FNE02-442: Using a Winter Cover Crop of Rye and Hairy Vetch for Soil Conservation and Weed Control in a Mixed Vegetable System
Interim Report, 3/7/2003

Prepared by:
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Project Goals:

This project intends to evaluate the effectiveness of a fall planted rye/vetch mixture as a mulch for vegetable crops planted the following summer. Winter squash, melons, and tomatoes will be planted into the killed, unincorporated cover crop. These will be compared with the same vegetable crops grown in plots of mowed, incorporated rye.

Test plots will be compared in the following aspects: yield for each crop, percent salable yield, and the effectiveness of weed control.

The ultimate goal of this project is to determine whether planting summer vegetables into killed winter cover crops is a profitable and efficient way to control weeds and conserve soil structure in a chemical-free system. This production method will be evaluated for future use on our farm, and the lessons learned will be shared with other interested growers.

Farm Background:

Fulton Farm is a working produce farm and an educational program of Wilson College. The farm raises mixed vegetables, small fruits, flowers, and herbs on seven acres in Franklin County, PA. All produce is raised without chemical pesticides or fertilizers, and the farm aspires to resource and energy sustainability in all practices. Produce is marketed to the college dining hall, a 100 family CSA program, and a local farmer's market.

Each year, we use approximately five acres for production, with an additional two acres in summer fallow/ cover crops. The farm has access to water for both drip and overhead irrigation. We raise our own transplants from seed in two passive solar greenhouses, approximately 4800 square feet total.

In 2002, the farm practiced a "trial run" of this project. Two plots of winter cover (one of a wheat/ vetch mix, the other of rye/vetch) were allowed to grow to near maturity. These plots were then rolled down several times with a flat roller. The rolling killed the cover crops effectively. We then transplanted winter squash and pumpkins into the remaining mulch. Casual observations made over the season will be useful in the coming project year.

Cooperators:

The principle cooperator on the project is Steve Bogash, Penn State (Franklin County) Extension agent for vegetable crops. Steve helped to draw up and plan the original proposal. Steve has agreed to visit the farm in the spring and summer of 2003 to advise on the timing of killing the cover crops, and to provide general advisory support.

We have also consulted with other members of the regional farming community for advice. Mr. R. Glen Jamison is a vegetable grower in our county who practices the planting of pumpkins into a roll-killed vetch/ rye mix. Matthew Ryan and Jeff Moyer of the Rodale Institute have provided advice on cover crop seeding rates and general methodology.

Progress to Date:

Test plots were seeded to the winter cover crops in the fall of 2002. Two distinct fields were chosen.

Field "1" is an area of historically high weed pressure (amaranth, lambsquarters, grasses). The total area of field 1 is .5 acres. Composted manure was spread evenly over the entire field. The field was then bisected into two quarter-acre sections, A and B. Section A was chosen to be the test plot for the hairy vetch/ rye mix, section B to be the control planting of rye only.

Section 1A was chisel plowed prior to broadcasting the cover seed, in order to loosen any hardpan. On 9/17/02, the section was broadcast with rye and vetch, at a rate of 2.5 bushels rye, 40 lbs. Vetch per acre. The seed was then incorporated with a harrow.

Section 1B was broadcast seeded with 2.5 bu. rye per acre on 9/25/02, and incorporated with a harrow. This section will be mowed, disked, and chisel plowed in the late spring, prior to vegetable planting.

Field "2" is an area of historically low annual weed pressure (it was in sod up until the spring of 2001). The total area of the field is .32 acres. Composted manure and amendments were spread evenly over the entire field. The field was then bisected into two sections, A and B. Section A was chosen to be the test plot of hairy vetch/rye, and section B to be the control planting of rye only.

Section 2A was chisel plowed prior to seeding. The section was broadcast with 2.5 bushels rye, 40 lbs vetch per acre on 9/17/02. Seed was incorporated with a harrow.

Section 2B was broadcast seeded with 2.5 bu. rye per acre on 9/17/02. Seed was incorporated by disking. This section will be mowed, disked, and chiseled before vegetable planting in 2003.

An additional field (3) of rye/vetch, seeded 9/25 may be used for the project if necessary. The area of this field is .43 acres. The field was manured but not chiseled before seeding. There is no rye control plot to match this section.

Cover crops in all plots established well in the fall of 2002, and grew to a height of approximately 9-12 inches. As of the writing of this report, the cover crops lay dormant under snow.

Remaining work on the project:

The bulk of the work of this project will occur in the 2003 growing season, as test plots are planted with vegetable crops, and the plantings are evaluated for yield and weed pressure.

As the rye/ vetch plots (1A, 2A) reach maturity (approximately late May, early June), the cover crops will be roll-killed. In 2002 we trailed this procedure using a weighted flat roller. While effective, the flat roller required several passes before we were convinced that the cover crops were killed. This may have contributed to soil compaction underneath the cover crops (the ground was very hard at the time of pumpkin/ squash transplanting). Consultations with other growers practicing roll killing of cover crops have led us to the conclusion that crimping bars should be added to the roller, to more effectively kill the cover crops in one pass. We will contract with a local welder to modify the equipment.

Our original proposal listed flail mowing as the planned method of killing the rye/vetch mix. However, we have chosen to roll kill the cover based on the suggestions of other growers. Experience in 2002 leads us to believe that flail mowing might cause the killed mulch to break down too rapidly, allowing annual weeds to become an early problem.

The Control plots of rye (1B, 2B) will be rotary mowed in early spring, then clipped a second time in early may. The field will then by disked, chiseled, and ready for planting by early June.

Vegetable crops will be transplanted into the four sections. Varieties and planting dates will be kept identical as much as possible. Field 1 (A and B) will be used for winter squash, melons, and pumpkins. Field 2 (A and B) will be planted to tomatoes, and possibly peppers.

Drip and/or overhead irrigation will be set up on both fields, and used when necessary. Irrigation hours will be recorded for all plots. Any other cultural techniques (row covers, organic sprays, etc.) will be kept constant between the test and control plots.

Field Data Stations will be established at the edge of fields 1 and 2, for efficient recording of data and ease of visibility. These will consist of simple tables, equipped with hanging scales, data sheets, and weather protected poster board for displaying results.

Results will be measured as follows:

- Overall yield: The total yield of each crop will be assessed by weighing all produce harvested from each plot, and recorded each harvest day.
- Crop quality (percent salable yield): Harvested crop will be sorted at the field stations, and salable, top quality product weight will be compared to the weight of second quality, marginal product. Any significant unharvestable (rotten) crop will be noted.
- Weed control: Weeding time will be measured in person and tractor hours spent in each field.
- Weed counts will also be taken at one-month intervals. One-meter squares will be laid upon the soil in randomly selected locations. Within these squares, all weeds over three inches in height will be counted. Three squares will be established for each crop in each plot. The same square locations will be used each month. Weeds will be controlled as necessary outside of the squares, but left intact inside. At the end of the season, fresh weights of all weeds inside the squares will be compared.
- Subjective assessments of general crop health and soil tilth will also be noted.

The above information details our progress to date, and plans for the coming season. There are no measurable results to report or analyze at this time. We have learned much since the inception of this project, and look forward to the lessons that we will learn in 2003.

Any questions or requests for more information should be referred to Matt Steiman, at the contact address listed on page 1.

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