</td>
<td>82</td>
<td>52</td>
<td>30</td>
<td>17</td>
<td>27</td>
<td></td>
</tr>
<tr>
<td>Experiment sites</td>
<td>20</td>
<td>13</td>
<td>11</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

Table. Percent control of seven common annual weed species treated with vinegar or Matran EC at 5, 10, 15, and 20%. Results were averaged across multiple sites.
Brown Marmorated Stink Bug Threatens Field Crops, Fruits and Vegetables

Sadly this is shaping up as another big year for the brown marmorated stink bug (BMSB), an Asian invasive with a very wide host range. Just how wide its impact is, is now becoming apparent in the mid-Atlantic region, where fruits such as apples, pears, brambles and others are impacted, as are vegetables, especially sweet corn, tomatoes, and peppers. However, in terms of acreage, the most extensive feeding and breeding habitats are forests and woody landscapes, field corn, and soybeans. This summer we observed BMSB adults in both corn and soybean BARC ROSE plots, and next year we will monitor populations to test for treatment effects and yield impacts.

Soybean effects include direct damage to developing beans within the pods, as well as a systemic effect of delayed maturity, which combine to disrupt harvest and degrade quality, according to Galen Dively of University of Maryland, who has studied effects of BMSB on soybeans and sweet corn. Damage is typically most severe near field edges, because bugs move in from adjacent woods or hedgerows. Growers may avoid harvesting border areas for this reason.

Brown marmorated stink bug adults on soybean plants in the BARC ROSE. Photograph by Lauren Young.

Both sweet and field corn are damaged, with bugs feeding through the husks on developing kernels. During the milk and dough stages, kernels are pierced and sucked by the BMSB’s mouthparts, deflating the grain and impacting quality as well as quantity. Recently, my summer student assistant, Tony DiMeglio, documented this effect on field corn near Brunswick, Maryland (photo, lower left).

BMSB populations are hard to control even with conventional pesticides, and applications may be prohibitively expensive anyway. Three fronts for applied research on how to manage BMSB are proceeding urgently here in the mid-Atlantic where it is most abundant. First, at the initiation of USDA Office of Pest Management Policy, a conference call on organic BMSB management has provided participants with the latest info as to possible organic-approved controls, including OMRI-approved pesticides, row covers, trap cropping, and other tactics. These calls are arranged by Ted Rogers (ted.rogers@ars.usda.gov) and the latest on was held on August 18. Please contact him if you would like to participate.

Second, chemists and entomologists in the Insect Biocontrol and Behavior Lab at ARS Beltsville, including my lab, are collaborating with Tracy Leskey at the ARS Appalachian Fruit Research Station in West Virginia, to identify attractants for use in BMSB management. This is not an easy bug to figure out! But pheromones may hold the key to moving it away from vulnerable plantings, and toward traps and/or other dead ends to reduce crop damage. We are very hopeful based on our field work this year.

(Continued on page 13)
Graduate Student Adjusts to Life at PSU

It’s hard to believe that it has been a year since I arrived in Pennsylvania. Just last August I drove from New Mexico to Nebraska and then from Nebraska to Pennsylvania to start a PhD program in a subject new to me and in a state I had only visited for a few days at a time. While seeing crops growing on hills and in the shadows of mountains is now more familiar to me, I am still adjusting to the climate and topography of central Pennsylvania. I have found scenic drives and favorite spots and am enjoying getting to know the places and people of Centre County.

Since arriving, I have completed two semesters of classes, attended extension meetings, written a research proposal, embarked on the journey that is field data collection, participated in the Weed Olympics, and had a number of adventures—some large, some small. Classes have been interesting and useful and have helped me develop an understanding of basic agronomy. While I still have a steep learning curve ahead of me, I am encouraged by the fact that I know much more about crop production now than I did a year ago. One class that was especially helpful to me was a fall semester farm operations and equipment course taught by the Penn State agronomy farm manager, Mr. Scott Harkcom. Classes were held either at the Penn State agronomy farm or in the equipment sheds or driveways of local farmers who told us about their farming practices, crop rotations, and equipment.

I spent much of the first half of the spring semester working on a research proposal, which I presented to my committee in April. I am interested in analyzing the weed control provided by different components of our organic rotational no-till cropping system. Another piece of my dissertation will quantify the weed control efficacy of shallow high-residue cultivation in reduced-herbicide soybean. My advisor (Dr. Bill Curran) and I conducted our first round of the experiment this year with the goal of seeing how different timings and frequency of cultivation influence weed control. Speaking just from visual observations, we saw good weed control in plots cultivated three times (compared to plots cultivated one or two times), but all three cultivation timings happened during the dry period at Rock Springs that lasted from early June to late July. Repeating this experiment next year will help us understand how effective shallow high-residue cultivation is in different soil moisture conditions if we have more rainfall during the summer of 2012.

