WISCONSIN - Grass-Legume Proportion in Forage Seed Mixtures and Effects on Forage Yields and Weed Invasion

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Knowledge of how the proportion of grasses and legumes in a forage seed mixture affect production and resistance to weed invasion will be useful in guiding the formulation of forage seed mixtures for farmers. The objective was to test the hypothesis that mixtures with more equal proportions of grasses and legumes in the seed mixture would have greater productivity and fewer weeds than monocultures or mixtures dominated by one or two species. Thirty different mixtures of grasses and legumes (two experiments of 15 mixtures each) were compared for yield along with legume and weed proportion at four sites in Pennsylvania and Wisconsin for three years. The results did not support the hypothesis that seed mixtures with more equal proportions of forage species would perform better than mixtures dominated by one or two species. Overall, grass-legume mixtures had less weed invasion than grass or legume monocultures. Mixtures also produced as much as or more biomass than nitrogen-fertilized grass monocultures. Optimal legume proportions of 30-40% or greater were achieved with a wide range of seed mixtures containing different grass and legume proportions. This indicates farmers have wide flexibility in formulating seed mixtures for specific locations and to achieve specific functions in their forage operations.

Table 1. Forage yields of selected monocultures and mixtures of grasses and legumes averaged over three years at two sites each in Pennsylvania and Wisconsin[1]. Grass monocultures received 100 lb of N in spring.

Monoculture or Mixture	Pennsylvania		Wisconsin	
	Site 1	Site 2	Site 1	Site 2
	------*lbs forage/ac*------			
Orchardgrass (OG) monoculture	6,900	3,900	6,700	5,900
Alfalfa (AL) monoculture	7,800	3,500	7,900	5,800
Meadow fescue (MF) monoculture	6,000	3,600	5,900	6,500
Red clover (RC) monoculture	8,300	3,500	7,300	4,800
OG/AL/QK/WC (70/10/10/10)[2]	6,900	3,200	6,000	4,900
OG/AL/QK/WC (40/40/10/10)	7,500	3,700	6,900	5,700
OG/AL/QK/WC (25/25/25/25)	7,200	3,700	6,700	5,900
MF/RC/RG/KC (70/10/10/10)	7,500	3,000	6,200	5,700
MF/RC/RG/KC (40/40/10/10)	7,900	3,400	6,900	6,600
MF/RC/RG/KC (25/25/25/25)	8,400	3,400	6,800	6,000

[1]Two experiments were conducted with 15 mixtures or monocultures of orchardgrass, alfalfa, quackgrass (QK), and white clover (WC; experiment 1). In experiment 2, there were 15 mixtures or monocultures of meadow fescue, red clover, reed canarygrass (RG), and kura clover (KC).
[2]Percentage of species in each mixture.