

CULTURAL METHODS OF CONTROLLING GRASSY WEEDS

Robert F. Norris
Botany Department
University of California, Davis

In this day of integrated pest management it is imperative that all viable methods of pest management be considered. Herbicides for control of grassy weeds in the summer in California alfalfa do not always provide the level of control desired. For both of these reasons it is desirable to determine if cultural techniques can be used to suppress the summer annual grasses. There are several grasses that invade alfalfa during the growing season, but barnyardgrass (Echinochloa crusgalli (L.) Beauv.) and yellow foxtail (Setaria lutescens (Weigel) Hubb.) are the most serious.

There are many management techniques that can alter invasion of weeds into alfalfa. Basically, any practice that weakens the alfalfa and makes it less competitive will increase weediness. Factors such as variety, fertilizer, soil type, irrigation time and quantity, frequency of cutting, date of last cutting, cutter-bar height, control of other pests (especially insects and vertebrates) can alter alfalfa vigor and hence weed invasion.

A three year experiment has just been terminated at the University of California at Davis in which the influence of timing of cutting and time of irrigation was investigated in relation to invasion of yellow foxtail. The treatments were cutting at 25 days, 31 days, or at 37 days. Superimposed on these were irrigation regimes of 0, 7, or 14 days delay after cutting for the first irrigation. All irrigation regimes included a second irrigation at about 7 days before cutting. Paraquat was applied uniformly over all plots in January each year to control winter annual weeds. Plots were harvested with a front-mounted sycle-bar mower, cutting at about 1 1/2" high.

Alfalfa yields increased with each longer cutting cycle. Season-long alfalfa yield was lowest for the 25-day cutting cycle, and highest for the 37-day cycle; the 31-day cutting cycle alfalfa yield was intermediate. The irrigation regimes did not themselves appear to alter alfalfa yield. At the end of three years the alfalfa stand was much weaker when harvested at 25 day intervals than that harvested at 31 or 37 days.

Cutting frequency had the biggest effect on yellow foxtail invasion. Weed invasion was rapid in the alfalfa cut at 25 days, and the weed caused a severe problem by the last two or three cuttings each year. About one-third of these latter cuttings was composed of yellow foxtail. Broadleaf weeds have also invaded these plots to a much greater degree than those cut at longer intervals. At the 31-day cutting cycle the yellow foxtail invasion was much slower, and did not reach the severity of that for the 25-day cutting cycle; yellow foxtail never exceeded 10% of the yield. There was essentially no invasion of yellow foxtail into plots harvested at the 37 day interval; a few scattered plants were all that were present.

Timing of irrigation had less effect than cutting frequency, but did cause distinct changes in the rapidity of yellow foxtail invasion. Irrigation immediately after cutting (within a few hours) increased invasion by the weed in comparison with delaying 7 days before irrigating. The increased invasion when irrigation was immediately after cutting was most pronounced at the 31-day cutting cycle; with a 25-day cutting cycle the yellow foxtail invasion was so rapid that irrigation did not modify it further, and at the 37-day cycle the weed did not invade to any significant degree. If irrigation was delayed to 14 days after cutting then the yellow foxtail invasion was reduced. With the 25-day cutting cycle the weed was reduced by 50% when irrigation was delayed by 14 days, and at the 31-day cycle the grass was almost totally suppressed.

CONCLUSIONS

Yellow foxtail can be kept out of alfalfa by long cutting cycles (37 days in the southern Sacramento Valley) and by delayed irrigation following cutting where this is feasible. Conversely short cutting intervals (25 days in this study) and irrigation soon after cutting can definitely result in rapid invasion of yellow foxtail, with substantial losses in alfalfa yield and hay quality at the later cuttings.

ACKNOWLEDGEMENTS

I wish to thank Debra Ayres, Dave Smart, and many others who helped irrigate and harvest this time-consuming experiment. Financial support was provided by the Environmental Protection Agency and the United States Department of Agriculture, Grant #71-59-2481-1-2-039-1; without this funding the research could not have been undertaken.