

Improving alfalfa digestibility by genetic manipulation of lignin biosynthesis.

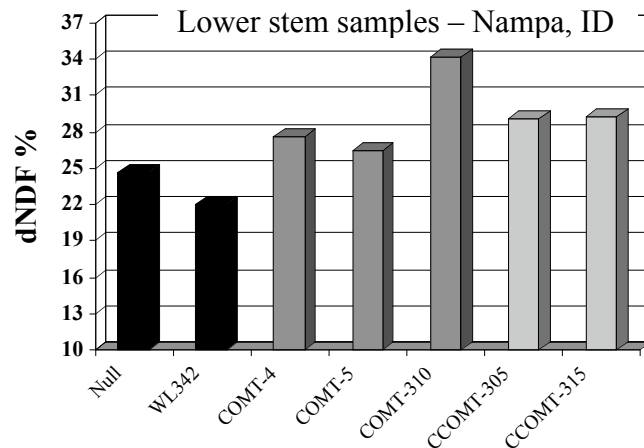
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Guo, et.al. (2001) reported that transgenic alfalfa plants with downregulated caffeic acid 3-O-methyltransferase and caffeoyl CoA 3-O-methyltransferase had altered lignin content and composition. In this study these T₀ plants were crossed to elite commercial lines. Transgenic and non-transgenic segregants were evaluated in 2001 for forage quality in field tests at three locations (ID, WI and IN). Whole plant samples were analyzed for IVD, ADL, dNDF, and NDF using NIRS. Lower stem samples were taken from the last two cuts at the ID location and analyzed these parameters. Wet lab dNDF and *in vitro* dry matter digestibility at 15hrs and 36hrs was also measured on a subset of the samples.

Segregation ratios of progeny from the transgenic x commercial crosses showed that all but one event (COMT310) contained multiple copies of the respective transgene. The transgenic progeny used in the study were segregating for copy number, complicating the analysis of the results. However, results were consistent over locations and germplasm type.

Using either whole plant or lower stem samples, all transgenic plants showed reduced ADL content. There were no differences in NDF content. Whole plant IVD and dNDF were higher for the transgenic plants, but differences were significant only for the COMT310 and CCOMT plants. The lower stem samples from Nampa showed the greatest differences for all parameters. With the lower stem samples the transgenic treatments were all significantly higher in IVD and dNDF (see table). Wet lab analysis of these samples gave similar results.

There were no significant differences in agronomic traits noted in 2001. The tests will be continued for a second year, and agronomic performance and lodging potential will be thoroughly evaluated. Forage quality will be measured again in 2002, with more emphasis on lower stem samples.



Guo, D., F. Chen, K. Inoue, J.W. Blount and R.A. Dixon (2001) Downregulation of caffeic acid 3-O-methyltransferase and caffeoyl CoA 3-O-methyltransferase in transgenic alfalfa: Impacts on lignin structure and implications of the biosynthesis of G and S lignin. *The Plant Cell* 13:73-88.