

## **Matted Row Strawberries Planted into Weed Suppressing Cover Crops FNE05-553**

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### **Goals**

The goals of this research project was to determine if strawberry crowns could be planted into a killed crop of overwintering rye or sudex, with the rye or sudex mulch providing weed control in the establishment year of matted row strawberries. The second goal was to test a method for mechanically planting strawberry crowns into the winter rye mulch.

### **Farm Profile**

River Berry Farm is a diversified berry and vegetable farm located along the LaMoille River in Fairfax, VT. The farm is managed by David Marchant and Jane Sorensen. The farm consists of 90 tillable acres of primarily river bottom land. We crop approximately 40 acres of vegetables, 2 acres of strawberries 1.5 acres of raspberries, with the remaining acreage in cover crops and hay. We also have a thriving retail bedding plant operation and produce greenhouse tomatoes in our 7 greenhouses. Our farm is diversified in marketing approach as well as crops. One third of our sales is on farm through bedding plants, pick your own berries, self-serve vegetable stand, and a local farmers market. Another third of sales comes from local wholesale accounts and another third of sales coming from out-of state wholesaling through the Deep Root Organic Truck Farmers Cooperative. All vegetable crops and raspberries are certified organic, with the strawberries ipm managed.

### **Project Participants**

The work of planting and establishing the research project was carried out by myself and our farm crew. John Haydn of the Farm Between was the technical advisor. He helped layout the original experiment that was planted into the winter rye.

### **Project Activities**

The work carried out by the farm crew included planting the rye and sudex, rolling the winter rye to kill it, planting the strawberry crowns, and evaluating weed pressure. After the first year the project changed dramatically. The reason for the change in the project was the complete failure for the rye or sudex to provide adequate weed control, regardless of the treatment, whether it was mowed or rolled.

### **Reasoning for altering the experiment**

During the first year of the project we experimented with a corn based biodegradable mulch (Bio Telo ) with various vegetable crops. The mulch is manufactured in Italy and is available from Dubois Agrinnovations of Quebec. The mulch worked extremely well and began

breaking down between 2 to 3 months from field application. Seeing how the mulch worked gave me the idea that it might work well with matted row strawberries. The mulch could provide the initial two months of weed control and then begin breaking down enough to allow runners to root forming a matted row. Thus the biodegradable film might provide the results I was hoping for with the rye mulch, a reduction in weed control labor in the establishment year of the matted row.

The project activities working with the mulch consisted of learning how to lay the film, testing methods of mechanically planting crowns through the film, and keeping track of labor spent controlling weeds in conventional bare ground planting and strawberries planted on the biodegradeable mulch.

## **Results**

### **Cover Crop establishment**

Winter Rye and Sudex establishment – The sudex was planted in early July at a rate of 35# to the acre and the winter rye was planted in the last week of August at a rate of 100# to the acre. Both fields became well established. The sudex was extremally thick and the rye had adequate establishment. After visual review by Dale Riggs (grant supervisor) the following spring, she felt the rye should have been planted at a thicker rate. Upon laying out the experiment in May and consultation with our technical advisor, John Haydyn, it was concluded that the sudex would not provide any weed control and that part of the experiment was eliminated. This conclusion came from weed emergence in early May through the winter killed sudex. At winter kill the sudex was five feet tall and extremally thick. It was knocked down over the winter, and I thought it had real promise for providing weed contol. As the spring progressed the sudex cover became very thin, with lots of bare ground being visible. It was like the sudex just disintegrated.

### **Plot Preperation**

The winter rye began to flower in the third week of May and we then laid out the experiment. The mowed plots were mowed with a 5 ft. brushhog, the bare ground was prepared by rototilling in the winter rye, and the rolled plots were prepared by rolling a 5 foot crimping roller that is typically found on a Perfecta type field cultivator. After preparing the plots it appeared that the mowed rye provided the best mulch cover.

### **Planting**

A custom soild spike planting wheel was manufactured for us by Recoltech, a horticulture supply and manufacturer in ST. Remi, Quebec (figure 1). The wheel had solid spikes that were 7 inches in length, with 15 in between plant spacing. This wheel was mounted on our water wheel transplanter. The wheel did not penetrate the rye without weight, so we weighted the wheel carrier with two cinder blocks. The spike made adequate holes in the rye mulch. We found that the best system was to make the holes in the mulch and drop the plants in the holes with someone riding the transplanter and then have a person walking behind with a jab stick to get the roots properly planted in the holes. While the spike wheel was successful in establishing the planting hole it was difficult to plant the crowns while on the transplanter .



### **Growth Observations**

The crowns were planted in the last week of May. The crowns in all three treatments began good initial growth. After 45 days it was apparent that there was sufficient weed pressure in all the treatments that the experiment was doomed to fail in terms of controlling weeds.

### **Biodegradable Mulch plot preparation**

The BioTelo biodegradable mulch was laid just before planting. It was laid with a Rain-flo raised bed mulch layer (figure 2). Two thicknesses of mulch was tested ,5 mil and .6 mil. Two rows of each thickness was laid with drip tape layed underneath the mulch. The bared ground plots were formed with the same raised bed shaper and had drip tape laid before planting. The rows were 350' long.

