Closing the Alfalfa Yield Gap

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Alfalfa is one of the most important forages in Wisconsin and the USA, providing forage of high nutritive value to the dairy and beef industry and several ecosystem services. However, there is a yield gap of two- to threefold between average and top-tier producers in most states. This project aimed to identify fields with high yields in Wisconsin and the management practices associated with them through an in-depth questionnaire for farmers. We surveyed 19 farmers comprising 30 fields with a mean yield of 3.7 ton DM/ac. Alfalfa yield of second-year stands, and alfalfa used for silage had higher yields than others, as expected. We divided the fields based on their yield as high (>4 ton/ac), medium (2-4 ton/ac), and low (<2 ton/ac). The management practices that show elevated association with higher yields were the application of manure in the seeding year despite the date or dose, instead of Phosphorus (P), Sulfur (S), or Potassium (K), herbicides for weed control in the first year, fertilization with Calcium (Ca) + S (mostly Gypsum) and K in the second year and harvesting for silage (vs hay). However, other significant variables that should be taken into consideration in the stand management like the type or variety (RR or not), grass intercrop, organic management, previous crop, age of the stand, tillage, seeding date, insecticide application in the first year, date of application and dose of manure in the first year, and fertilization with Ca, nitrogen (N) or Boron in the first year, were less important at the moment of the definition of the alfalfa yields in this research. This study was useful to test the survey form for a larger study of alfalfa soil health indicators that will help to understand the best management practices and their interaction with the productivity of the fields.

Table 1. Frequency (%) of management practices associated with alfalfa Yield tier.

		Yield tier*			
		High	**Medium**	**Low**	**Total**
Manure application in the first year	No	8	36	100	31
	Yes	92	64	0	69
Weed control in the first year	No	0	71	100	45
	Yes	100	29	0	55
Fertilization with P in the first year	No	92	86	33	83
	Yes	8	14	67	17
Fertilization with S in the first year	No	75	79	0	69
	Yes	25	21	100	31
Fertilization with K in the first year	No	67	64	0	59
	Yes	33	36	100	41
Fertilization with K in the second year	No	33	57	100	52
	Yes	67	43	0	48
Fertilization with Ca + S in the second year	No	42	79	100	66
	Yes	58	21	0	34
Harvest method	Hay	0	50	100	34
	Silage	100	50	0	66

*High: > 4 ton/ac; Medium: 2 to 4 ton/ac; Low: < 2 ton/ac.