



## Switchgrass Stubble Height

**Purpose:** The purpose of this publication is to describe the impact of stubble height at harvest on yield, quality, and persistence of switchgrass.

### Stubble height as an agronomic issue

Stubble height (often incorrectly referred to as cutting height) refers to the height at which the cutter bar of a mower is set. Typically the cutter bar is adjusted to cut as low as possible, maximizing the yield recovered. Cutter bar height depends primarily on the field terrain, and whether or not a field has stones on the surface.

There are several reasons why a higher stubble height may be advantageous for forage crops. Some crops, such as alfalfa, will have an increased chance of overwintering successfully if either regrowth or a tall enough stubble is left on the field to catch an insulating snow cover. Corn for silage is often cut with a high stubble height to increase quality of the harvested forage, and decrease nitrate concentrations.

Warm-season grasses such as switchgrass, mowed during the growing season, generally require a 6" stubble left in the field to minimize risk of damaging the stand. A fall mowing near or after first frost, however, does not have any stubble height requirement for maintaining stand persistence.

For switchgrass that is to be overwintered in windrows, it has been recommended to mow with a higher than normal stubble height (maybe 6" or so) in an attempt to keep the mowed forage off the ground. This may allow the windrow to dry out in the spring without needing to rake windrows.

### Stubble Height Evaluation

We sampled switchgrass in fields ('Cave-in-Rock' or 'Nebraska') at the Cornell Mt. Pleasant research farm near Ithaca, and switchgrass in research plots ('Cave-in-Rock') at the Cornell Willsboro research farm in northern NY. The research plots were fertilized with different

levels of inorganic fertilizer or with dairy manure or dairy manure compost (See Bioenergy Information Sheets #12 & 13).

Switchgrass samples were cut at a 4" stubble height, and 2" segments were cut sequentially from the bottoms of the stems (Fig. 1). Four 2" segments were cut from each sample, dried and weighed. Samples were ground and analyzed for composition.



Fig. 1. After lining up stems on a heavy duty paper cutting board, two inch segments were consecutively removed from the base of the stems, then weighed and analyzed.

### Results

Consecutive 2" segments removed from the cut stem bases did not greatly differ in weight, as a percent of the total plant. This allowed us to average the segment weights and determine an average yield per inch of stubble height.

### Fields and Plots Sampled

Replicated samples were collected each fall from 2009 to 2012 in fields at the Mt. Pleasant Research Farm. 'Cave-in-Rock' plants were always considerably taller than 'Nebraska' plants, which resulted in Nebraska usually having a larger percent of the total yield per inch of stubble height (Table 1). 'Cave-in-Rock' was very consistent over years, while 'Nebraska' tended to be more variable.

Table 1. Yield loss per inch of stubble height in fields at the Mt. Pleasant Research Farm.

Year	'Nebraska'	'Cave-in-Rock'
% of total yield per inch		
2009	2.73	2.33
2010	2.17	2.23
2011	3.17	2.25
2012	2.85	2.29
<b>Average</b>	<b>2.73</b>	<b>2.28</b>

Table 2. Yield loss per inch of stubble height in 'Cave-in-Rock', as influenced by fertility treatments at Willsboro, NY. Average of two sites with 3 replicates each.

Fertility	2010	2011	2012	Ave.
% of total yield per inch				
N	1.89	2.14	2.10	<b>2.04</b>
NP	1.89	2.25	1.96	<b>2.03</b>
NPK	1.91	2.33	1.99	<b>2.08</b>
Manure	2.05	2.16	2.11	<b>2.11</b>
Compost	2.07	2.20	2.10	<b>2.12</b>
Check	2.21	2.58	2.75	<b>2.51</b>

Fertilized switchgrass at Willsboro was generally taller than the 'Cave-in-Rock' at Mt. Pleasant each year, resulting in slightly lower percent yield per inch of stubble height. The unfertilized check, however, was somewhat shorter and subsequently higher in percent yield per inch of stubble. Fertilized switchgrass at Willsboro averaged 2.08% yield per inch of stubble height.



Fig. 2. Switchgrass in Willsboro, NY. The taller the biomass crop, the smaller the proportion of yield in an inch of stubble.

### Stubble Height and Crop Composition

Stubble height has a relatively minor impact on crop composition. As stubble height is increased, nitrogen and phosphorous content of the harvested biomass will increase slightly, while lignin, chlorine, potassium, and total ash

content will decrease slightly. The BTU and S content of the feedstock are not influenced by stubble height. Any soil contamination issues due to wet soils at harvest will have more impact on composition than stubble height.

### Summary

Mowing switchgrass in the fall as close as possible to the soil surface (3-4" stubble height) had no impact on stand persistence over several seasons. High yields of switchgrass overwintered in windrows will likely require raking in the spring to facilitate drying. Stubble left in the field will not significantly impact biomass quality, but every inch of stubble left in the field will reduce DM yield by 2 to 3%, influenced primarily by the height of the stand.

### Additional Resources

Cherney, J.H. and K.M. Paddock. 2013. Overwintering Switchgrass in the Field in NYS. Bioenergy Information Sheet #10. [www.grassbioenergy.org](http://www.grassbioenergy.org).

Cherney, J.H. and K.M. Paddock. 2013. Harvest Management and Switchgrass Composition. Bioenergy Information Sheet #11. [www.grassbioenergy.org](http://www.grassbioenergy.org).

Cherney, J.H., K.M. Paddock, Q. Ketterings, M. Davis, and D.J.R. Cherney. 2013. Grass Biomass Yield as Influenced by Fertility. Bioenergy Information Sheet #12. [www.grassbioenergy.org](http://www.grassbioenergy.org).

Cherney, J.H., K.M. Paddock, Q. Ketterings, M. Davis, and D.J.R. Cherney. 2013. Grass Biomass Composition as Influenced by Fertility. Bioenergy Information Sheet #13. [www.grassbioenergy.org](http://www.grassbioenergy.org).

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For more information



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