2012 ORGANIC SPRING WHEAT WEED CONTROL STRATEGIES REPORT

Dr. Heather Darby, University of Vermont Extension
Heather.Darby[at]uvm.edu

Many organic cereal grain growers struggle with weed issues, especially in spring wheat. Weed(t)-4(.)] TJETBT4 Tf1 0

Table 2. Treatments in the weed control trial, 2012, Alburgh, VT.

Treatment	Row spacing inches	Tineweeding date	Inter-row cultivation

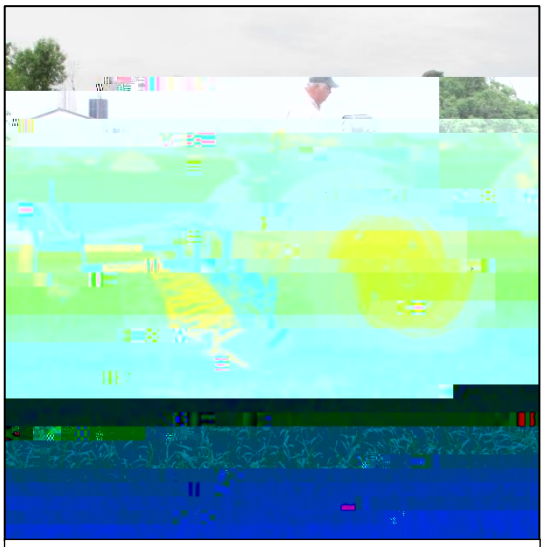

Image 1. Inter-row cultivation using the Schmotzer hoe, Alburgh, VT

the Perten FN 1500 Falling Number Machine. The falling number is related to the level of sprout damage that has occurred in the grain. It is measured by the time it takes, in seconds, for a stirrer to fall through a slurry of flour and water to the bottom of the tube. Falling numbers greater than 350 indicate low enzymatic activity and sound quality wheat. A falling number lower than 200 indicates high enzymatic activity and poor quality wheat.

All data was analyzed using a mixed model analysis where replicates were considered random effects. The LSD procedure was used to separate weed management strategy means when the F-test was significant ($P< 0.10$).

LEAST SIGNIFICANT DIFFERENCE (LSD)

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 treatments is real or whether it might have occurred due to other variations in the field. All data was analyzed using a mixed model analysis where replicates were considered random effects. At the bottom of each table, a Least Significant Difference (LSD) value is presented for each variable (e.g. yield). LSDs at the 10% level (0.10) of probability are shown. Where the difference between two treatments within a column is equal to or greater than the LSD value at the bottom of the column, you can be sure in 9 out of 10 chances that there is a real difference between the two values. Treatments listed in bold had the top performance in a particular column; treatments that were not significantly lower in performance than the highest value or top performing treatment in a particular column are indicated with an asterisk.

In the example below, treatment C is the top-performer and is significantly different from treatment A but not from treatment B. The difference between B and C is equal to 729, which is less than the LSD value of 889. This means that these treatments did not differ in yield. The difference between A and C is equal to 1454, which is greater than the LSD value of 889. This means that the yields of these two treatments were significantly different from one another.

Variety	Yield
A	3161
B	3886*
C	

RESULTS

Seasonal precipitation and temperatures were recorded using a Davis Instruments Vantage Pro2 weather station at Borderview Research Farm in Alburgh, VT, weather data was summarized for the 2012 growing season (Table 3). Though May was wetter than normal (based on 1981-2010 data), April, June, and July all had less precipitation than average. All months during the growing season had higher than average temperatures (based on 1981-2010 data). There were an accumulated 3547 Growing Degree Days (GDDs) at a base temperature of 32°F. This was 195 more than the historical 30-year average for April-July. Favorable spring weather led to earlier than normal planting and harvest of spring wheat.

Table 3. Summarized weather data for 2012 – Alburgh, VT.

otein was the treatment at 13.8% although not significantly different from the other weed control treatments. All of the treatments had protein levels that met commercial milling standards of 12-15%. The falling numbers for each treatment exceeded industry standards of 250-400 seconds.

Table 5. Impact of weed control strategies on wheat yield and quality.

Treatments	Yield @ 13.5% moisture	Moisture	Test weight	Crude protein @ 12% moisture	Crude protein @ 14% moisture	Falling number
	lbs ac^{-1}	%	bu ac^{-1}	%	%	seconds
Standard	2929	18.7	58.1	**14.4**	**14.1**	418
Standard +						

Treatments indicated in **bold** had the top observed performance in a particular column.
* Treatments with an asterisk did not perform significantly lower than the top-performing treatment in a particular column.
NS No significant difference was determined between treatments.

