

# Development of Grazing-tolerant Alfalfa for the Southwest

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Because of its high feed value, adaptability and soil-building capabilities, alfalfa is considered one of the most valuable components of multiple species pastures. However, alfalfa may not remain a stable component of many pastures due to its palatability and disproportionate consumption by grazers. It was recognized long ago that winter-dormant alfalfas, which regrow slowly following harvest and have large crowns and root systems, are better able to survive the stresses of grazing. In fact, many of the best grazing alfalfas are highly winter dormant, growing actively only from about May to September.

## *A special trait conferring "grazing tolerance"*

Many prostrate, winter-dormant alfalfa varieties are also able to produce new shoots on root tissue, a response that allows regrowth and survival should the entire aboveground portion of the plant be consumed. Varieties expressing this survival response are often referred to as "creeping-rooted". New shoots are produced in gradually enlarging concentric circles as the plant ages; they appear to "creep" away from their original parental plant. However, since traditional creeping-rooted (CR) varieties are very winter-dormant, they are of little use in pastures at low elevations in the Southwest where seven to eleven months of alfalfa growth is typical. Transfer of the CR trait to less dormant genetic backgrounds could lead to the production of a grazing-tolerant variety for the Southwest.

## *The plant breeding strategy:*

In 1985, we began a conventional plant breeding program with the goal of producing a nondormant alfalfa that expressed creeping rootedness. Plants from four CR varieties were crossed with the nondormant hay-type variety CUF 101; roughly 3,500 hybrids were planted in a field nursery. In 1986, these plants were dug and their roots scored for the presence of CR. Selected plants that expressed the CR trait and exhibited good winter growth were interpollinated, as well as backcrossed to their CR parents. Approximately 750 progenies resulting from these crosses were again planted in the field in 1987. A total of 147 of these plants were selected in 1988, based on winter forage production, seed production, and expression of CR. These plants have been interpollinated to produce an experimental nondormant CR population for further testing.

Data collected so far in this breeding program suggests that a grazing-tolerant alfalfa for Arizona may soon be available. The selected parental plants expressed creeping rootedness that approached that of their dormant, CR parents. Importantly, these selected plants also exhibited winter growth (nondormancy) similar to their hay-type parents (Table 1).

**Table 1.** Scores for creeping rootedness (CR) and winter growth for hay-type alfalfas, CR parents, and the selected and unselected hay-type + CR hybrids.

Population	Mean CR score <sup>1</sup>	Winter growth <sup>2</sup>
Original parents		
Hay-type parents	1.1	3.7
CR parents	4.0	1.2
Hybrids		
Selected plants <sup>3</sup>	3.2	2.7
Unselected plants	2.3	2.2

<sup>1</sup> Scale: 1=not creeping rooted, 4=excessive creeping rootedness.

<sup>2</sup> Scale: 1=poor winter growth, 4=excellent winter growth.

<sup>3</sup> Represents the 147 plants intercrossed to produce nondormant creeping-rooted population for testing.

More improvement will be necessary, however, before this population is available for wide release. For example, we will need to determine, and possibly improve, levels of resistance to the spotted alfalfa aphid in the CR population. Selection for seedling drought resistance will also be conducted to improve establishment under the harsh environmental conditions encountered in pastures. Even with further improvements, a winter-growing, creeping-rooted population produced using conventional plant breeding should be available