Alfalfa-grass mixtures performance for forage/biomass production in North Dakota

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The high yield and quality of alfalfa-grass mixtures (AGM) makes it an excellent source of biomass for hay or lignocellulose feedstock. The objective of this study was to determine the performance of AGM in North Dakota. Replicated plots of 24 AGM treatments were seeded at Fargo, Prosper, and Carrington, ND, in 2010. Grasses used for the mixtures were smooth brome, orchardgrass, reed canary, (RCG), tall fescue (TF), meadow fescue, intermediate wheatgrass (IWG), crested wheatgrass (CWG), western wheatgrass (WWG), and tall wheatgrass (TWG). Treatments included 13 grasses in monoculture, alfalfa in monoculture, and nine alfalfa-grass mixtures. Forage yield and quality was determined for two harvests in the seeding year and four harvests in the production years. The combined results across years indicated a strong interaction between location and treatments. The Carrington location was much dryer than the Fargo and Prosper locations and the sole alfalfa and the AGM had much lower biomass yield than the grasses in monoculture. At Prosper, the highest biomass AGM yield was not significantly different than alfalfa grown in monoculture or in mixture other grass mixtures. At Fargo, the highest biomass AGM yield was not significantly different than the alfalfa monoculture or alfalfa in mixture with CWG, TWG or IWG or monoculture of IWG and RCG. The combined analysis across locations and years indicated the greatest forage yield was for RCG in monoculture (9.4 Mg/ha), and TF in mixture with alfalfa (9.8 Mg/ha). Forage quality was highest for alfalfa alone, but increasing grass in the mixture increased fiber digestibility as well.