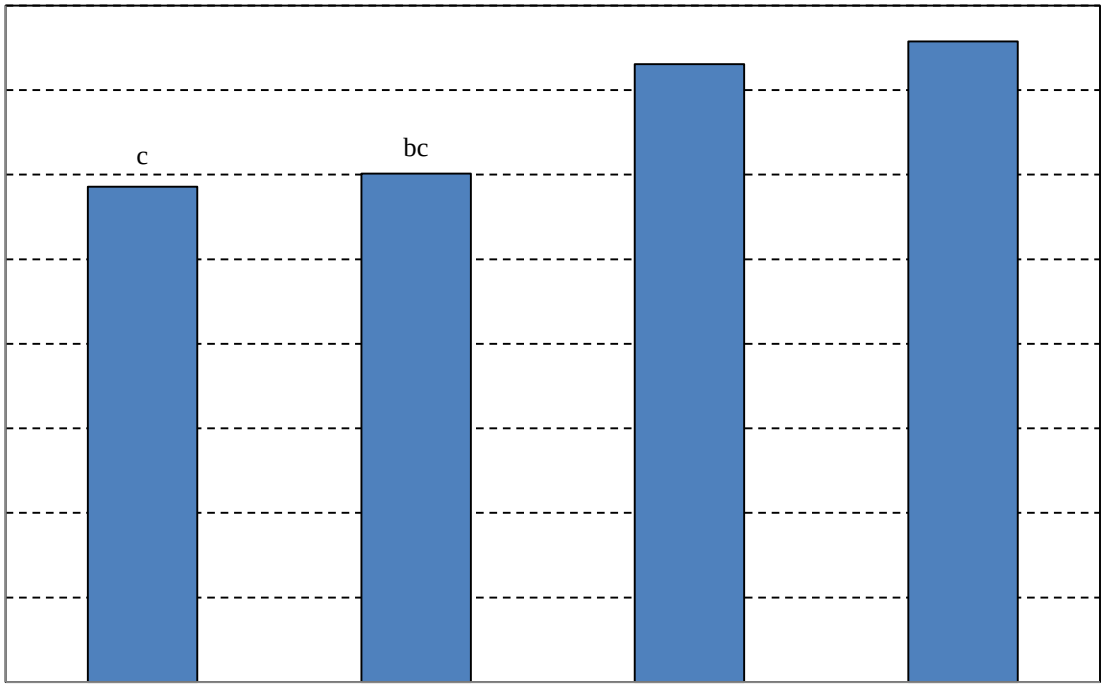

Figure 1. The impact of weed control strategies on yield, Alburgh, VT. Treatments with the same letter did not differ significantly in yield.

DISCUSSION

resulted in the highest yield; this enabling more wheat to be planted in each plot. Conversely, t spacing had one of the lowest yields, possibly due to less wheat being planted per plot and potentially plants killed through cultivation. ndard+ , which was tineweeded twice post wheat emergence, yielded 725 lbs ac^{-1} atment without tineweeding. Tineweeding did appear to reduce annual grass and broadleaf weeds. As shown by other studies, the timing of tineweeding events can have a significant impact on the effectiveness of weed control. In 2012, the tineweeding events occurred later than they had in previous trial years (32 and 42 DAP). The first tineweeding event (21-May) caused greater reduction in annual grasses than the second event (31-May). This may be attributed to the grasses having deeper root systems and more difficult to remove by tineweeding. The 31-May tineweeding resulted in no losses in wheat, which could be attributed to the wheat being more established at the time of tineweeding. Overall, increasing the density and tineweeding improved overall yields and presumably weed control. Ultimately, it appears that several strategies will lead to improved weed control over standard practices.

Grain quality was not impacted by the different treatments. The lowest protein levels were in the row treatments (13.8%), which could be attributed to more competition for plant available nitrogen by the wheat. The dry conditions during wheat dry down resulted in very little sprout damage and very high falling numbers. The falling numbers of all the treatments were above 400 seconds, which means there is too little enzymatic activity, and therefore, would need to be amended with barley malt to increase enzymatic activity. The test weights, protein levels and falling numbers met or exceeded commercial milling standards for bread baking.