

## **Farmer/Grower Grant Final Report**

### **FNE01-368: No-Till Reduction/Elimination of Major Equipment for the Small Scale Farmer**

Maggie Randolph  
Maggie's Tomato Patch  
Burlington, VT

My intention in doing this project was to ascertain the feasibility of developing a system of no-till farming that would reduce/eliminate the need for heavy equipment (tractors, plows, discs, cultivators, etc.) for the small-scale farmer (2-10 acres). I planned to reach this goal by using a combination of cover cropping, black ground cloth and a riding lawn mower instead of the above mentioned equipment.

My farm consists of four certified organic acres in Burlington's Intervale. I specialize in heirloom tomatoes, and also grow a variety of other vegetables and strawberries, which I sell through a home delivery service. My tomatoes and tomato plants are sold at the Burlington Farmer's Market, to local restaurants, stores and caterers. In 2001, one acre was planted in tomatoes, two acres in other vegetables and strawberries and the fourth acre was cover cropped.

My collaborators in this project were:

Andy Jones, Farm Manager - Consultant regarding conventional methods vs no-till  
Intervale Community Farm  
Burlington, VT

Ann Hazelrigg  
UVM Plant Diagnostic Lab Coordinator - Advisor - Plant diseases in no-till system

Amy Stevens  
Johnny's Selected Seeds - Advisor - Cover crops in no-till system that will winter kill

In two separate plots, I planted the same varieties of tomatoes, peppers, eggplant, and watermelon (more tomatoes than the other plants since I grow more tomatoes than any other crop). The first plot was tilled in strips four feet wide, and the second plot was not tilled at all. The latter had been in a cover crop of oats, timothy and other grasses (unknown to me) for the past six years. It had been cut for hay during that time. In both plots, I put down 3' wide strips of black ground cloth, like that used in nurseries or hoop houses. I prefer this ground cloth to the traditional black plastic because it goes down much quicker and is air and water permeable, and can be used for several seasons. I planted into each plot varieties that have performed well for me in the past. Every two weeks throughout June and July, I checked the two plots for height, number of fruit set, and overall health. During that time, there was no significant difference in the plot that had been tilled and the one that had not been tilled. Toward the end of July, tomatoes



were beginning to ripen. Again, I found no significant difference in the two plots regarding ripening times, or quantity and quality of the fruit. The peppers, eggplant and melons also showed no significant difference in performance and quality in the two respective plots. Throughout the picking season, there continued to be no significant difference in the number and quality of the tomatoes, peppers, eggplant and melons.

The next phase of my project was to determine whether or not the use of a riding mower to mow between the beds in the plots as opposed to plowing, discing, tilling and cultivating was economically viable. My technical advisor, Andy Jones, provided me with the number of hours and costs required for one acre of field tomatoes grown in the traditional manner. A copy of his breakdown is attached. I am only going to make comparisons between the actual field preparation and maintenance since that information is what is relevant to this project.

Using the conventional methods, plowing took 2 person hours, discing three successive times took 2.25 hours, rototilling/bed formation took 2.5 hours, three successive rototillings between the rows took 9 hrs and hoeing and hand weeding twice took 20 hours for a total of 35.75 hrs.

In my no-till situation, using a riding lawn mower, it took 2 hrs to do the initial mowing of one acre before putting down the ground cloth. Thereafter, it took about 2.5 hrs. to mow between the rows (and around the perimeter of the field) every 7–10 days. I mowed 12 times during the season for a total of 30 hrs. Hand weeding along the edges of the ground cloth once took 8 hrs. Andy's rows were 5' on center, which is fairly standard spacing. My rows were 9' on center. All of my rows are set up on this wide spacing since tomatoes are my main crop and I prefer a lot of distance both within and between the rows. It is advantageous for tomatoes to have as much air as possible to dry quickly after a rain, as the leaves are more vulnerable to some kinds of diseases when wet. With this difference in spacing, Andy was cultivating about  $\frac{1}{3}$  of an acre while I was mowing about  $\frac{2}{3}$  of an acre. If I had been using the same spacing as Andy, I would have been mowing  $\frac{1}{3}$  of an acre, which would have taken 15 hrs. Also taking into consideration the difference in spacing, I would have had twice as much edge area to hand weed bringing that figure up to 16 hrs. So, if we had used Andy's spacing, the total hrs for ground preparation and maintenance would be 35.75 hrs. using conventional methods and 33 hrs. using no-till/mowing.

