

Graminicides applied post-cutting control grasses in alfalfa (*Medicago sativa*)

C. L. Foy and H. L. Witt

Department of Plant Pathology, Physiology and Weed Science
Virginia Polytechnic Institute and State University
Blacksburg, VA 24061-0331 USA

Summary

CGA-82725 (2-propynyl-2-[4-[(3,5,-dichloro-2-pyridinyl)oxy]phenoxy]propanoate), fluazifop, and sethoxydim at the higher single rates, or repeated, provided suppression of quackgrass [*Elytrigia repens* (L.) Nevski., AGRE], orchardgrass (*Dactylis glomerata* L., DACGL), and tall fescue (*Festuca arundinacea* Schreb., FESAR). With few exceptions, these three herbicides as well as BAS 517 (2[1-(ethoxyimino)butyl]3-hydroxy-5(2H-tetrahydrothiopyran-3-yl)-2-cyclohexen-1-one), clethodim, cloproxydim, fenoxaprop, fluazifop-P, haloxyfop, quizalofop, and SC-1084 (methyl-3-hydroxy-4-[4-[[5-trifluoromethyl-2-pyridinyl]oxy]phenoxy]pentanoate) were highly effective in controlling fall panicum (*Panicum dichotomiflorum* Michx., PANDI), giant foxtail (*Setaria faberi* Herrm., SETFA), barnyardgrass [*Echinochloa crus-galli* (L.) Beauv., ECHCG], and large crabgrass [*Digitaria sanguinalis* (L.) Scop., DIGSA]. Alfalfa yields were not increased with herbicide treatments in many cases. Only sethoxydim plus thifensulfuron reduced alfalfa yields at one location.

Introduction

Weeds continually pose a threat to the production of alfalfa, a valuable and popular perennial forage crop in Virginia. In new plantings, weeds compete strongly with alfalfa for light, moisture, and nutrients (2). Established alfalfa fields develop weed problems as the stand thins and loses vigor or when environmental conditions and harvest dates reduce alfalfa competitiveness (7). Most of the herbicides at rates approved for use in alfalfa in Virginia that are applied as fall or dormant treatments do not provide residual control of annual grasses that may germinate during late-spring and during the summer months (7).

The objective of this research was to evaluate 11 postemergence, grass-selective herbicides applied after the first and/or second cuttings for control of grasses and yield of alfalfa in Virginia. This paper presents a general summary of the results obtained since numerous tables of data cannot be accommodated.

Materials and Methods

Eleven replicated field experiments, involving six varieties of alfalfa, were conducted during 1982 to 1988. Alfalfa fields selected had been established from less than one year to as high as five years. Applications were made to alfalfa and grasses 1.5 to 30 cm in height. Individual plots were 1.8 m wide by 6.1 m long and were replicated three to four times. Treatments (Table 1) were applied with a knapsack sprayer delivering 448 L ha⁻¹ (1982) or with a CO₂-charged hand sprayer delivering 187 to 252 L ha⁻¹ (1983-88). Adjuvants used included: Agri-Dex, Agri-Oil, AL-411F, BASF COC (crop oil concentrate), Dash, and X-77 at 1.25, 1.25, 1.0, 1.0, 1.25, and 0.25% (v/v), respectively.

Table 1. Herbicides and adjuvants used in experiments during 1982-88 in Virginia.

Herbicide	Rate tested (kg ha ⁻¹)	No. of experiments	Adjuvant used
BAS 517	0.06 to 0.28	5	BASF COC or Dash
CGA-82725	0.14 to 0.56	4	AL 411F
Clethodim	0.08 to 0.22	2	Agri-Oil or Agri-Dex
Clopyroxydim	0.28	2	BASF COC
Fenoxaprop	0.14 to 0.56	3	BASF COC or Agri-Dex
Fluazifop	0.14 to 0.56	5	AL 411F or BASF COC
Fluazifop-P	0.14 to 0.56	5	BASF COC or Agri-Dex
Haloxyfop	0.28 to 0.56	6	AL 411F; BASF COC; or Agri-Dex
Quizalofop	0.04 to 0.56	7	AL 411F; BASF COC; Agri-Dex; or X-77
SC-1084	0.28 to 0.84	2	AL 411F or BASF COC
Sethoxydim	0.14 to 0.56	10	AL 411F; BASF COC; or Dash
Sethoxydim + thifensul- furon	0.28 + 0.04	3	X-77 (0.25)

Fresh weights of alfalfa and grasses were recorded from strips 0.9 m wide by 3.0 to 4.6 m long in the center of each plot. Visual estimates of grass control were recorded in some experiments.

