NORTH DAKOTA - Alfalfa/Grass-Mixtures Performance in North Dakota

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Well-managed grass/alfalfa mixtures can yield as much or more as alfalfa alone. Also, alfalfa in the mixture can improve overall stand persistence, reduce reliance on inorganic N, and increase carbon sequestration in the soil. Mixtures also provide greater fiber content and digestibility, thus increasing average daily gain and milk production. Alfalfa/grass mixtures also have potential as feedstocks for bioenergy.

Replicated plots of 24 alfalfa/grass-mixture treatments were seeded June 2 at Fargo and Prosper, and June 3 at Carrington, ND, in 2010. Treatments included 13 grasses in monoculture, alfalfa in monoculture, and 9 alfalfa-grass mixtures. Plots were 5' by 30'. Grass plots were fertilized with 50 lbs N/ac. Alfalfa and alfalfa/grass mixtures received no N fertilizer. All plots were fertilized with 120 lbs K_20/ac and 110 lbs P_2O_5/ac in fall 2010. Grasses in mixtures included smooth bromegrass (SB), meadow bromegrass (MB), orchardgrass (OG), reed canarygrass (RCG), tall fescue (TF), meadow fescue (MF), intermediate wheatgrass (IWG), crested wheatgrass (CWG), and tall wheatgrass (TWG).

The first production year (2011) demonstrated a strong interaction between treatments and locations. Carrington was much dryer than Fargo and Prosper; so alfalfa and alfalfa/grass mixtures yielded much less than grasses, due to the greater water requirements for alfalfa, sole or in mixture. At Prosper, greatest forage yield was with alfalfa alone, although not significantly different than alfalfa mixed with TF or RCG. At Fargo, greatest forage yield occurred with alfalfa/CWG (~ 20% CWG); but this mixture was not significantly different than alfalfa alone or alfalfa mixed with RCG, TF, or IWG, or RCG alone.

Combined analysis indicated that greatest forage yield was with RCG alone (6.3 tons/ac) or in mixture with alfalfa (6.0 tons/ac). Using alfalfa-grass mixtures enhances biomass yield, decreases the need for N fertilizer, and therefore reduces the cost of forage production.

Table 1. Forage yield (ton DM/acre) of grasses, alfalfa, and their mixtures averaged over 3 ND locations (Fargo, Prosper, and Carrington) in 2011.

Species or Mixture	Variety	2011 Harvest				
		1st	2nd	3rd	4th	Total
Smooth bromegrass	VNS	2.25		2.85		**5.10**
Meadow bromegrass	MacBeth	2.56		2.34		**4.90**
Orchardgrass	Intensiv	1.81		3.01		**4.82**
Orchardgrass	Potomac	1.65		2.62		**4.27**
Orchardgrass	Baridana	1.65		2.81		**4.14**
Reed canarygrass	Palaton	2.59		3.67		**6.26**
Tall fescue	Barelite	2.59		3.17		**4.92**
Tall fescue	Baroptima	1.87		3.37		**5.24**
Meadow fescue	Pradel	1.74		2.55		**4.29**
Intermediate wheatgrass	Oahe	2.74		2.78		**5.52**
Crested wheatgrass	Hycrest	2.51		1.94		**4.45**
Tall wheatgrass	Alkar	2.06		3.30		**5.36**
Western wheatgrass	VNS	2.28		3.44		**5.72**
SB/alfalfa	VNS	2.20	1.14	0.83	1.10	**5.50**
OG/alfalfa	Potomac	1.84	1.14	1.12	0.93	**5.46**
OG/alfalfa	Baridana	1.89	1.15	0.88	1.16	**4.96**
RCG/alfalfa	Palaton	2.23	1.42	1.02	1.15	**6.02**
TF/alfalfa	Barelite	1.89	1.41	1.13	1.16	**5.77**
MF/alfalfa	Pradel	2.01	1.22	1.05	0.89	**5.32**
IWG/alfalfa	Oahe	2.36	1.13	0.92	1.04	**5.54**
CWG/alfalfa	Hycrest	1.90	1.22	0.87	0.93	**4.94**
TWG/alfalfa	Alkar	2.04	1.25	1.03	1.06	**5.44**
WWG/alfalfa	VNS	1.59	1.33	1.04	0.97	**5.00**
Alfalfa alone	**55v48**	**1.47**	**1.47**	**1.21**	**1.27**	**5.61**
LSD (0.05)		***0.47***		***0.66***		***1.53***
Grass average		**2.18**		**2.79**		**5.00**
Grass/alfalfa average		**1.95**	**1.26**	**1.01**	**1.06**	**5.41**
CV, %		17	17	25	34	7