### **Planting**

We used our waterwheel transplanter on the biodegradable mulch and the bare ground plots (figure 3). We first attempted to use our custom wheel to plant the crowns, but the extra long spikes would leave a very long surface hole in the film so we ended up using our standard water wheel. We trimmed the roots before planting the crowns. We could plant the crowns with the water wheel transplanter while riding the planter. The speed was quite slow. We planted one row of plants per bed 12in. between plants. The beds were covered with 4' wide film. Center to center the rows were 66" apart. The plants were planted May 15<sup>th</sup>.

### **Plant growth**

All the crowns grew well. From general observation the plants on the film had the most robust growth. We didn't try to measure this, just farmer observation. This is likely due to moisture retention from the mulch. Even though all treatments had drip irrigation the mulch prevented any evaporation. The experiment was planted on an very sandy soil. We decided to just observe the mulch to see if runners could root through the mulch without us prepoking the mulch. By the end of the growing season the plants on the biodegradable film had formed a nice matted row. Both weights of mulch appeared to breakdown enough to allow runners to root. The bare ground treatment formed a very good matted row.

### **Weed Control**

The main component that was measured was the time weeding the two treatments ,mulch and bareground, (Table 1). Initially (the first 45 days) the bareground treatment had three passes with a Reigi weeder while the mulch film had only one pass for cultivating wheel tracks. After the plant establishment we continue to cultivate but have to start hand hoeing. Both treatments had the same time input for wheel track cultivation. The mulch treatment had signicately less labor input in terms of hand hoeing. It should be noted that we do not use any herbicides in the plant establishment year.

Table 1 Weeding labor for bareground and mulch treatments.

Bare Ground:	Total Time (per 350' row)
Before Runner Establishment	
3 passes with reigi weeder (2 people)	24 min.
1 pass hand hoeing	25 min.
After Runner establishment	
5 hand hoeings (ave. 45 min. row)	225 min.
3 passes with tractor for wheel tracks (4 min/row)	12 min.
Total Time	286 min.
Mulch	Total Time (per 350' row)
Laying Mulch 2 people 10 min./ row	20 min.
Before Runner establishment	
1 hand weeding (10 min)	10 min.
1 tractor pass for wheel tracks	3 min.
After Runner establishment	
3 handweeding(ave. 30 min. row)	90 min.
3 passes with tractor for wheel tracks (4 min./row)	12 min.
Total time	135 min.

### Economics

#### Mulch Treatment

135 min. = 2.25hrs @ 12.50/hr	28.13
Mulch Cost (6 cent/ft. x 350)	21.00
Total	\$49.13

#### Bare Ground Treatment

285 min. = 5.1 hrs. @ 12.5/hr	\$63.75
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### **Assesment**

The results of the experiment with the Biotelo mulch is very encouraging. The results with the rye mulch proved to me that matted row strawberry establishment is too lengthy and that the weed control with the rye, while working for a month or so, might be useful with a fast growing crop.

The biodegradeable mulch significantly reduced our weeding labor input. With the diversity of our farm, crops like strawberries often get overlooked during the hectic harvest season of August, Sept. and October. The mulch seems to keep weed from getting out of control when the berries are not receiving adequate attention for weeding.

### **Adoption**

With the success of the biodegradeable mulch, we decided to work with it again in a second year.

Questions answered in year 1

1. The mulch significantly reduces weeding labor.
2. The .5 and .6 mil mulch breaks down enough to allow a matted row to establish.
3. The mulch remains in the picking year are insignificant.
4. The strawberry bed is easily disced in without having to remove any mulch.

Additional Questions for further research.

1. Because of the use of 4' mulch the beds are 66" on center, thus plants per acre is low and there is a reduction in row edge, which might result in reduced yields.
2. When to plant the crowns. Is it possible to plant the crowns a month later and still get matted row establishment?
3. Would two rows of crowns planted on the plastic provide better plant density, or would it result in an overcrowded matted row.

In the second year we planted the crowns two rows per bed with in row spacing of 12 or 18 inches. We also tried planting as late as mid July with a couple of the beds. Two rows per bed definitely forms a full matted row. The late planting resulted in very little runner establishment.

We will be looking at the yield on the double row plantings in 2009.

### **Continued work with the Biotelo.**

We plan on planting half of our two acres on the biodegradeable mulch this year and continue to work with planting density and time of planting.



## **Outreach**

At this point we have informally discussed the research project at the New England Fruit and Vegetable Conference and at the Vermont Vegetable and Berry Conference. In both cases the project was discussed in sessions on Biodegradable mulch and strawberry production, respectively. We also showed the biodegradable strawberry planting during two general farm tours for growers.

## **Report Summary**

Establishment of matted row strawberries into a killed cover crop was unsuccessful. The rye mulch provided weed control for approximately 30 days which was not adequate for establishing strawberries. The use of a 7" long spike transplanting wheel helped in planting, but was not significantly faster than hand planting.

The use of BioTelo corn based biodegradable mulch worked well in reducing weeding labor during the establishment year of the strawberries, when compared to bare ground system. The mulch decomposed at a rate that allowed a matted row to establish and was decomposed enough in the picking year so as to not interfere with harvesting. The use of biodegradable mulch has excellent potential for use in matted row strawberry production.



Figure 1



Figure 2





Figure 3



Figure 4





Figure 5