PERENNIAL RYEGRASS RESPONSE TO FOLIAR APPLICATION OF BAS 125 11 W PLANT GROWTH REGULATOR, 1998

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Introduction

Perennial ryegrass grown for seed is prone to lodging at the high fertility rates used to maximize seed production. Lodging of the crop can result in increased problems from disease and can reduce the efficacy of pollination. Use of manufactured plant growth regulators (PGRs) to control stem elongation and optimize seed production in cool season grasses had some success in the mid 1980s. Research developed during this period was based on the use of a residual, soil applied PGR in the triazole family (paclobutrazol) that gave reliable control of lodging and was able to improve seed yields. However, due to the longevity of this chemical in the soil, and difficulties in funding registration of chemicals for use on minor crops, use of this family of chemicals is not allowed.

Recent development of new foliar applied PGR type chemicals that readily breakdown in the environment and are effective at controlling rapid stem elongation are being studied to assess their potential for use in grass seed production systems. This experiment was conducted to examine the effect of BAS 125 11 W, a foliar applied PGR manufactured by BASF Corporation on perennial ryegrass grown for seed production.

Procedure

An established stand (planted fall 1994) of 'Buccaneer' perennial ryegrass at Hyslop Crop Science Research Farm was used for this trial. The experiment was treated with 1.6 lb a.i./a diuron in the fall as well as 250 lb/a 16-20-0 fertilizer. Spring N was applied March 9 at 120 lb N/a and April 17 at 30 lb N/a. The experimental design was a randomized complete block replicated four times with five treatments as follows: an untreated check, BAS 125 11 W applied as two single treatments at ½ lb a.i./a on April 21 and May 5, and two split applications (¼ + ¼ lb a.i./a and χ + χ lb a.i./a) on the same dates. PGR treatments were applied at walking speed using a bicycle type 6-foot wide boom sprayer with nozzles at 18 inch spacing. The sprayer operated at 20 psi with XR TEEJET 8003VS nozzles (approx. 30 gal/a water). Plot size was 6 ft x 25 ft. The first (early) application was made at the onset of active internode elongation and during rapid leaf development. The second (late) application was made at about two palpable nodes during rapid internode elongation. Elongation and nodal development was assessed using a weighted average of tiller size and internode expansion from plant samples taken the day of or day prior to treatments.

Plots were sampled (9-inch row samples) at early bloom for fertile tiller counts, length measurements, and above ground biomass weights. Ten inflorescences were also randomly sampled for yield component analysis and spike length measurements. Harvesting was done using a 5 ft wide swather for windrowing and a Hege 180 small plot combine for harvest. Combined seed samples were cleaned using an M2-B clipper cleaner for final cleanout; subsamples of clean seed were taken for 1000 seed weights.

Results

All of the treated plots significantly increased seed yield over the untreated check in Buccaneer perennial ryegrass. Yields in the treated plots were not statistically different from each other. No phytotoxic effects were observed from the foliar applications.

Aboveground biomass was not affected by the PGR treatment nor were the number of fertile tillers per unit area. Floret numbers tended to increased about 15 - 20% (P value <0.10, data not included), but this does not account for the magnitude of yield improvement. The effect on crop lodging was dramatic in relation to the check. The untreated stands were lodging by bloom and were level with the ground at harvest. In contrast, the stand in treated the plots remained upright past bloom and were well into seed fill when plots began lodging. The ¼ + ¼ lb split application gave the best lodging control and before control than a single application of ½ lb. At harvest the treated plots were still off the ground, which allowed for easier windrowing.

Cleanout levels tended to be somewhat lower in the treated plots (P value = 0.11). In addition to improved cleanout, the increase in harvest index indicates better seed set or seed recovery in the crop. Overall tiller length and spike length was reduced an average of 31% across all treated plots (Table 1). This along with reductions in lodging indicate improved conditions for seed set, fill, and harvest.

It should be noted that this trial was conducted on a 4 year old stand and therefore results may be affected by the age of the stand as younger, and first-year, fields often yield at the levels the treated plots did in this trial. But this study shows the significant impact this product has on seed yield in older stands. Experiments will be expanded in 1999 to include new stands of perennial ryegrass, tall fescue and fine fescue to determine the impact this PGR has on seed production in these species.

Acknowledgments: This research was supported in part through funds from BASF Corporation.

Table 1. Effects of foliar applied BAS 125 11 W on seed yield, harvest components, and tiller length in Buccaneer perennial ryegrass, 1998.

Treatment		Seed yield	Seed yield	Aboveground biomass	Fertile tillers	Clean-out	Harvest index	Culm reduction	Lodging score
(lb a.i./a)		(lb/a)	(% of check)	(ton/a)	(no./sq ft)	----------(%)----------			(1-5)[2]
Untreated check		826 b*	100	4.8	177	19	6.7[1]	0 c	5.0 a
Early	Late								
½	0	1502 a	182	4.2	162	13	13.2	27 b	3.4 b
0	½	1621 a	196	5.9	236	16	9.9	30 ab	3.3 b
χ	χ	1598 a	193	5.5	199	17	9.1	29 ab	3.9 b
¼	¼	1731 a	210	4.7	214	13	12.7	39 a	2.0 c

*Means in columns followed by the same letter are not significantly different by Fisher's protected LSD values at P=0.05

[1]Contrast of treated vs untreated significant P=0.05

[2]Lodging score at harvest 1-5: 1 = vertical; 5 = horizontal