

EFFECT OF FOLIAR FERTILIZATION ON
THE SEED PRODUCTION OF MERIT KENTUCKY BLUEGRASS IN 1984

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ABSTRACT

The use of foliar nutrient sprays is an alternative method for getting nutrients into plants rapidly. However, the benefits of the practice to seed production of Kentucky bluegrass have not been demonstrated. In 1984, the Station studied the response of Merit Kentucky bluegrass to applications of two nutrient formulations, High Yield and High K; each applied at the five-pound per acre rate. No statistically significant increase in seed yield was obtained compared to the normal soil fertilization program. There was a significant increase in the number of florets and number of seeds per spikelet at the bottom of the panicle after treatment with High Yield at early boot stage and with High K three-four days after pollination began compared to soil fertilization alone. Perhaps 10-15 lb/A rates of foliar nutrients would increase seed yields.

Foliar feeding of plant nutrients is an established practice with many horticultural and vegetable crops (2). However, the practice has not been adopted for field crops like wheat, corn, soybeans, alfalfa and grasses for seed. Both positive and negative results have been obtained. Limited experimentation by the author has failed to show benefits from applications of foliar nutrients to Baron and Merit Kentucky bluegrass (1). Since there are many aspects or variables involved in the use of foliar nutrients and their subsequent value it was decided to continue the work. An experiment on Merit Kentucky bluegrass was conducted in 1984 to determine the effect of foliar nutrient application at early boot and again after flowering.

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ACKNOWLEDGEMENTS: Appreciation is expressed to Rod Brevig, Technician, Central Oregon Experiment Station, for assistance in this study and to Smith & Ardussi, Inc., 201 Elliott Ave. West, Suite 501, Seattle, Washington 98108 for providing the foliar nutrient concentrates.

MATERIALS AND METHODS

Merit Kentucky bluegrass in its fourth year of seed production at the Madras research site of the Central Oregon Experiment Station was top-dressed with 25-10-0-S-15 at 448 and 390 lbs/A on October 15, 1984, and February 26, 1985, respectively. This soil fertilization program was supplemented by foliar nutrients. The analyses for the two water soluble foliar feed concentrates, High Yield and High K, are shown in Table 1. The treatments were arranged in a randomized complete block design with five replications. Each plot was 7 feet wide x 12 feet long. The kind of foliar nutrient formulation, the stage of plant development, and date of application for each treatment appear in Table 2. The foliar nutrients were applied with a bicycle type sprayer early in the morning when the grass leaves were moist and humidity was high in the grass leaf canopy. The bluegrass had been irrigated 1-2 days before applications. Before harvest, approximately 20 panicles were selected randomly from each plot and stored in a freezer until 10 panicles were chosen from which the spikelets were counted. An area 3.3 feet wide through the center of the plot x 12 feet long was cut by machine early in the morning when dew prevented seed shatter. The cut material was placed in a cotton bag and hung on a line to air dry. All seed was threshed with a stationary machine. Seed weights per plot and quart seed weights were used to calculate seed yield/A and bushel weights, respectively. The number of panicles/1,000² centimeters were obtained from two samples selected randomly along the border of each harvested plot. Four panicles were selected randomly from each panicle number sample for counting the number of florets/spikelet and seeds/floret, each from two spikelets at the bottom, middle, and top of the panicle. The percent seed set was calculated by dividing the number of seeds/spikelet by the number of florets/spikelet and multiplying by 100. Four 100-seed lots per plot were counted by hand and weighed to determine an average 100-seed weight value per plot.

All results were analyzed statistically. Differences between treatments must be larger than the LSD at the 5% level of probability before a significant difference can be claimed.

RESULTS AND DISCUSSION

The three foliar nutrient treatments showed no significant beneficial effect on seed yield, bushel weight, panicles/1,000² cm, seeds/panicle, 100-seed weight, spikelets/panicle, seeds/spikelet, and percent seed set compared to no foliar nutrient application or soil fertilization alone (Table 2). However, there was a significant increase in the number of florets/spikelet for Treatment four compared to Treatment one. And, this increase occurred in the bottom portion of the panicle rather than at the middle or top (Table 3). It is

also interesting to note that there was a significant increase in the number of seeds/spikelet at the bottom of the panicle although the percent seed set was not significant. If one is searching, this treatment comparison may show a trend in favor of Treatment four for an increase in number of fertile tillers/unit area (panicles/1,000² cm), seeds/panicle, spikelets/ panicle, seeds/spikelet, and percent seed set.

