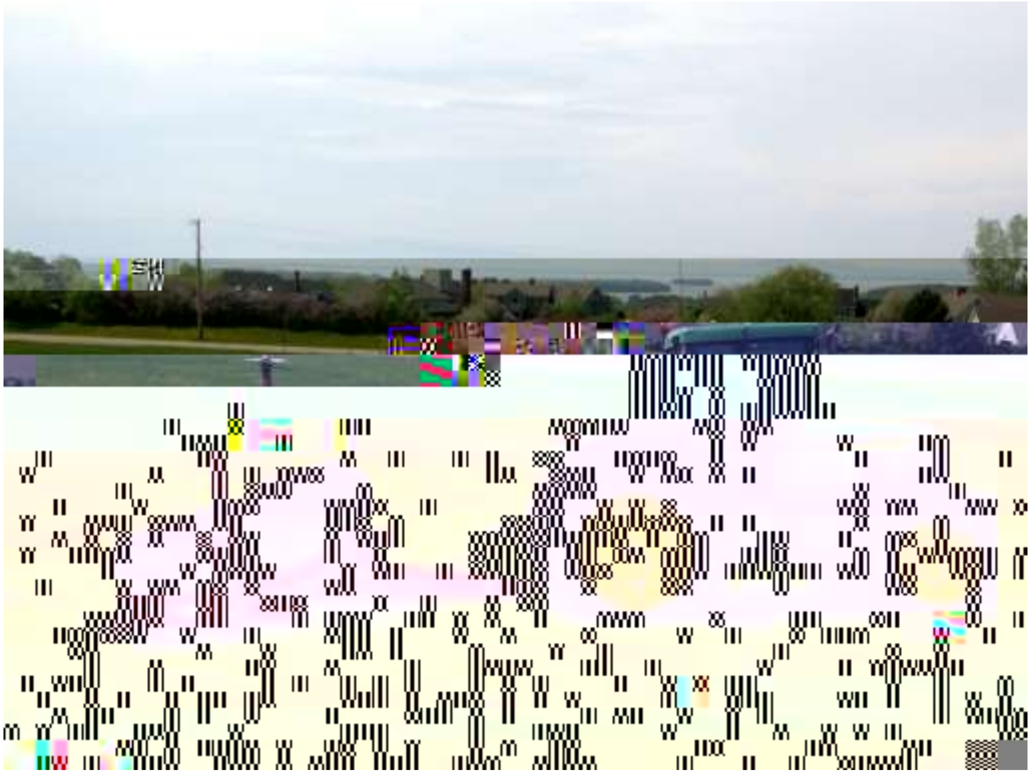
2014 Minimum Tillage Corn Trial



Dr. Heather Darby, UVM Extension Agronomist
Jeff Sanders, Erica Cummings, Susan Monahan, Julian Post and Sara Ziegler
UVM Extension Crops and Soils Technicians
802-524-6501

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Dr. Heather Darby, UVM Extension
heather.darby[at]uvm.edu

Minimum tillage practices have significant potential to reduce expenses and the potential negative environmental effects caused by intensive tillage operations. Conventional tillage practices require heavy machinery to work and groom the soil surface in preparation for the planter. The immediate advantage of reduced tillage for the farm operator is less fuel expense, equipment, time, and labor required. It's also clear that intensive tillage potentially increases nutrient and soil losses to our surface waterways. By turning the soil and burying surface residue, more soil particles are likely to detach from the soil surface and increase the potential for run off from agricultural fields. Reducing the amount and intensity of tillage can help build soil structure and reduce soil erosion.

Many growers are interested in a variety of minimum tillage strategies including 'strip-till,' 'no-till,' and 'vertical-till.' Strip tillage cultivates a 4-6" strip of soil along both sides of the planted row (Figure 1). Strip tillage allows the soil in close proximity to the seed to dry out and warm up faster than it would without tillage. It also deeply tills the soil (8-10 inches) where the crop is planted. No-till (Figure 2) implements do not till the soil, but rather use metal coulters to cut the soil and plant seed into the slot created by the coulters (disk openers). An attachment on the back of the planter closes the slot and maximizes seed to soil contact to facilitate germination. This can be done in a variety of ways. Some systems use a heavy press wheel, while others use spiked wheels or even rubber wheels to perform this critical action. The type of wheel selected will depend on soil types and conditions so may vary from farm to farm. Vertical tillage (Figure 3) is a tillage system, which lightly tills the top 2-3 inches of the soil, preparing a smooth seedbed without introducing tillage pans into the soil profile. Vertical tillage equipment is developed to run shallow and fast over the field sizing and anchoring residue while preparing a uniform seedbed for planting. Over time, it has been found that reduced tillage systems can

the less digestible portions of plants are contained in the fiber fraction. The detergent fiber analysis system separates forages into two parts: cell contents, which include sugars, starches, proteins, non-protein nitrogen, fats and other highly digestible compounds; and the less digestible components found in the fiber fraction. The total fiber content of forage is contained in the neutral detergent fiber (NDF).