The first year of field work is not over yet but it is going very well. Due to the extraordinary efforts of our technicians Dave Sandy and Mark Dempsey and the hard work of our summer undergraduate employees, data collection has gone about as smoothly as possible. Getting out into the field on beautiful days is a benefit of agricultural research and I have appreciated it. Seeing cover crops grow, crops planted, and weeds come up has been exciting and I am looking forward to harvesting corn and soybean. This fall I have a full load of classes and will also be preparing for my candidacy exam. If all goes well, I will present on my research at the regional Northeast Weed Science Society meeting in January and also at the national Weed Science Society of America meeting in February.

By Clair Keene, Penn State
Organic Grower Network Tours Erb Grain Farm

Organic milk, meat, poultry and eggs represent some of the fastest growing sectors of the organic market. Because agricultural feed ingredients in the diets of certified livestock must be organically produced, growth in the retail organic market has resulted in increasing demand for organic feed grains and forages, creating opportunities for growers. Typically, there is a price premium for organic feed grains, which have reached 50 to 150% above conventional prices in the past.

In late August, 2011, the Central Susquehanna Valley Organic Crop Growers Network toured the Jeremy Erb Farm near Milton, PA. The meeting was co-hosted by Columbia Co. Cooperative Extension Educator Dave Hartman. The Erb farm produces organic agronomic crops following a rotation of 2 to 3 years of alfalfa/grass, followed by corn, soybeans followed with fall-planted small grains, and back into fall-planted alfalfa/grass after small grain harvest on a total of 210 acres, which includes about 50 acres on the home farm. The farm was certified organic in 2008.

From the alfalfa/grass mix, Erb produces large round wrapped bales for high quality forage mostly to support local (< 50 miles) organic dairy farms, with some going to Lancaster. Jeremy prefers to plant hay in the fall, without oats, which compete with newly planted hay for moisture. He likes to plant in the fall because he has fewer weed problems than when he plants alfalfa in the spring. If conditions cause him to plant alfalfa in the spring, he uses a nurse crop of oats to compete with weeds. He finds that a couple of years of alfalfa/grass in the rotation, with its frequent cutting, provides weed control for the following row crops.

To establish his hay crop, Jeremy plants 18 – 20 lbs of alfalfa plus 3 lbs of grass. He experiments with the type of grass, and has used orchard grass, fescue, and timothy in the past. This year he tried festolium (also called festu- loliuim; a cross between meadow fescue/tall fescue and Italian/Annual ryegrass), but did not like it because it heads too quickly between cuttings and he prefers not to have seed heads in his hay. He uses some leafhopper resistant alfalfa varieties but finds that they do not consistently result in less leafhopper damage than non-tolerant varieties when insect pressure is high. He manages leafhoppers and alfalfa weevil by cutting, typically 5 – 6 times per year. If he sees insect damage starting to occur, he cuts.

Hay making is usually a 2-day process for high quality. On the first day he mows wide and lets the hay lie flat and bales the next day. He finds that making hay over two days, as opposed to one day, results in higher sugar content. The leaves need some moisture in them to pack tight for baleage, so Jeremy bales at night if the hay seems dry. He uses Silo-King® Special (http://www.agriking.com/) as a forage fermentation aid and preservative. Fermentation aids are designed to enhance the fermentation process, improve dry matter recovery, increase nutrient retention and improve bunk life while improving digestibility and palatability of forages and grains.

Jeremy sells wrapped, round-baled hay off the farm along with the nutrients contained in the hay, so he pays close attention to soil fertility and plant nutrient tests. His fertility program includes a mineral amendment (Super Basic, 300 lbs/a) and poultry manure (4 tons/a). He watches potassium levels in his forage tests as an indicator of the need for potassium application. He also applies Photo Mag™ Plant Health Therapy (Advancing EcoAgriculture, LLC), a foliar fertility amendment that contains magnesium, sulfur, boron, cobalt, and molybdenum.

Corn follows alfalfa in the rotation and is planted into tilled ground. Jeremy is currently growing 101- and 102-day organic varieties, which typically yield 170 bu/a. For early season weed control, he uses an S-tine cultivator

(Continued on page 12)
three times plus a cultipacker to conserve moisture. He sells ear corn to grazing and organic dairies, mostly in Centre Co., and excess shell corn to Kreamer Feed (www.organicfeeds.com). To estimate the price of ear corn, he figures that it is worth $30/ton for every $1/bu shell corn. For example, if shell corn is $10/bu, ear corn is $300/ton.

