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From the Ground Up

Agronomy News for the Shenandoah Valley

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IN THIS ISSUE:

Should We Worry About Frost Damaged Corn in 2009?

Due to the wet spring conditions, quite a few acres of corn in the Valley were planted at later than optimal dates this year. Some meteorologists are also predicting the possibility of cooler than average temperatures this fall. The combination of late planting and cooler fall temperatures means that we need to at least be prepared for the possibility of frost damaged corn this fall.

What's The Risk?

Corn maturity follows very closely with the growing degree days, or heat units, that are accumulated during the growing season. A typical Virginia mid-season corn hybrid requires approximately 2190 GDD to reach dough stage, 2450 GDD to reach dent, and 2700 GDD until physiological maturity. These units are determined either from planting or from emergence, depending on the maturity rating system used by the corn seed company. Since we know how many GDD it takes for a particular hybrid to reach various growth stages we can calculate at what date the corn should reach this stage. It is also possible to calculate the probability of a freezing event taking place on or before the date that the corn should reach the desired growth stage (Table 1). This information was determined from 30 years of accumulated weather data collected at Staunton VA.

Table 1. Probability of reaching various corn growth stages before frost in 2009.

Planting Date	Average Date to Reach Dough Stage*	Average Date to Reach Dent Stage*	Probability of 32.5°F		Probability of 28.5°F	
			Before Dough	Before Dent	Before Dough	Before Dent
1-Jun	18-Sep	2-Dec	<10%	50%	<10%	<30%
15-Jun	9-Oct	2-Dec	40%	>90%	20%	>90%
20-Jun	20-Oct	31-Dec	70%	>90%	40%	>90%

*Typical mid-season hybrid requiring 2190 GDD to reach dough stage, 2450 GDD to reach dent stage

Handling Frost Damaged Corn

Frost damage to the corn stalk, leaf and husk will occur when temperatures drop to 28 degrees for even a few minutes, or from 29 to 32 degrees for 4 to 5 hours. Corn that is frosted at either milk stage or early dough stage will likely be too wet to properly ensile (Table 2). If corn at the milk stage is harvested immediately after frosting, silage quality will be poor and nutrients will be leached out as the silage "juices". Waiting until the proper moisture levels are reached to harvest corn that was damaged at the milk stage will increase quality but decrease dry matter yield. Estimates are that as much as 10% dry matter will be lost in the first 10 days after the frost, and 20% dry matter lost by 40 days. Mold will also likely develop in the ears raising the potential for mycotoxins. Testing for mycotoxin levels in early frosted corn is advisable. Corn frosted in the milk stage will likely require a compromise between dry matter yield and ideal moisture content. Several options exist when forced to harvest corn that is too wet. In some cases grain or chopped hay or straw can be added to decrease overall moisture content. However, in general 30 lbs of dry matter are required to reduce a ton of corn silage by one moisture percentage point. Thus, this option may be prohibitively expensive. Another option for corn that is too wet to ensile is to feed as green chop, either by itself or mixed with other feed sources. If frost damage occurs to corn in the dough or early dent stage, allow several days of drying time before harvesting. Frost occurring at late dough, early dent stage or later may be harvested immediately.

Regardless of when the frost occurs, be certain to accurately determine the moisture content of the corn before ensiling. This can easily be performed with a microwave oven or a commercial forage moisture tester. Do not rely solely on grain development stage as an indication of crop moisture. Data from Pennsylvania indicate that corn at full dent, half-milk and black-layer stages average 68, 61, and 53 percent whole plant moisture, but year and hybrid effects may cause this rule of thumb to vary by as much as 4 percentage points.

Track Your Own Corn Development

Through funding obtained from the Augusta County Ag Industry Board, Virginia Cooperative Extension purchased five high quality weather stations which are located throughout Augusta County, along with a previously purchased station at the Verona extension office. Data from these weather stations, including accumulated growing degree days, is being regularly updated at http://www.valleycrops.cses.vt.edu. In addition to relative maturity ratings, most corn seed companies know the growing degree units required for a particular corn hybrid to reach various growth stages. If you know the date your corn was planted, and the growing degree units required to reach maturity, you can use the weather information available online to help determine the likelihood you will be dealing with frosted corn this year or not.