Results

CGA-82725, fluazifop, and sethoxydim were the only herbicides evaluated on perennial grasses (quackgrass, orchardgrass, tall fescue). Fresh weights of these grasses were reduced (as compared to the untreated check) at the third cutting by the following treatments: CGA-82725 at 0.56 kg ha⁻¹ after the second cutting or at 0.28 kg ha⁻¹ after both the first and second cuttings; fluazifop at 0.14, 0.28, or 0.56 kg ha⁻¹ after the second cutting or at 0.14 and 0.28 kg ha⁻¹, each after both the first and second cuttings; and sethoxydim at 0.56 kg ha⁻¹ after the first cutting, at 0.14, 0.28 and 0.56 kg ha⁻¹ after the second cutting, and at 0.28 kg ha⁻¹ after both the first and second cuttings.

Fresh weights of annual grasses (fall panicum, giant foxtail, barnyardgrass, large crabgrass) were reduced (as compared to the untreated check) at the next cutting following application of the herbicides (listed in Table 1) in 8 out of the 10 experiments conducted on annual grasses. No annual grasses were present in the forage harvested from many treated plots. In the other two experiments, where CGA-82725, fluazifop, or sethoxydim were applied after the first cutting, fresh weights of annual grasses were reduced at the second cutting. However, applications after the first, second, or both cuttings did not result in such reductions at the third cutting. The period between the second and third cuttings was late in the growing season in these two experiments.

Alfalfa yields were not increased with herbicide treatments in 6 of the 11 experiments. Alfalfa yields were increased with the majority of herbicide treatments in only one experiment.

Sethoxydim plus thifensulfuron reduced alfalfa yields in one experiment.

Discussion

Results of these studies indicate that postemergence, grass-selective herbicides applied alone after cutting are effective against annual grasses and cause no adverse effects on alfalfa yield. Wilson (6) reported that fluazifop and sethoxydim controlled barnyardgrass and yellow foxtail [*Setaria glauca* (L.) Beauv., SETLU] effectively and did not affect seedling alfalfa adversely. Haloxypop also had no adverse effects on seedling alfalfa (4). Sethoxydim applied alone or with 2,4-DB [4-(2,4-dichlorophenoxy)butanoic acid] injured seedling alfalfa, but annual applications did not reduce seed yields in established alfalfa (4). Three species of perennial grasses were suppressed with CGA-82725, fluazifop, and sethoxydim in one of our experiments. Single or repeated applications of fluazifop, haloxypop, and quizalofop resulted in less quackgrass and increased alfalfa yields (5) and late postemergence applications of sethoxydim suppressed quackgrass (3). Alfalfa yields are not always increased with herbicide treatments. The benefits of weed control in alfalfa often are not apparent in forage yields; however, potential benefits exist in increased forage quality (1, 3).

References

1. Cosgrove, D. R. and Barrett, M. (1987). Effects of weed control in established alfalfa (*Medicago sativa*) on forage yield and quality. *Weed Science*, 35, 564-567.
2. Hagood, E. S., Wilcut, J. W., Wilson, H. P., Ritter, R. L. and Webb, F. J. (1990). Weed control in forage crops. In '1990-91 Pest Management Guide for Field Crops'. Publication 456-015 pp. 52-58, Virginia Cooperative Extension Service, Blacksburg.
3. Leroux, G. D. and Harvey, R. G. (1986). Comparison of fall-applied pronamide with spring-applied sethoxydim for quackgrass (*Agropyron repens*) control in established alfalfa (*Medicago sativa*). *Weed Science*, 34, 444-448.
4. Malik, N. and Waddington, J. (1990). Alfalfa (*Medicago sativa*) seed yield response to herbicides. *Weed Technology*, 4, 63-67.
5. Trimmer, M. C. and Linscott, D. L. (1990). Diffusive resistance and transpiration of quackgrass (*Elytrigia repens*) following postemergence herbicides. *Weed Technology*, 4, 824-827.
6. Wilson, R. G. (1986). Weed control in irrigated seedling alfalfa (*Medicago sativa*). *Weed Science*, 34, 423-426.
7. Wolf, D. D. and Foy, C. L. (1984). Alfalfa yield response to a between-cutting contact herbicide. *Crop Science*, 24, 645-648.