

# 2014 Corn Cropping Systems to Improve Economic and Environmental Health



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**2014 CORN CROPPING SYSTEM TO IMPROVE ECONOMIC AND ENVIRONMENTAL  
HEALTH**

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community. Soil proteins (N mg/soil g) are measured with citrate buffer extract, then autoclaved. This measurement is used to quantify organically bound nitrogen that microbial activity can mineralize from soil organic matter and make plant-available. Soil respiration (CO<sub>2</sub> mg/soil g) is measured by amount of CO<sub>2</sub> released over a 4 day incubation period and is used to quantify metabolic activity of the soil microbial community.



Yield data and stand characteristics were analyzed using mixed model analysis using the mixed procedure of SAS (SAS Institute, 1999). Replications within trials were treated as random effects, and hybrids were treated as fixed. Hybrid mean comparisons were made using the Least Significant Difference (LSD) procedure when the F-test was considered significant ( $p < 0.10$ ).

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

## RESULTS

### Weather Data

Weather data was collected with an onsite Davis Instruments Vantage Pro2 weather station equipped with a WeatherLink data logger. Temperature, precipitation, and accumulation of Growing Degree Days (GDDs) are consolidated for the 2014 growing season (Table 3). Historical weather data are from 1981-2010 at cooperative observation stations in Burlington, VT, approximately 45 miles from Alburgh, VT.

The spring of 2014 was wetter with 3.81 inches more rain than the average year. This delayed corn planting for many farmers. However, after June the summer was drier and cooler than normal. GDDs are calculated below at a base temperature of 50°F for corn (Table 3) and 32°F for perennial forage (Table 4). Between corn planting in May and harvest in September, there was a total of 2,241 corn GDDs, 30 more than the 30-year average. There were 5,299 GDDs accumulated for perennial forage crops between April and September (50 less than the historical average). In mid-September there was an early frost that prevented the corn from maturing and drying down quickly.

**Table 3. Consolidated weather data and GDDs for corn, Alburgh, VT, 2014.**

<b>Alburgh, VT</b>	<b>May</b>	<b>June</b>	<b>July</b>	<b>August</b>	<b>September</b>
Average temperature (°F)	57.4	66.9	69.7	67.6	60.6
Departure from normal	1.0	1.1	-0.9	-1.2	0.0
Precipitation (inches)	4.90	6.09	5.15	3.98	1.33
Departure from normal	1.45	2.40	1.00	0.07	-2.31
Corn GDDs (base 50°F)	238	501	613	550	339
Departure from normal	40	27	-27	-31	21

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.

**Table 4. Consolidated weather data and GDDs for perennial forage, Alburgh, VT, 2014.**

<b>Alburgh, VT</b>	<b>April</b>	<b>May</b>	<b>June</b>	<b>July</b>	<b>August</b>	<b>September</b>
Average temperature (°F)	43.0	57.4	66.9	69.7	67.6	60.6
Departure from normal	-1.8	1.0	1.1	-0.9	-1.2	0.0
Precipitation (inches)	4.34	4.90	6.09	5.15	3.98	1.33
Departure from normal	1.52	1.45	2.40	1.00	0.07	-2.31
Perennial forage GDDs (base 32°F)	330	789	1041	1171	1108	860
Departure from normal	-54	33	27	-27	-31	2

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.

**Soil Data**  
On 7-May,

### Corn Silage Data

On 25-Sep, data was collected on corn silage populations and plots were harvested to determine moisture and yield (Table 7). Corn silage planted in tilled winter cover crop or in no-till conditions had significantly higher populations with 19,907 and 21,301 corn plants per acre, respectively. Corn borer populations were lowest in the NC plots and highest in the CC plots. However, there was no statistical difference among corn borer populations by corn cropping treatment. With respective dry matter yields of 22.72 and 20.40 tons per acre, NC and WCCC cropping systems had significantly higher yields (Figure 1).

