

## SUMMER GRASSES IN ALFALFA

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**Abstract:** Summer annual grasses in alfalfa are common in the Lower Colorado River Desert. This paper presents data to show that these grasses are colonizing vacant areas in alfalfa fields, rather than being invasive species that compete directly with the crop. Weed management, therefore, should focus on maintaining a vigorous, dense alfalfa crop, instead of on herbicide systems.

**Keywords:** summer annual grasses, weeds, linear correlations, competition, herbicides.

### INTRODUCTION

Most alfalfa fields in the Lower Colorado River Desert are infested with summer annual grasses, particularly junglerice, barnyardgrass, and cupgrasses. By August, if not controlled, the level of infestation can get very heavy; it is not unusual for the grass to be 50 to 70% of the forage yield. Controlling this grass can be accomplished by a combination of good agronomic practices and herbicides. When the price of alfalfa hay is low, as it is at present, many growers wonder if the benefit of using a herbicide is greater than the loss incurred from the weeds. They also wonder about the long-term consequences of not controlling these grasses. The purpose of this paper is to present some information on these subjects.

### ALFALFA AGRONOMY AND WEEDS

In 1909, J. E. Wing, writing in Alfalfa Farming in America, stated that, "when the soil is made right and a good stand of alfalfa secured one need give weeds little thought. It is ten times better to spend effort making soil conditions right than to spend it in fighting weeds." Wing's advice is sound and is as applicable today as it was 83 years ago. This concept, backed up by scientific research, has been presented to alfalfa growers by several authors over the years (1,2,3). In the Lower Colorado River Desert farming areas, good agronomic practice for alfalfa production that also reduces weed problems involves harvest schedules, planting dates, controlling equipment traffic, and irrigation management. The references cited have a wealth of information and recommendations on proper alfalfa growing that will optimize yield and reduce weed and other pest problems.

### SUMMER ANNUAL GRASSES; INVADERS OR COLONISTS

When the relationship of summer annual grasses in an alfalfa field is considered, one question has occupied my thoughts for several years, namely whether the grasses are invaders or colonists. Invaders are plants that infringe upon or compete with other species and acquire room for themselves. Colonists, on the other hand, establish themselves in areas in a field left vacant by dead or diseased alfalfa. The answer to this question is import-

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ant, particularly in terms of the "new" concepts of sustainable agriculture and integrated pest management. Invaders must be repelled actively, in this case by herbicides. Colonists, by contrast, can be kept out of a field by not providing space for their colony. Good agronomic practice in alfalfa (i.e. maintaining a strong, vigorous, dense crop) should, therefore, prevent colonization by grasses. The literature already cited seems to support the notion of these grasses as colonists; proper alfalfa growing has been shown to prevent weed problems.

#### RESEARCH PROJECTS

Starting in 1986, I began conducting research into this question of whether summer annual grasses are colonists or invaders. There were two phases to this research. One was to make systematic, quantitative measurements in established alfalfa fields in order to see how alfalfa biomass (yield) related to grass biomass. The other was to use a herbicide to control the grass and to see the resulting effect on alfalfa yield.

The first project took place in 1987 and 1989. Eight established fields were used per year, all with the same grower who did not use any herbicides. Four locations were used per field, with ten subsamples per location. Data collection started with the first cutting of the spring, and continued through the fourth cutting in 1987 and the fifth cutting in 1989. All samples were dried for 72 hours before weighing. When grasses were present, they were separated from the alfalfa before drying. The grasses present were a mixture of junglerice (*Echinochloa colona*) and prairie cupgrass (*Eriochloa contracta*).

The result of this data collection is a series of simple linear correlations between the alfalfa and the grass. Only the fields with grasses were used for these correlations. The basic findings are:

1. The ratio of alfalfa yield at the first cutting (February) to the alfalfa yield at the fourth (July) cutting is constant regardless of the amount of grass present. Correlation coefficients of  $r = .807$  in 1987 and  $r = .698$  in 1989 support this conclusion.

2. The alfalfa yield at the first cutting will predict the grass biomass at the fourth cutting. In this case, the correlation coefficients are ;  $r = -.360$  in 1987 and  $r = -.777$  in 1989. Additionally, the slope of these correlations (b in the formula  $Y = a + bx$ , where Y is the grass biomass and x is the alfalfa biomass) is equal in both years. In other words, the amount of change in the grass biomass caused by a change in the alfalfa biomass is the same both years and this change is determined by the alfalfa before the grass begins to germinate.

These results indicate that the grass is having little direct impact on the alfalfa by competition. If the grass species were invaders, the grassiest fields should have relatively less alfalfa; a conclusion that is not supported by the data. The grassy fields do have less alfalfa, but they had less alfalfa in February, at the first cutting, before the grass had even germinated. Also, the fact that the spring alfalfa yield can predict the level of grass in the summer indicates that the grass is colonizing vacant areas in the field rather than reducing the crop.

The second project compared the effect of grass infestation on alfalfa yield. A series of plots were either treated with a herbicide to control the grasses or not treated. The hypothesis was that killing the grass would increase the alfalfa yields in late summer. This was done in 1990 and 1991 by using sethoxydim (Poast, BASF Corp.) to control emerged grasses in May. In 1992, several treatments, including trifluralin granules (Treflan TR10, Dow Elanco Co.) and an experimental herbicide from Monsanto Co. (MON13200), were applied in March. Data collected in these trials were the biomass of the alfalfa and the grass from the treated and untreated plots.

In these trials there were no differences between the treated and untreated plots for alfalfa biomass ( $P > 0.05$ ), although there were large differences in the grass biomass. The data did not support the hypothesis that eliminating the grass would increase the alfalfa yield. The grass biomass does not decrease the alfalfa yield, but rather is in addition to it. The bottom line is that herbicide use for summer grass control does not increase alfalfa yield, but it does reduce total forage yield. The way to increase summer alfalfa yields is to follow good agronomic practices that maintain a strong crop stand.

#### REFERENCES

1. Hagemann, R.W. and V.L. Marble. 1983. Variety response to cutting schedules in the Imperial Valley. Proceedings, 13th California Alfalfa Symposium.
2. Lehman, W.F. 1979. Alfalfa production in the low desert valley areas of California. University of California, Division of Agricultural Sciences, Leaflet 21097.
3. Norris, R.F. 1985. Effect of cutting frequency and timing of irrigation on growth of alfalfa (*Medicago sativa*) and yellow foxtail (*Setaria glauca*). Proceedings, Western Society of Weed Science, 38:140-141.