LONG TERM WEED MANAGEMENT EFFECTS IN ALFALFA

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ABSTRACT

Five herbicide treatment regimes were applied to spring and fall seeded alfalfa from 1991 to 1995 at two locations, Klamath Falls and Powell Butte, Oregon. Treatments were evaluated by measuring alfalfa crown and weed stand counts, yield, weed content and forage quality of all cuttings each year. Weed control treatment did not affect hay yield at Klamath Falls. Severe weed competition in 1991 caused lower yields in untreated plots in 1992 at Powell Butte. Weed growth was most pronounced in the first cutting at both sites. The presence of weeds did not adversely affect forage quality in any cutting except the first cutting following planting. In all years second cutting hay did not meet dairy quality standards at either location. There were no significant differences in gross returns less herbicide expense in fall planted plots at Klamath Falls. Weed management strategy 2, which included herbicide treatment at establishment and none thereafter resulted in the highest gross returns less herbicide costs in both spring and fall established plots at Powell Butte.

INTRODUCTION

Weeds compete with alfalfa seedlings during establishment and reduce yields and stand longevity by competing with alfalfa plants for nutrients, water, and light (Fischer et al., 1988; and Peters and Liuscott, 1988). Weed control in seedling alfalfa often does not increase total forage quantity, but increases the proportion of alfalfa harvested and improves forage quality and palatability (Fischer et al., 1988; Harvey, 1991; and Temme et al., 1979). Grass or broadleaf weeds with low CP content will reduce the overall nutritional value of the forage (Cosgrove and Barrett, 1987; Holland and Keasar, 1990; Temme et al., 1979). Grass and broadleaf weeds, advancing alfalfa maturity, and reduction in alfalfa leaf to stem ratios can increase forage ADF and NDF values and subsequently reduces forage palatability and digestibility (Temme et al., 1979). Field plots were established at the Central Oregon Agricultural Research Center's Powell Butte site (COARC) and at the Klamath Experiment Station (KES) to evaluate the effect of weed contol on stand longevity, forage quality and profitability.

METHODS

No individual herbicide treatment was selected for this study. Instead, the appropriate herbicide for control of weeds present at each site and year was determined. Dormant season herbicides were rotated to prevent development of herbicide resistance. The following treatments are included for both spring and fall established alfalfa:

(1) a. Best herbicide treatment in establishment stage.
    b. Best herbicide treatment every year after establishment.

(2) a. Best herbicide treatment in establishment stage.
    b. Best herbicide treatment one year after establishment.

(3) a. No herbicide treatment in establishment stage.
    b. Best herbicide treatment every year after establishment.

(4) a. No herbicide treatment in establishment stage.
    b. Best herbicide treatment in year three or four or both as a salvage treatment.

(5) a. No herbicide treatment in establishment stage.
    b. No herbicide treatment thereafter.

These treatments are applied to spring and fall seeded alfalfa. Treatments were evaluated by measuring alfalfa crown and weed stand counts, yield, and forage quality of all cuttings each year. Subsamples were hand-separated to determine weed and alfalfa percentages. Quality was determined with tests for crude protein, acid detergent fiber, digestible dry matter, and neutral-detergent fiber. Gross income was calculated by determining the value of hay produced at each cutting and totaling the value of hay produced throughout the study.

RESULTS AND DISCUSSION

Results at KES. Severe frost eliminated weeds in untreated fall established plots resulting in no difference in weed composition due to herbicide treatment. In 1991, weeds were abundant in the first cutting of fall established plots which received no herbicide treatment at establishment. Weeds present included prickly lettuce, mallow, sowthistle, filaree, and smartweed. There were very few weeds in any plots of the second and third cutting throughout the study, with no differences between treatments. Herbicide treatment at planting significantly reduced the amount of weeds in the establishment year of spring planted plots. Spring established plots had fewer weeds present in the first cutting of 1992 than fall established plots. This trend continued throughout the study.

The presence of weeds did not adversely affect forage quality in any cutting except the first cutting following planting of spring established plots. In all years second cutting hay was considered to be stock hay, while most first and third cutting hay was dairy quality.

There were no significant differences in gross returns less herbicide expense in fall planted plots at Klamath Falls.

Results at Powell Butte. Herbicide application at establishment in both fall and spring established plots decreased total yield by significantly reducing the amount of weeds in the first cutting. Forage from untreated plots were over 50 percent weeds. The weed density at Powell Butte was higher than at Klamath Falls and the effect of herbicide application was more pronounced throughout the study. Severe weed competition in 1991, when alfalfa plants were small and uncompetitive caused lower yields in untreated plots in 1992. Weed growth was most pronounced in the first cutting. However, as the stand aged weeds began to be more prominent in the second and third cuttings.

Forage quality was not adversely affected by the presence of weeds in any cutting except the first cutting following planting of spring established plots. In all years second cutting hay was considered to be stock hay, while most first and third cutting hay was dairy quality.

In 1992 alfalfa stand density in untreated plots was significantly lower than plots receiving herbicide treatment. In 1992 alfalfa density had declined to about 30 plants per ft^2 and there was no difference due to treatment. In 1995 alfalfa stand density of weed management strategy 5, which had received no herbicide treatment dropped to 6 plants per ft^2, significantly lower than herbicide treated plots.

Weed management strategy 2, which included herbicide treatment at establishment and none thereafter resulted in the highest gross returns less herbicide costs in both spring and fall established plots

at Powell Butte. Strategies 1 and 3, which had annual applications of herbicide every year had slightly lower gross returns after herbicide costs than treatments 4 and 5, which had only one or no herbicide applications, respectively. Annual application of herbicide did not increase yield and did not improve price, when using chemical lab analysis as a rating system.

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