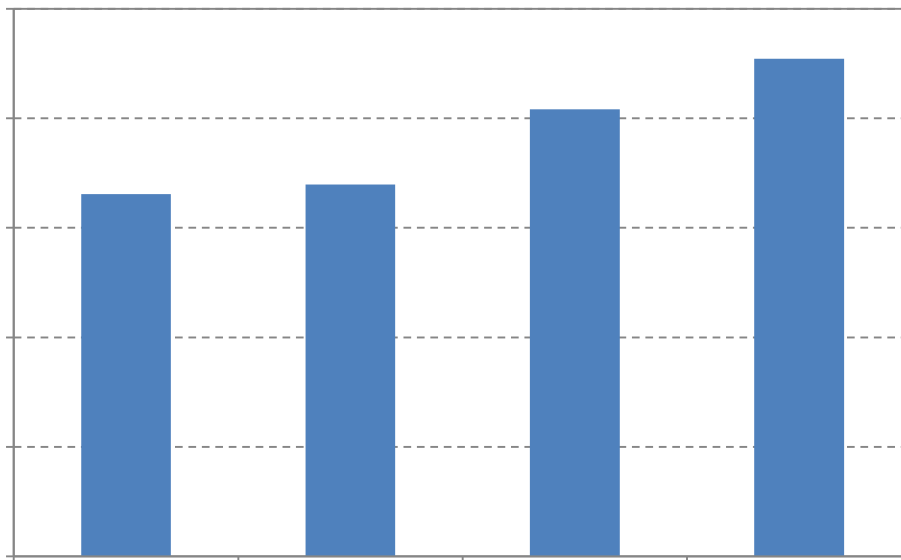
**Table 7. Corn Silage and corn borer population and yield by treatment, Alburgh, VT, 2014.**

Corn cropping system	Harvest population plants ac <sup>-1</sup>	Corn pest population % ac <sup>-1</sup>	Harvest dry matter %	Yield at 35 DM t ac <sup>-1</sup>
CC	18,687	20.3	31.6	16.98
NC	18,513	<b>0.0</b>	34.5	<b>22.72*</b>
NT	19,907	9.54	33.8	16.54
WCCC	21,301*	13.3	<b>35.3</b>	20.40*
LSD (0.10)		NS	NS	2.5
Trial mean	19,602	10.9	33.8	16.16

Treatments shown in **bold** are top-performing in a particular column.

\* Treatments with an asterisk did not perform significantly lower than the top-performing treatment in a particular column.

NS ó No significant difference was determined.



**Figure 1. Dry matter yields of corn cropping systems in tons per acre, Alburgh, VT, 2014. Treatments that share a letter were not significantly different from one another (p=0.10).**



Standard components of corn silage quality were analyzed (Table 8). There was no significant difference in NDF, NDFD, starch, TDN, NE<sub>L</sub>, or Milk ton<sup>-1</sup>. Crude protein was significantly higher in the NC

**Table 9. Impact of harvest date on perennial forage quality, 2014.**

Alfalfa/Fescue cutting	CP % of DM	ADF % of DM	NDF % of DM	NDFD % of NDF	Yield at 35 DM t ac <sup>-1</sup>
6-Jun	<b>14.2*</b>	32.9	55.9	62.4	1.76
1-Aug	12.6	<b>35.5*</b>	57.26	62.3	3.52
LSD (0.10)	1.2	1.7	NS	NS	NS
Trial mean	13.4	34.2	56.6	62.3	2.64

Treatments indicated in **bold** had the top observed performance.

\* Treatments indicated with an asterisk did not perform significantly lower than the top-performing treatment in a particular column.

NS 64 Tf1 0 0 1 205.01 696.5vd t/F1a26.(4 Tm0 geW\* <00B1JBTBT/F1 9 Tf1 0 Q\* nq78uas)16(ter2.6 reW\* nBTB1JW\* nBTB14.26 Tm02

The perennial forage first cutting had nearly twice as much crude protein as the highest corn silage cropping system (new corn), but the perennial forage total harvest was 23% the DM yield ton per acre than the new corn cropping system.