NORTH DAKOTA - Mixtures Suppress Weeds during Establishment Better than Monocultures

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Species proportion in seeded mixtures could affect weed invasion. The hypothesis was that forage mixtures with even species proportion would reduce weed invasion during establishment better than mixtures dominated by a few species or monocultures.

Fifteen mixtures and monocultures of 'Baridana' orchardgrass (bunch), 'Everett' quackgrass (rhizomatous), 'Winter' alfalfa (erect), and 'Will' white clover (stoloniferous) were sown in Autumn 2008 at four locations in Pennsylvania and Wisconsin (Table 1). There were four monocultures, four mixtures dominated by one species, six mixtures dominated by pairs of species, and one equal mixture. Weed presence was measured in 2009.

Grass-legume mixtures resisted weed invasion better than monocultures. In contrast to the hypothesis however, within mixtures, species proportion did not influence weed invasion, nor did it affect resource use as measured by light interception and soil inorganic N levels. Individual species had a strong effect because weed proportions decreased as orchardgrass proportion of the seed mixture increased. Selecting appropriate species to use in mixtures is more important than the proportions of the species in the mixture.

Table 1. Percentage weeds in harvested forage in 2009 from 15 monocultures and mixtures seeded August 2008 in PA and WI (averaged over May, July, and September 2009 samplings).

Species	Monoculture or Mixture	Pennsylvania 2 sites (%)	Wisconsin 2 sites (%)
Monocultures	Orchardgrass (OG)	10	5
	Quackgrass (QK)	38	17
	Alfalfa (AL)	32	23
	White Clover (WC)	25	27
4-Species Mixtures Dominated by 1 species	70 OG:30 QK/AL/WC	10	10
	70 QK:30 OG/AL/WC	14	12
	70 AL:30 OG/QK/WC	7	15
	70 WC:30 OG/QK/AL	16	16
4-Species Mixtures Dominated by 2 Species	80 OG/QK:20 AL/WC	15	15
	80 OG/AL:20 QK/WC	7	7
	80 OG/WC:20 QK/AL	7	11
	80 QK/AL:20 OG/WC	11	11
	80 QK/WC:20 OG/AL	11	22
	80 AL/WC:20 OG/QK	5	16
4-Species Equal Mixture	25 OG:25 QK : 25 AL:25 WC	5	13

In mixtures dominated by one species, the other three species were included at 10% each. In mixtures dominated by two species, each dominant species was included at 40% each, remaining species were included at 10% each.