Variations in yield and quality can occur because of variations in genetics, soil, weather, and other growing conditions. Statistical analysis makes it possible to determine whether a difference among hybrids is real or whether it might have occurred due to other variations in the field. At the bottom of each table a LSD value is presented for each variable (i.e. yield). Least Significant Differences (LSDs) at the 0.10 level of significance are shown. Where the difference between two hybrids within a column is equal to or greater than the LSD value at the bottom of the column, you can be sure that for 9 out of 10 times, there is a real difference between the two hybrids. Hybrids that were not significantly lower in performance than the highest hybrid in a particular column are indicated with an asterisk. In the example to the right, hybrid C is significantly different from hybrid A but not from hybrid B. The difference between C and B is equal to 1.5, which is less than the LSD value of 2.0. This means that these hybrids did not differ in yield. The difference between C and A is equal to 3.0 which is greater than the LSD value of 2.0. This means that the yields of these hybrids were significantly different from one another. The asterisk indicates that hybrid B was not significantly lower than the top yielding hybrid C, indicated in bold.

Treatment	**Yield**
A	6.0
B	7.5*
C	**9.0***
LSD	**2.0**

RESULTS

The 2014 growing season was characterized by a wet spring during the normal planting season and then a colder than normal July and August (Table 2). The area of this corn trial received 4.90” of rain during the month of May. The month of June was 1.1 degrees warmer than normal and received 2.40” of precipitation above the 30-year average. The wet soil conditions in May and June resulted in a spring planting season where finding ideal field conditions were difficult. July and August were a little wetter than the long range average and September was much dryer than average. Much of the area had a damaging frost on 12-Sep and this reduced the ability of the corn to finish maturing and to dry down adequately. During the months of critical plant growth from June through August, 31 less growing degree day units were accumulated and the crops had 3.47 additional inches of precipitation based on long term averages. The 2014 growing season faced some challenges but overall was considered by many to be a good corn season.

Table 2. Data from a weather station in close proximity to Alburgh, VT.

Alburgh, VT	May	June	July	August	September	October
Average temperature (°F)	57.4	66.9	69.7	67.6	60.6	55
Departure from normal	1.0	1.1	-0.9	-1.2	0.0	6.8
Precipitation (inches)	4.90	6.03	5.15	3.98	1.33	2.00
Departure from normal	1.45	2.40	1.00	0.07	-2.31	-1.60
Growing Degree Days (base 50°F)	238	501	613	550	339	69
Departure from normal	40	27	-27	-31	21	69

Based on weather data from a Davis Instruments Vantage Pro2 with WeatherLink data logger. Historical averages are for 30 years of NOAA data (1981-2010) from Burlington, VT.
October data represents weather recorded through the last corn harvest, 14-Oct 2014.

Analysis of the data indicates that the different now that the soil has improved to a point where higher yields are supported. As we continue to evaluate better ways of implementing no-till practices, we expect the yields to continue to improve. The strip-till treatments produced significantly lower yields while maintaining similar forage quality characteristics. The benefits of strip-till cropping methods are sound and the low yields produced in this trial may be the result of a slightly more complicated task of planting corn correctly into the strips in a small field plot situation. For strip-till tillage methods to work best, GPS systems and precision agriculture planting techniques are generally implemented. It is of upmost importance that the seed be placed directly in the center of the strips when implementing this type of cropping system. If the seed misses the strip or is placed away from the center, significant yield losses may occur. The dry matter measurements between the three tillage practices evaluated did not vary significantly from each other. The crops grown from these different tillage methods matured and dried down similarly.

Minimum tillage methods did not significantly impact corn silage quality indicating that no-till, strip-till, and vertical tillage have comparable effects on quality. The only significant difference observed was in milk per acre. The corn silage harvested in this trial was similar in quality and quantity to corn planted conventionally. This was the fourth year of reduced tillage practices in this research plot and yields overall were improved compared to 2012 and 2013 results. Overall, the yields from this year's trial were compatible to yields from conventional tillage practices.

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