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Alfalfa Yields from Mixtures of Dormant and Non-dormant Varieties

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Abstract
During the establishment year, alfalfa seedings typically yield only 40-60% of fully established stands. All alfalfa varieties grown in Iowa are classified as dormant or moderately dormant, a characteristic that is important for winter survival. However, as plants become dormant in late summer, their yield declines. Alfalfa varieties from the southwestern United States are non-dormant and continue to grow until the autumn freeze, but tend to die over winter. The objective of this experiment was to determine if including a proportion of non-dormant seed at planting could improve establishment year yield without affecting successive year yields or forage quality. The rationale for this experiment is that more plants are present in the first year of a stand than in successive years when individual plants grow larger as their crowns expand. Because of normal plant loss, we reasoned that death of non-dormant plants after the first winter might not adversely affect the yields of the remaining stand.

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Introduction

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Materials and Methods

To test our hypothesis, we grew two dormant varieties (Vernal and 5454) in various combinations with two non-dormant varieties (Mecca II and 5939). Entries included each variety grown in a pure stand and mixtures including 10, 30 and 50% non-dormant seed. To limit the number of combinations, Vernal was mixed with Mecca II and 5454 with 5939. The experiment was planted in April 1998 with a drill at a rate of 18 lb/A. Each variety and variety mixture was replicated four times in a randomized complete block design. Plot size was 3’ x 12’. The test was harvested four times in 1998 (July, August, September, October), and four times in 1999 (June, July, August, September) using a sickle bar harvester. Fertility was maintained according to ISU soil test recommendations. The test was sprayed to control potato leafhoppers.

Results and Discussion

The two different mixtures (Vernal/Mecca II and 5454/5939) performed similarly; therefore, the results reported are average values. Both at the beginning and end of 1998, the establishment year, plant numbers were similar for all plots. In 1998, average total dry matter yields were similar for all plots (Table 1). Plots with low percentages of non-dormant seed yielded more at first harvest. The yield advantage of non-dormant varieties was only in the September and October harvests, showing their ability to grow during autumn. Even the planting of 50% of the seed as a non-dormant variety did not improve first year yields. After the mild winter of 1998, substantial yield declines were seen in all mixtures relative to pure stands of the adapted dormant varieties in the first, second and third harvests of 1999. The non-dormant mixtures and pure stands produced yields similar to the dormant pure stands in the 4th harvest in 1999, but this was due in part to weed encroachment. Including only 10% non-dormant seed at planting reduced the yield in the first full production year. Adding a proportion of non-dormant seed at planting will not improve seeding year yields and will depress forage yield in subsequent years.

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Table 1. Dry matter alfalfa yields for plots containing from 0% to 100% non-dormant seed; test seeded in April 1998.

Non-dormant	1998					1999				
seed in mix	July	August	Sept.	Oct.	Total	June	July	Aug.	Sept.	Total
--%--	tons dry matter/acre									
0	2.25	1.92	2.00	1.38	7.56	3.00	1.86	0.46	0.89	6.22
10	2.19	1.94	2.05	1.54	7.71	2.74	1.76	0.44	0.87	5.81
30	2.15	1.94	2.00	1.67	7.75	2.35	1.47	0.43	0.85	5.10
50	2.04	1.86	1.94	1.78	7.62	1.77	1.15	0.38	0.81	4.11
100	1.92	1.87	1.93	1.89	7.62	0.49	0.49	0.20	0.56	1.73
Mean	2.11	1.91	1.99	1.65	7.65	2.07	1.35	0.38	0.80	4.59
LSD (P=0.05)	0.12	ns	ns	0.09	ns	0.16	0.14	0.08	ns	0.33