

Interim Report

Project Title: Using Chickens and a Cover Crop Barrier for Weed Control in Organic Asparagus

Grant Number: FNE09-671

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Project Goals & Objectives

The goal of this project is to evaluate the effectiveness of controlling weeds in organic asparagus with the use of chickens and a cover crop barrier. Although organic asparagus is a high-value crop that grows well in the Northeast, weed control is a significant challenge, particularly with a perennial crop such as asparagus. We are taking a two-pronged approach to this problem: first, after the asparagus harvest season is over, we are allowing laying hens to range freely in the asparagus patch by using a "chicken tractor" (a portable chicken pen) and a moveable fence. Secondly, we have established a weed barrier, a tilled buffer zone 10 feet wide around the perimeter of the asparagus patch. This weed barrier is intended to keep perennial weeds such as quack grass (*Agropyron repens*) from working their way into the asparagus from the surrounding sod.

Secondary objectives include evaluating the use of cover crops (oats and winter rye) seeded into the weed barrier in the fall, comparing the use of two types of organic mulch (straw and waste hay), determining guidelines for the recommended number of chickens per acre, comparing insect pressure between the experimental and control plots, and evaluating different methods for incorporating the cover crops in the spring.

Farm Background

Chick Farm is a small diversified farm with 10 acres of pasture, a 160-acre woodlot, and just over an acre of cultivated land. We produce certified organic mixed vegetables, strawberries, eggs, and poultry, all marketed through a CSA program, a wholesale account, and on-farm sales. We are a husband-and-wife operation, with Rick farming full-time year-round and Marilyn working full-time during the growing season and part-time in the winter. We have been farming since 2001.

Since the project began we have made two changes to the livestock side of our operation: our eggs are now certified organic and we are raising organic started pullets which will be available for sale this spring.

Cooperators

Our technical advisor is Dr. Eric Sideman of the Maine Organic Farmers & Gardeners Association (MOFGA). Dr. Sideman provided valuable feedback on our grant proposal and has been available to answer questions throughout the project.

Activities Completed

Ground preparation & Planting

We planted our asparagus in two separate but similar plots. Both plots are 5000 sq ft (50'x100'), both have been in use for organic vegetable production, and both are on level ground with light, sandy, well-drained soil. The two plots are roughly 200 yards apart. In early May 2009 we applied soil amendments based on soil test recommendations. Using our tractor, we made 8 trenches in each plot, leaving a tilled 10' weed barrier zone around the entire perimeter of each plot. The trenches were 80 feet long and spaced 4 feet apart, giving us a total of 640 row feet per plot. We used "Jersey Supreme" hybrid asparagus, planting the crowns by hand at a depth of roughly 8 inches with 15-inch spacing between crowns.

Getting the Planting Established

As the asparagus grew, we gradually filled in the trenches with a soil & compost mixture and installed drip tape 4 inches below soil level. Throughout the rest of the summer we weeded mechanically and by hand, keeping the plantings as weed-free as possible until the plants were big enough to handle the chickens.

It was interesting to note the difference in weed populations between the two plots. The plot we call Front Field 1 (FF1) had a well-established seed bank of annual weeds such as lamb's quarters, purslane, and pigweed. Front Field 4 (FF4), which had only been in production for a year, had fewer annual broadleaf weeds and more grasses, including quack grass.

Putting the Chickens to Work

Our work force consisted of 24 five-month-old Buff Orpington laying hens. The hens were housed in a "chicken tractor", a moveable pen/shelter that we built in 2008. We positioned the chicken tractor in the 10-foot weed barrier zone and then set up fencing around one half of the plot with the chicken tractor inside the fence. In the morning we would open the pen door and let the hens roam within their fenced-in area. At dusk the hens would go back into the shelter, and then we would go out after dark and shut the door behind them.

For fencing we used portable electrified poultry netting to confine the hens and also to protect them from predators. In the past we have used a solar fence charger for powering this type of fence, but we decided to run an electric line out to the field for this project.

It was early September before the asparagus plants were big enough to handle the chickens, so the hens were only on the job for about four weeks, and only in the FF4 plot. We were concerned that we might not see any conclusive results in such a short time. We needn't have worried: within a couple of weeks the hens had pretty much eliminated the weeds on their half of the plot. They continued to keep the weeds under control until we took them out in early October. Tables 1 and 2 show the monitoring results in FF4 before and after the hens did their work.

The hens seemed to enjoy being in the asparagus patch. The ferns provided shade and also seemed to give the hens a sense of security, keeping them somewhat hidden and less vulnerable to attack from above by hawks and owls.

The hens also fed on the ferns a bit. We do not believe the feeding was enough to damage the plants, but we will evaluate this during the second growing season in 2010.

End-of-Season Jobs

In August we took soil test samples in both plots. Based on the results, we will apply the necessary soil amendments for spring 2010.

In early September we planted oats in one quarter of the weed barrier zone in FF4, applied at the rate of 4 lbs per 1000 sq ft. Later that month we planted winter rye at the same rate in one quarter of the FF1 weed barrier. Both cover crops showed good growth before winter.