Soybean production is similar to corn, except if soil crusts early in the season, Jeremy will use a rotary hoe to break up the crust. He then cultivates every 10 days after planting until lay-by to reduce weed populations. Most of Jeremy’s soybeans were virtually weed-free. So clean that one farmer on the tour asked if Jeremy sends his kids out to pull weeds! Jeremy’s soybeans typically yield 50 – 55 bu/a.

After the group had toured the field, Jeremy was asked to explain his reasons for and challenges associated with transition to organic. His main challenges include weed and leafhopper control, and not enough hours in the day during haymaking! Jeremy credits his neighbor and fellow organic crops network member, Bucky Ziegler, in helping him to decide to transition to organic. Jeremy’s father, who previously farmed the land, also influenced him because his tendency was to farm with practices consistent with organic production. Economics was another factor that contributed to his decision to transition. He used conventional tillage to produce crops before transitioning to organic, and the price of inputs and tillage were continuously rising. Jeremy decided he needed to find a way to offset the rising costs of production associated with tillage. He tried no-till, but it wasn’t for him, so decided to try organic. He started by transitioning his home farm, followed by his rented ground. One landowner, a beekeeper, requested that Jeremy transition the land he was renting from him to organic. Jeremy also enjoys being able to have his three young sons involved in more aspects of farming. He felt that when he was farming conventionally, and was working with chemicals or sprayers, that he had to tell his children to stay away, and he didn’t like the message that he was sending.

By Mary Barbercheck, Penn State

---

**No-till Soybean into Rolled Rye Suggestions from Chris Reberg-Horton in North Carolina**

- **You need a lot of rye.** For this system to work, we are recommending over 8,000 pounds of rye dry matter per acre.

- **Plant the rye early.** Your chances of getting over 8,000 lbs DM are greatly improved by planting rye in September or October. *(Earlier the better in PA!)*

- Make sure the rye has **enough nitrogen.** Fertilizing the rye and tissue testing for N may be called for. This may sound like overkill, but the roller system demands that we think about the cover crop differently. That **rye cover crop represents your entire weed control program;** it will save you all the costs associated with spring tillage and cultivation.

- Wait until the rye is in the **milk or soft dough stage before rolling.** Roll too soon and it will stand back up and will not die.

- Rolling and planting on the same day makes it more likely you are planting into dry soil. **Rye cover crops are really effective at depleting soil moisture.**

- **There are more weed problems in this system than the standard organic practices being utilized in North Carolina.**

- **Soybean lodging is worse in the roller system.** We have a lot of theories so far, and very little data. **Lateral roots on the soybeans appear to be shallower in the mulched system.** Mulched soybeans were taller this year with pod set higher on the stem. Both observations could be part of the problem. *(So far, we have not experienced this problem in PA.)*

- **Almost any type of roller seems able to kill the rye,** though this has not been researched here yet. By waiting until the rye is in milk or soft dough, the rye is well on its way to senescence. **Several farmers have tried cultipackers with good success.**
Lastly, and probably most promising in the long run, is so-called classical biological control. There are many examples of exotic pests exploding in magnitude after invading a new island or continent without their native natural enemies, which include predators, parasitoids, and pathogens. Consistent with this, BMSB is only a minor pest in Asia! Eggmasses are hard to find, and most are heavily parasitized. Foreign exploration has already yielded some promising natural enemies from the area of origin (Japan, Korea, and eastern China). Kim Hoelmer of ARS Beneficial Insect Introduction Research Unit in Newark, Delaware, has been exploring for parasites and predators of soybean aphid in Asia over the past few years, and took advantage of this travel to secure contacts for BMSB. He now has rearings of four species of tiny wasps which parasitize and kill BMSB eggs, for evaluation at Newark’s quarantine facility. Introducing new insects to North America is not taken lightly, nor does it typically happen rapidly. The process involves evaluating these parasitoid wasps for effectiveness against the target pest, then screening for non-target effects on other possible hosts including native stink bug predators, which are beneficial insects. A Technical Advisory Panel with representatives from the US, Canada, and Mexico, then recommends to USDA APHIS Plant Protection and Quarantine, whether the applicant (in this case USDA-ARS) has made a good case for the benefits and risks of introducing the proposed beneficial insect.

Invasion by the brown marmorated stink bug is a long-term problem and we need to take a sustainable approach, as well as doing our best to identify and promote promising short-term measures.

By Don Weber, USDA-ARS

Not stinkbugs, but grasshoppers in rolled-crimped hairy vetch at the University of Delaware ROSE site. Populations were high (~60/ft²) and caused extensive crop damage. Photograph by Barb Scott. Read more about the DE ROSE site in the spring 2012 issue of the ROSE Review.