The results of the next part of my project cannot be determined at this time because it will take at least two more seasons to determine if my proposed methods will be successful. My original intent had been to do the following. At the end of this season, I planned to leave the ground cloths in place over the winter to help reduce soil erosion, and in the spring to remove the ground cloths and plant annual cover crops. These cover crops would of course need to be mowed throughout the season to prevent seed formation. The annual cover crop would die out during the winter. The following season, these rows would be planted in different vegetables for rotation purposes. At the end of this season, I discovered a problem with this plan when I removed part of the ground cloths. I realized that the three foot beds were not going to be wide enough for the smaller seeded



crops and transplants I intended to plant the following year in this location. I still think the overall plan is feasible, but I would suggest that anyone trying this method should start with 4' wide ground cloth which is the more traditional bed size. In my particular situation, I am going to leave a couple of the rows covered with the ground cloth so I can continue my experiment on general principle, but will have to till the remaining strips in that field.

In conclusion, I believe that even if my method of cover cropping to smother weeds and build organic matter is not successful, it would still be possible to eliminate the use of heavy equipment by using a combination riding mower/rototiller, once the beds were established. However, I think smaller would be better in this case, 2-5 acres instead of 2-10 as I originally proposed.

Outreach:

Visits from neighboring farmers: Urban Roots owner, Jonathan Rappe, and his intern; Intervale Community Farm manager, Andy Jones, and his five interns.

I plan to write and submit an article for consideration for NOFA Notes within the next week or two.

Maggie Randolph

01-09-02

Intervale Community Farm

Andy Jones

January 4, 2002

**Field Production Cost for 1 Acre of Field Tomatoes**

	Machine hours	Machine cost total	Person hours	Labor cost	Materials Cost	Total Cost
Overall Production stats	29	\$ 401.00	278.5	\$ 3,063.50	\$ 2,520.00	\$ 5,984.50

Activity	Machine hours	Cost per hour	Person hours	Cost per hour	Materials Cost	Total Cost	Notes
<b>Initial Field Preparation</b>							
Plow field	1.5	\$ 16.00	2	\$ 11.00	\$ -	\$ 46.00	
Spread compost, 25 yd/A	2.5	\$ 16.00	3	\$ 11.00	\$ 375.00	\$ 448.00	
Disc field	0.5	\$ 16.00	0.75	\$ 11.00	\$ -	\$ 16.25	
Disc field	0.5	\$ 16.00	0.75	\$ 11.00	\$ -	\$ 16.25	
Disc field	0.5	\$ 16.00	0.75	\$ 11.00	\$ -	\$ 16.25	
Rototill/bedform	2	\$ 16.00	2.5	\$ 11.00	\$ -	\$ 59.50	
Fertilize beds K2SO4/SulPoMg			3	\$ 11.00	\$ 30.00	\$ 63.00	
Lay plastic & drip tape	3.5	\$ 16.00	8	\$ 11.00	\$ 400.00	\$ 544.00	
<b>Subtotal, field prep costs</b>	<b>11</b>	<b>\$ 16.00</b>	<b>20.75</b>	<b>\$ 11.00</b>	<b>\$ 805.00</b>	<b>\$ 1,209.25</b>	
<b>Transplant production</b>							
Sow seeds - 10 trays			1.5	\$ 11.00	\$ 140.00	\$ 156.50	seed; soil; trays
Pot up to 2" cells			25	\$ 11.00	\$ 175.00	\$ 450.00	potting soil; trays
Growing costs - 8000 plants			20	\$ 11.00	\$ 400.00	\$ 620.00	GH space & watering
<b>Subtotal, transplant production</b>			<b>46.5</b>		<b>\$ 715.00</b>	<b>\$ 1,226.50</b>	
<b>Growing costs -- Field</b>							
Transplanting (7000+- plants)	6	\$ 16.00	16.5	\$ 11.00		\$ 277.50	
Install stakes	3	\$ 16.00		45	\$ 11.00	\$ 900.00	\$ 1,443.00
Weave plants				34.5	\$ 11.00	\$ 25.00	\$ 404.50
Weave plants				28.75	\$ 11.00	\$ 25.00	\$ 341.25
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Rototill between plastic	3	\$ 9.00		3	\$ 11.00		\$ 60.00
Rototill between plastic	3	\$ 9.00		3	\$ 11.00		\$ 60.00
Rototill between plastic	3	\$ 9.00		3	\$ 11.00		\$ 60.00
Hoe/handweed plastic edges				10	\$ 11.00		\$ 110.00
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<b>Subtotal, growing costs -- field</b>	<b>18</b>			<b>211.25</b>		<b>\$ 1,000.00</b>	<b>\$ 3,548.75</b>

**Notes:**

rent includes fixed and operating costs.

Cost per hour for personnel includes payroll taxes and other employment costs.

Determinate tomato plants are set in single rows 5 feet apart, 15" in-row.

Basket weave trellis system with 1 stake for every two plants.

22 beds @ 380 feet each