

Alfalfa Longevity: Key Factors

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Poor longevity is a major factor reducing the use of alfalfa for grazing in the northern Great Plains. Plant traits important to survival are often masked in standard yield trials since tests are often conducted at relatively high producing sites and maintained for relatively short 3-5 year periods. Survival and yield of 25 alfalfa varieties and experimental strains were evaluated in 7-year old stands that had been interseeded into semi-arid rangeland at the USDA-ARS Northern Great Plains Research Lab (Mandan, ND). Entries were grouped as follows: I – plant spread by rhizome and root proliferation (8 entries); II – plant spread by rhizome proliferation (4 entries); and III – typical hay-type alfalfas with narrow plant crown and relatively rapid recovery after cutting (13 entries). The objective was to determine plant traits important to survival.

Yellow-flowered *Medicago falcata* parentage is prevalent in all entries in Groups I and II. All entries in Groups I and II had a branched root system and a broad, low-set crown. Root proliferation, found only in Group I, results from new plant shoots arising at irregular intervals on horizontal roots located 4-8 inches below the soil surface. In Group II, new plant shoots were produced from short horizontal stems (rhizomes) that arose from a low-set crown. Entries in Group III had a high percentage of purple-flowered *Medicago sativa* parentage, which resulted in a tap root system, relatively narrow and high-set crowns, and

Group	Years after seeding			DM ton/ac
	--plants per square yard--			
	1	2	7	
I. Rhizome and root proliferation	8.1a	4.3a	5.8a	2.5a
II. Rhizome proliferation	8.0a	3.9a	4.0b	2.1b
III. Narrowcrown	7.4a	3.8a	2.6c	1.4c

a-c Means followed by a different letter are significantly different at P=0.05

more rapid regrowth after cutting or grazing than entries in Groups I and II. One cutting of hay was harvested each year followed by light grazing in the fall.

No stand differences were found among Groups I, II, and III in the first 2 years following establishment. Seven years after, all but one entry in Group I had stand density increase compared to year 2. Stand density in Group II remained stable, while most entries in III declined. Dry matter yields were highest in Group I and lowest in III. High survival traits include spread by root proliferation; broad, deep-set crowns; and high levels of drought- and cold-induced dormancy. All are found in yellow-flowered *M. falcata* alfalfa, but seed yield is low. Populations with apx. 75% yellow-flowered parentage and 25% purple-flowered parentage have been developed. The goal is to improve seed yields to economic levels, while maintaining survival mechanisms. Seed increase of an experimental population is underway with release expected in three years.