Table 2. Recommended moisture contents for corn silage stored in various types of silos.

Silo Type	Recommended moisture content (%)
Upright silo	60 - 65
Upright "oxygen-limiting silos	50 - 60
Horizontal silos	65 - 70
Bag silos	60 - 70

Affects of Wide-Row Spacing in Wheat

Recent research from the Midwest has shown some advantage to planting wheat spaced in wide rows. Traditionally in Virginia and most of the country, wheat is drilled in 6", 7" or 7.5" rows, but we were curious to see if we would see any response to wide-row wheat in the Valley. Tests were conducted in both Augusta County and Blacksburg in 2008-09 to determine if there was a response to either yield or quality of wheat planted in 15" rows compared to 7.5" rows. In Augusta County, "Featherstone" wheat was planted on October 20 on land owned by North Point Farms, Inc. Wheat was either drilled in 7.5" wide rows with a Sunflower drill or planted in 15" wide rows with a Kinze 3500 planter. Tillage was also a factor at this site, with half the area being tilled and half planted no-till. In Blacksburg, "Shirley" wheat was no-till drilled on both 7.5" and 15" wide rows with a Great Plains 3P606NT drill, with seed tubes blocked off to achieve the 15" wide spacing. Both plots were planted with approximately 22 to 23 seeds per foot. Both areas were harvested in mid-July 2009 with conventional grain harvesting equipment. Plots were weighed and moisture samples were obtained.

At both sites and in all tillage treatments, wheat planted in 7.5" wide rows yielded greater than wheat planted in 15" wide rows (Table 1). No difference in either test weight or grain quality was observed at either site. Foliar disease and lodging ratings were not measured in this experiment. An interesting result that we didn't foresee was that the conventionally tilled wheat tended to yield better than the no-till wheat. This was generally true across the state in 2009, and was likely a function of the colder than normal fall and winter. Wheat across the state failed to tiller like normal, and in no-till soil conditions tend to be cooler, which likely led to even less tillering. The yield differences between tilled and no-tilled wheat seen this year are not normal, as we have many years of Virginia data showing that no-till wheat typically gives us either no difference or is a yield advantage.

Table 1. Wheat yields under different row spacings and tillage treatments for two locations in Virginia in 2009

Location	Tillage Treatment	Row Spacing	Yield (bu/ac)
Waynesboro	Conventional	7.5"	78.0
	Conventional	15"	61.3
	No-Till	7.5"	58.9
	No-Till	15"	51.5
Blacksburg	No-Till	7.5"	84.6
	No-Till	15"	62.1

Area Weather Summary for 2009

Mean Monthly Temperature

Location	Month				
	March	April	May	June	July
Stuarts Draft	45.9	54.2	62.8	70.6	70.6
Verona	45.9	54.5	63.0	71.3	71.5
Weyers Cave	45.1	52.1	62.1	70.3	70.1
Waynesboro	44.6	55.3	62.8	70.4	70.5
Mt. Solon	44.4	53.3	61.1	70.1	69.3**
Middlebrook	44.2	52.6	60.8	69.1	68.6
*Historical**	*42.4*	*52.4*	*61.4*	*69.1*	*73.2*

*Based on 30 years of data collected from Staunton Virginia Wastewater Treatment Plant
**Data collection interrupted

Total Monthly Precipitation

Location	Month					Yearly
	March	April	May	June	July	Total
Stuarts Draft	1.57	3.18	5.94	1.53	1.02	13.24
Verona	1.57	2.84	5.62	1.41	0.15**	11.44
Weyers Cave	1.41	2.66	6.33	3.89	1.98	16.27
Waynesboro	2.18	2.47	5.49	3.10	2.50	15.74
Mt. Solon	1.06	4.62	7.26	3.40	1.20	17.54
Middlebrook	1.54	3.57	7.75	2.40	2.80	18.06
*Historical**	*3.24*	*2.88*	*3.61*	*3.39*	*3.74*	*16.86*

*Based on 30 years of data collected from Staunton Virginia Wastewater Treatment Plant
**Data collection interrupted

Determining the Moisture of Corn Silage in the Microwave

The moisture of corn silage, or any forage crop, can be easily determined using a simple step by step procedure and a home microwave.