Results and Accomplishments

Although the hens were in the asparagus for less time than originally planned, the results seem encouraging, as shown in the tables below. Table 1 shows the “before” picture in plot FF4. We chose two crowns at random within each row and measured crown circumference, height of tallest shoot, number of shoots, number of asparagus beetles, and number of weeds within a 20” radius circle around the crown.

Table 1: FF4 8/31/09 – Just before deploying chickens

Sample	Crown Circ (in)	Height(in)	Shoots	Beetles	Weeds
1	15	59	12	1	12
2	13	64	16	0	20
3	14	54	13	0	27
4	10	50	8	0	37
5	12	60	9	0	6
6	9	55	6	0	3
7	14	63	19	0	7
8	14	53	8	0	8
9	12	53	14	0	10
10	19	62	24	0	7
11	17	58	11	0	12
12	13	61	12	0	1
13	9	53	11	0	6
14	11	62	15	0	6
15	12	55	12	0	27
16	10	57	11	0	2
TOTAL:	204	919	201	1	191
AVG:	13	57	13	0	12

Table 2 shows the weed counts for the two halves of the FF4 plot after the chickens had completed their work. As with the earlier monitoring, we chose two crowns at random within each row and counted the weeds within a 20” radius circle around the crown.

Table 2: FF4 10/29/09 – After removing chickens

With Chickens		Without Chickens	
Sample	Weed Count	Sample	Weed Count
1	1	9	9
2	0	10	2
3	2	11	16
4	0	12	8
5	1	13	13
6	2	14	6
7	0	15	9
8	1	16	17
TOTAL:	7	TOTAL:	80
AVG:	1	AVG:	10

One other finding is very clear: 24 hens are too many for 2500 square feet of asparagus. By the end of their four weeks in the asparagus, the hens had essentially eliminated the weeds inside their fence and had started looking for other things to do, such as digging around the crowns. A couple of them even started flying over the fence to feast on all the weeds & grasses on the other side. For 2010 we plan to put a smaller number of hens in FF4 and use a “two weeks in, two weeks out” approach in FF1.

Probably because these were new plantings, we saw very few asparagus beetles or other insect pests. It's too soon to tell if the chickens will have any effect on insect populations.

Conditions Affecting Results

Maine's 2009 growing season featured a record-setting stretch of rainy weather starting in late May and continuing right through July. We might have lost the entire asparagus planting were it not for our very sandy well-drained soil. As the rains continued into July, the asparagus ferns started showing signs of nitrogen deficiency, with the new growth a paler green color, even somewhat yellow. Figuring that the rains had leached away a lot of nitrogen, we side-dressed both plots with blood meal and chicken manure; this seemed to correct the problem.

We decided not to use mulch the first year, mainly because FF4 had more quack grass than expected and we wanted to dig that out by hand before adding any mulch. We plan to add mulch after the harvest in 2010. This highlights the importance of starting with plots that are as weed-free as possible.

Economic Findings

The endless rains of June & July prompted an “Ah ha!” moment that improved the economics of our asparagus project. As the rains continued and our lower gardens remained too wet to plant, we found ourselves eyeing those empty 10-foot-wide weed barriers on either side of the asparagus plots. Thinking it through, we realized that planting short-duration annual crops in those empty spaces would not compromise the purpose of the barriers, which is to prevent quack grass from migrating into the asparagus from the surrounding sod. We did not end up using the barrier space in FF4, but in FF1 we planted lettuce, beets, cabbage, and broccoli, with good results.

New Ideas Generated

Our results so far have prompted us to wonder if weeder chickens might work well in raspberry & high-bush blueberry plantings. We also would be interested in trying some of the meat breeds to see how they compare to laying breeds.

Next Steps

Planting Maintenance

Soil amendments will be applied in early spring based on soil test results. The 10-foot weed barrier around the perimeter of each plot will then be tilled with a disk harrow. We would like to try three different methods for incorporating the winter rye cover crop: disking, mowing followed by disking, and mowing followed by chickens.

We will use mechanical and hand weeding as needed to maintain both plots before and during the harvest period. After the harvest is complete we will apply mulch over the entire planting area (not including the weed barrier) to a depth of 6-8” or one bale per 100 sq ft, using straw on one half of the plot and mulch hay on the other. We had originally planned to use mulch on both plots but are considering leaving FF4 bare as a comparison.

Harvest

Because this is a newly established asparagus planting, the harvest will last only two weeks, compared to 6 to 8 weeks for a mature planting. We will still wait until late July to deploy the chickens in order to more closely mimic conditions in a mature planting.

Monitoring

Weed growth, asparagus growth, and insect numbers will be monitored three times during each growing season: early June, mid-July (just before the chickens are deployed), and early October (after the chickens have been removed). To evaluate asparagus growth, individual plants will be randomly selected and measured for crown circumference, height of tallest shoot, and number of shoots. Insect numbers will be evaluated by selecting individual plants randomly and counting adult insects and eggs present for each insect species found.

Outreach

We will share our results with other farmers through an article in the Maine Organic Farmer & Gardener and by giving talks at venues such as the Maine Department of Agriculture Trade Show and events sponsored by the Cooperative Extension Services in Maine and New Hampshire.

Marilyn Stanley
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