NW CROPS & SOILS PROGRAM

2010 Winter Wheat Harvest Date Trial

Dr. Heather Darby
heather.darby@uvm.edu
(802) 534-6501

Susan Monahan, Erica Cummings, Rosalie Madden, Amanda Gervais, and Philip Halteman

The UNIVERSITY of VERMONT EXTENSION

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INTRODUCTION

In New England, frequent rainfall, and prolonged high humidity are common during the period of wheat ripening. From the time of physiological maturity of the grain to acceptable storage moisture, the quality of the wheat can decline considerably due to these fluctuating temperatures and moisture conditions. Delays in harvesting may not only result in quality losses but reductions in yield due to lodging, shattering, or hail damage (Farrer, et al 2006).

Baking quality of wheat suffers when high levels of the enzyme alpha amylase are present in the grain. This enzyme, which breaks starch down into sugars, is present when the grain begins to germinate. Pre-harvest sprouting occurs in the field if there is a delay in harvest during periods of high humidity or frequent rainfall. The objective of this research was to determine if timing of harvest affects yield and quality parameters of winter wheat.

METHODS

Four hard red winter wheat varieties were planted at Borderview Research Farm in Alburgh, Vermont on September 19, 2009. The experimental plot design was a randomized complete block with four replications. Wheat varieties evaluated are listed in Table 1.

Table 1: Winter wheat varieties planted in Alburgh, VT.

Species	Seed Source
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Table 2: General plot management for trial.

Location	**Borderview Farm Alburgh, VT**
Soil type	Benson rocky silt loam
Previous crop	Sod
Row spacing (in.)	6
Seeding rate	150 lbs./acre
Replicates	4
Planting date	9/19/09
Harvest date 1	7/7/10
Harvest date 2	7/15/10
Harvest date 3	7/21/10
Harvest date 4	7/29/10
Harvest area (ft.)	5x20
Tillage operations	Fall plow, disc, & spike-toothed harrow

WEATHER

Seasonal precipitation and temperature recorded at a weather station in close proximity Alburgh are shown in Table 3. The 2010 growing season was ideal for growing wheat. Due to early season warmth, wheat grew quickly in the spring and its growth stages were about 2 weeks ahead of past years. Below average rainfall during flowering periods led to low disease levels on wheat in 2010. From planting to harvest, there was an accumulation of 5094 Growing Degree Days (GDD), 273 GDDs higher than the 30-year average.

Table 3: Temperature and precipitation summary for Alburgh, VT, 2010.

South Hero (Alburgh)	September 2009	October 2009	March	April	May	June	July
Average Temperature (F)	57.77 Tn						

The highest test weight (60.3 lbs. per bushel) resulted from the earliest harvest, July 7th (Table 4). Test weight is the measure of grain density determined by weighing a known volume of grain. Generally, the heavier the wheat is per bushel, the higher baking quality. Acceptable test weight for bread wheat is between 56-60 lbs. per bushel. A common cause of low-test weight is when grain in the field is rewetted by rainfall or dew causing the grain to initiate the germination process before harvesting (preharvest sprouting). During germination, oil, starch, and protein are digested to provide energy to produce a new seedling. This process leaves small voids inside the grain. Although the grain may again dry in the field, the seed size does not change and the small voids inside the seed result in a decreased test weight. Maximum test weight is generally achieved when grain is harvested prior to frequent wetting and drying cycles, which generally means wheat is higher in moisture.

Table 6: Quality data by harvest date

Harvest Date	Crude protein @14% moisture	Falling number @14% moisture	DON
	%	seconds	ppm
July 7, 2010	8.85	344	0.181
July 15, 2010	8.71	369	0.138
July 21, 2010	8.91	362	0.194
July 29, 2010	8.99	366	0.188
Trial Mean	8.86	360	0.175
LSD (0.10)	NS	NS	NS

Table 7: Quality data by variety.

Variety	Crude protein @14% moisture	Falling number @14% moisture	DON
	%	seconds	ppm
Arapahoe			

Figure 1

In the Northeast, *Fusarium* head blight (FHB) is predominantly caused by the species *Fusarium graminearum*. This disease is very destructive and causes yield loss, low test weights, low seed germination and contamination of grain with mycotoxins. A vomitoxin called deoxynivalenol (DON) is considered the primary mycotoxin associated with FHB. The spores are usually transported by air currents and can infect plants at flowering through grain fill. Eating contaminated grain (grain with DON levels >1ppm) poses a health risk to humans. All DON levels in this trial were within acceptable levels for human and animal consumption. There was no statistical difference in DON levels based on harvest date (Table 6), but there was a statistical difference by variety, with Harvard having the highest DON levels, 0.244 ppm (Table 7).

This means that varieteis performed similarly across harvest dates. There was a significant harvest date by variety interaction for DON (P=0.1052), meaning that not all varieties had the same outcome from each harvest date. Arapahoe had very low DON levels at the first harvest, July 7th (Figure 3). much higher than the other varieties on the July 21st harvest. Although the varieties resulted in different DON levels from each harvest date, all DON levels were less than 1 ppm and acceptable for human consumption.

The UVM Extension Crops and Soils Team would like to thank Borderview Research Farm for their generous help with the trials and acknowledge the Agriculture Experiment Station for their financial support.

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