Step 1: Collect the sample. When the milk line begins to move from the tip to the base of the kernel, it's time to begin thinking about moisture testing. To begin sampling, collect at least ten plants at random from each field. Keep in mind that soil moisture, hybrid technology (example "Stay-Green"), planting date and maturity will affect the dry-down rate of various hybrids differently.

Step 2. Chop the sample. If you collected sample plants, these should be chopped to the theoretical length of cut (TLC) that your chopper would achieve. Use of a chipper/shredder is a good way to get close. However, many of these chippers chop material too fine. A better method would be to fire up the chopper and manually feed the plants through, but *please use extreme caution*!

Step 3. Determine the moisture content. Once you have obtained a chopped sample, mix it thoroughly and take a composite sample for moisture testing. There are a number of commercial moisture testers available and each of these have specific instructions that should be followed. If you are using a household microwave, your composite sample should weigh approximately ¼ to ½ lb. Spread the sample evenly on a paper plate and weigh the wet silage and the plate. Write down this number and then heat the sample on high for two minutes. Remove the plate from the microwave and weigh the sample again, noting the weight. Continue to heat the sample in two minute intervals until the weight does not change, at this point the sample is considered dry. To calculate the moisture content, use the following formula:

$$\left(\frac{FreshWeigh\ t - DryWeight}{FreshWeigh\ t} \right) \times 100$$

Testing New Cover Crops in Virginia…Calling for Volunteers

There is a growing amount of interest in the area regarding cover crops, particularly those that can both condition the soil and provide nutrients to the following cash crop. Recently I have teamed up with Steve Groff, farmer and nationally known no-till innovator from Pennsylvania, to get a national look at new and emerging cover crops. We have procured limited quantities of a number of cover crop species that may not be familiar (Table 1) but which may have a place in our cropping systems. We are interested in finding at least two farms in the Valley that would be interested in trying these cover crops out. If you would be interested, please contact me as soon as possible and we can talk about the details of this project.

Table 1. Species available in the 2009 Cover Crop Kits

Species	Growth Type	Seeding Rate	Planting Dates
Early cover hairy vetch	Winter annual	20 lbs	Aug 20 to Sept 30
Common vetch	Winter annual	40 lbs	Aug 1 to Sept 30
Crimson clover	Winter annual	15 lbs	Aug 1 to Sept 15
Subterrainian clover	Winter annual	15 lbs	April 30 to Sept 15
Persian clover	Winter annual	4 lbs	Aug 1 to Sept 30
Yellow Sweet Blossom Clover	Winter annual	4 lbs	Aug 1 to Sept 15
Arrowhead clover	Winter annual	4 lbs	Aug 1 to Sept 15
Canola	Winter annual	5 lbs	Aug 1 to Sept 15
Cow peas	Winter annual	50 lbs	Aug 1 to Sept 30
Austrian winter pea	Winter annual	80 lbs	Aug 1 to Sept 30
Bell beans	Winter annual	80 lbs	Aug 1 to Sept 30
Phacelia	Winter annual	4 lbs	April 1 to Sept 20
Mung beans	Winter annual	15 lbs	Aug 1 to Sept 30
Sunn hemp	Summer annual	10 lbs	May 20 to Aug 20
Buckwheat	Summer annual	10 lbs	June 1 to Sept 1
Sunflower	Summer annual	10 lbs	July 1 to Aug 30

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