Considering trends, for control vs Treatment 4, the magnitude of the difference between these two treatments is either the same or similar for florets/spikelet, seeds/spikelet, and percent seed set at both the bottom and top of the panicle (Table 3). No such "response" appeared for these traits for the middle portion of the panicle. In fact, the percent seed set was 2.1% lower on Treatment 4 than for the control. Since organ differentiation begins near the middle of the panicle and proceeds both toward the base and apex of the panicle at the same time, it may be that the second application of foliar nutrient (High K) should be made sometime before the onset of flowering. Perhaps a positive response could be obtained for the middle portion of the panicle with increases in seed yield.

For the foliar nutrient formulations tested, from 5 to 10 or a high of 15 lbs/A are recommended application rates on some crops so the application rates in this study were on the low side. One could speculate that higher rates of foliar nutrients than tested may show significant benefits. A test to evaluate responses from several high level treatments may be elucidative.

It may be productive to study the response of foliar nutrients applied before or at early boot stage and again after the panicles are fully extruded from the flag leaf but before flowering.

References

1. Nelson, J. Loren. 1984. Effect of Foliar Fertilization on the Seed Production of Baron and Merit Kentucky Bluegrass at Madras, Oregon, in 1982 and 1983. p. 18-23. In Irrigated Crops Research In Central Oregon 1984. Oregon Agricultural Experiment Station Special Report 717. July 1984.
2. Wittwer, S.H., M.J. Bukovac, and H.B. Tukey. 1963. Advances in Foliar Feeding of Plant Nutrients, p. 429-448. In Fertilizer Technology and Usage. Soil Science Society of America, Madison, Wisconsin.

Table 1. Analyses of foliar nutrients applied on Merit Kentucky bluegrass in 1984

Element	High Yield ¹	High K ¹
	-----%-----	
N	15	12
P ₂ O ₅	20	8
K ₂ O	20	30
S	2	2
B	.08	1
Ca	.25	.5
Mn	.10	.1
Fe	.10	.1
Mo	.0005	.0005
Zn	1	1

¹ Application Rate: 5 lbs/A in 25 gal. water/A.

Table 2. Effect of foliar fertilization on seed yield and related characteristics of Merit Kentucky bluegrass, Madras, Oregon, 1984

Trt. No. ¹	Seed Yield (lb/a)	Bu. Wt. (lb)	Panicles Per 1000 cm ²	Seeds Per Panicle	100 Seed Wt. (mg)	Spikelets Per Panicle	Florets Per Spikelet	Seeds Per Spikelet	Seed Set (%)
1	360	24.0	167	244	45.5	94.4	2.79	2.58	92.5
2	400	23.7	198	251	46.0	93.8	2.87	2.68	93.1
3	407	23.8	214	245	45.9	94.4	2.83	2.61	92.1
4	405	23.6	218	267	45.6	97.2	2.93	2.76	94.1
LSD .05	NS	NS	NS	NS	NS	NS	.126	NS	NS
CV (%)	11.6	1.9	21.3	11.1	1.9	9.4	3.2	5.1	3.4

- ¹ Trt. Descriptions:
1. Control (No Foliar Fertilizer).
 2. High Yield Applied At Early Boot, May 3, 1984.
 3. Trt. 2 + High Yield 3-4 Days After Pollination Began, June 8, 1984.
 4. Trt. 2 + High K 3-4 Days After Pollination Began, June 8, 1984.

Table 3. Effect of foliar fertilization on plant height at harvest, florets per spikelet, seeds per spikelet and percent seed set of Merit Kentucky bluegrass, Madras, Oregon, 1984

Trt. No. ¹	HT. (cm)	Florets/Spikelet				Seeds/Spikelet				Seed Set (%)			
		(B) ²	(M)	(T)	AVG.	(B)	(M)	(T)	AVG.	(B)	(M)	(T)	AVG.
1	52.2	2.59	2.78	2.99	2.79	2.32	2.61	2.83	2.58	88.8	93.8	94.6	92.5
2	52.6	2.63	2.88	3.10	2.87	2.39	2.65	2.99	2.68	90.3	92.1	96.3	93.1
3	52.6	2.63	2.84	3.00	2.83	2.43	2.57	2.84	2.61	92.1	89.8	94.4	92.1
4	52.4	2.76	2.85	3.17	2.93	2.57	2.63	3.08	2.76	92.8	91.7	97.1	94.1
LSD .05	3.1	.149	NS	NS	.126	.217	NS	NS	NS	NS	NS	NS	NS
CV (%)	4.3	4.1	4.3	4.8	3.2	6.5	7.4	6.4	5.1	4.5	5.7	3.2	3.4

- ¹ Trt. Description: 1. Control (No Foliar Fertilizer).
 2. High Yield Applied At Early Boot, May 3, 1984.
 3. Trt. 2 + High Yield 3-4 Days After Pollination Began, June 8, 1984.
 4. Trt. 2 + High K 3-4 Days After Pollination Began, June 8, 1984.

² (B), (M), (T) represent the bottom, middle, and top portion of the panicle.