

Influence of Variety & Seeding Rate on Alfalfa Stem Firmness

Purpose:

To determine if alfalfa stem fineness (diameter) for hay can be improved by variety selection or seeding rate.

Background:

Hay producers want alfalfa that is fine stemmed, rather than course stemmed. This is thought to minimize “sorting”, and improve palatability, forage quality (digestibility) and marketability. Stem fineness is more important when alfalfa is harvested as dry hay rather than haylage. Hay producers are likely willing to sacrifice some yield potential for an improvement in stem fineness, whereas haylage producers are not. Are hay producers inadvertently selecting unsuitable varieties? There are anecdotal differences between varieties with regards to stem fineness. There is also anecdotal evidence that stem fineness can be improved by a high seeding rate, although this effect may not last past the first year.

While the Ontario Forage Crops Committee (OFCC) registration trials include new and experimental varieties compared to check varieties, this is a side-by-side performance trial where the commercially available varieties are together in one plot. This provides an excellent site for Soil & Crop Tours to discuss variety selection, as well as alfalfa management. Information will be shared between the U of G, OFCC, and Ontario Forage Council.

Methods:

Trial #1 – Variety

Side-by-side alfalfa performance variety trials were seeded in May 2005 near Enniskillen by the University of Guelph. However, without the Ontario Soil and Crop Improvement Association Regional Grant, there would have been no funding to harvest these plots and obtain the data. The trial consists of 49 varieties, in 1 X 6 m plots that are replicated 4 times. These plots will be harvested and evaluated for yield and stem diameter.

Plot Harvest

East-Central S&C uses the Centralia plot harvester and is responsible for the transportation and insurance of the machine for the 3 harvests each year.

Stem Diameter

Two harvests of 1 square foot are made of each variety. The stems are “staged”, and the number of stems/stage counted. These are put in paper bags, dried, and weighed to determine “mean stage by weight”. Stems at “stage 4” (early flower) are to be measured for stem diameter between the first internodes from the base, using electronic calipers.



Yield Measurements

The entire plot is then harvested using the plot harvester, with the sample weights being added back in.

Preliminary Results

“Evaluation of alfalfa varieties for maturity and stem diameter”. Nov 2007, S. R. Bowley, D. Hancock, A. Bowman, and L. Robertson, University of Guelph
<http://www.regionalscia.org/MSW-Diameter-Report-26Nov2007-1.pdf>

Yield of 49 varieties of alfalfa managed under a standard, 3-harvest system were obtained from this trial, as well as a similar trial conducted at Elora. Yield results were incorporated into the Ontario Forage Crops Committee performance database and computations of relative variety performance for Ontario. Maturity and stem diameter measures were also recorded; for stem diameter measurement, diameters of Stage 4 stems (late bud stage, >2 buds with open flowers) were measured to avoid confounding effects due to maturity differences among stems. For both traits, variety differences were detected, however, there were no significant variety x environment interactions. This indicated that relative maturity and stem diameter were consistent from test to test, harvest to harvest, and that the data (Enniskillen & Elora) could be pooled. Combined over trials, six varieties (Macon, Amerigraze 401+Z, Steak, Oneida VR, Rhino, and Hybri-Force 400) were significantly less mature than the test mean and six varieties (Starbuck, Reliance, Genoa, Stallion, Exp636, and 4.2) were significantly more mature than the test mean. Three varieties (Affinity+Z, 53V52, and Rhino) had Stage 4 stems that were significantly smaller in diameter compared to the test mean. Seven varieties (GH700, Stallion, 134, FSG 300LH, WinterGold, OAC Superior, and Renaissance) had Stage 4 stems that were significantly larger in diameter compared to the test mean.

Herbage yield, maturity, and Stage 4 stem diameter were not correlated with each other. The absence of a strong correlation indicated that if maturity and/or stem diameter was

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an issue for producers, then both management (ie. harvest timing) and variety selection are factors to incorporate in the design of a system to produce the desired harvested product. For example, harvesting at an earlier stage of development will result in forage that has a greater proportion of finer stemmed, less mature material. However, varieties differ in their maturity as well as their diameter of Stage 4 stems. Thus, one could leave harvest date unchanged but modify the maturity/diameter by changing the variety. Since there was not a high correlation with herbage yield, the latter does not need to be sacrificed to obtain the desired forage characteristics. Bi-plots were constructed to assist in identifying varieties with the desired combination of attributes.

Trial #2 – Seeding Rate

Seeding preparation was done by farm co-operator. The Elora forage plot planter was used. It was transported to the site and back by East-Central S&C.

Varieties & Seeding Rates

Five varieties were planted. Seeding rates were 5.1, 11, 16.6 and 22 kg/ha. The plots were replicated 4 times, similar to Trial #1.

Preliminary Results:

Alfalfa seeded at higher seeding rates will, when harvested on the same date, be less mature than stands seeded at lower seeding rates. This relationship was found for all harvests of the season. For the five varieties tested, there were differences in their reaction to changes in seeding rate. At higher seeding rates, the maturity was less, but the relative change in maturity differed between varieties. Alfalfa seeded at higher seeding rates had smaller diameter stems at first harvest compared to lower seeding rates. However, seeding rate did not affect stem diameter at the second or third harvest of the season.

Summary:

Year 2 of this 3 year trial is complete.

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