EFFECT OF FOLIAR FERTILIZATION ON THE SEED PRODUCTION OF BARON AND MERIT KENTUCKY BLUEGRASS AT MADRAS, OREGON, IN 1982 AND 1983

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The use of foliar nutrients on a number of economically important crops is an established practice to correct nutrient deficiencies and/or to supplement soil fertilization. However, with Kentucky bluegrass for seed production, the practice is not well established nor are the benefits documented. Therefore, studies were conducted in 1982 and 1983 to determine some effects of foliar fertilization on bluegrass seed production.

MATERIALS AND METHODS

The experiments in both years were conducted at the Central Oregon Experiment Station Madras site on a Madras loam soil.

Experiment I and II. Baron Kentucky bluegrass in its second year of seed production was selected for the test in 1982. The field had been fertilized with 25-10-0-15 (N-P_2O_5-K_2O-S) to supply 70 lb N/A each on October 21, 1981, and December 4, 1981, and 84 lb N/A on February 17, 1982, a crop season total of 224 lb N/A. All applications of foliar nutrients were planned to be supplemental to the soil fertilization program. Three foliar nutrient formulations were applied at recommended rates (Table 1). These treatments along with a non-treated control were arranged in a randomized complete block design with four replications. Each plot was 7 feet wide x 12 feet long. The Leffingwell and Ortho products were each applied as a tank mix in 25 gallons water/A on May 28 (Experiment I). At this time, the Baron bluegrass was 30 centimeters (11.8 inches) tall and the panicles had emerged from only a few tillers. Plant development was defined as the very late boot stage. The Pure-Gro product was not available for application until June 2 so consequently it was not compared with the Leffingwell and Ortho products. Subsequently, results from this treatment were compared only

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Table 1. Quantity of nutrients applied per acre of three different formulations in 1982 on Baron Kentucky bluegrass at Madras, Oregon

Nutrient	Leffingwell[1]	Ortho[2]	Pure-Gro[3]
	lb/A	lb/A	lb/A
N	1.20	.65	1.0100
P_2O_5	.60	.44	.6060
S	.05	-0-	.5050
Ca	.25	-0-	.2525
Mg	.10	.16	.1010
Zn	.10	.68	.1010
Fe	.09	.05	.0505
Mn	.04	.09	-0-
B	.05	-0-	.0505
Cu	-0-	.04	-0-

APPLICATION RATES:

[1]Leffingwell: 1 qt/A of Sorba-Spray MIP (Liquid), 0-10-0 (N-P_2O_5-K_2O) and 5 lb/A of Nutra-Phos N (Wettable Powder), 20-12-0 (N-P_2O_5-K_2O).

[2]Ortho: 1 qt/A (Liquid), 10-20-0 (N-P_2O_5-K_2O) and 5 lb/A Nutrient D (Wettable Powder), 9-4-0 (N-P_2O_5-K_2O).

[3]Pure-Gro: 1 gal/A (Liquid), 10-6-0 (N-P_2O_5-K_2O).

with the non-treated control (Experiment II). On June 2, about 20 panicles were selected at random throughout each plot. From these, 10 panicles were chosen at random and the number of spikelets counted on each. Florets/spikelet from 2 spikelets each at the bottom, middle, and top of four panicles were also counted. An area 3.3 feet wide x 12 feet long of each plot was cut by machine in the early morning when dew prevented seed shatter and placed in a cotton bag and allowed to air dry. All seed was threshed with a stationary machine, delinted, scalped, and cleaned with a M-2B air screen machine. Seed weights per plot and quart seed weights were used to calculate seed yield/A and bushel weights, respectively. After harvest the panicles were clipped at stubble height from a 6-inch wide by 24-inch long strip on the border of each plot and bagged until determination of panicle numbers per square foot could be made. Four 100-seed lots per plot were counted by hand and weighed to obtain an average 100 seed weight value for each plot. The number of seeds/spikelet were calculated from panicles/ft^2, number of spikelets/panicle, and 100 seed weight data. The percent seed set was calculated by dividing the number of seeds/spikelet by the average number of florets/spikelet and multiplying by 100.

All results were analyzed statistically. Duncan's multiple range test at the .05 level of probability was used to test for significant differences among treatments.

Experiment III. Merit Kentucky bluegrass in its third year of seed production was used in the 1983 test. The field was fertilized with 25-10-0-15 (N-P_2O_5-K_2O-S) to give 130 and 60 lb N/A on October 18, 1982, and February 28, 1983, respectively. Foliar nutrient applications were supplemental to the soil fertilization program. Leffingwell Sorba-Spray MIP and Mg with Nutra-Phos N were mixed and sprayed as a tank mix at early boot, late boot, start of pollination, and seed fill. These four stages of growth along with a non-treated control constituted the five treatments which were replicated four times in a randomized complete block design. Quantity and rate of foliar nutrients applied are shown in Table 2. Data from each 7 x 12 foot plot were collected and analyzed in a manner similar to

Experiments I and II. In addition, a germination test on seed from each plot was conducted by the Oregon State University Seed Laboratory.

RESULTS

Experiments I and II. No significant beneficial effect from foliar fertilization as a supplement to soil fertilization was found for any variable that was measured (Table 3).

Experiment III. There was no advantage to foliar fertilizer applications at the four growth stages tested (Table 4).

Table 2. Quantity of foliar nutrients applied per acre* at each growth stage of Merit Kentucky bluegrass at Madras, Oregon, 1983

Nutrient	Sorba-Spray MIP	Sorba-Spray Mg	Powder Nutra-Phos N	Total**
	----------	lbs/A	----------	
N	---	---	1.00	1.00
P_2O_5	.20	.20	.60	1.00
Ca	---	---	.25	.25
Mg	---	.06	.10	.16
S	.05	.06	----	.11
Zn	---	.02	.10	.12
Mn	.04	---	----	.04
Fe	.04	---	.05	.09
B	---	---	.05	.05

* Amount of nutrients/A were calculated from application rates of 1 qt/A each of Sorba-Spray MIP & Mg (Liquids) and 5 lbs/A of Nutra-Phos N (Wettable Powder).

** Total of each nutrient applied at each growth stage.

Table 3. Effects of foliar fertilization on seed yield and related characteristics of Baron Kentucky bluegrass, Madras, Oregon, 1982

Product Source	Seed Yield (lb/A)	Bu. Wt. (lb/bu)	Panicles Per Ft.^{2}	Seeds Per Panicle	100 Seed Wt.(gm)	Spikelets Per Panicle	Florets Per Spikelet	Seeds Per Spikelet	Seed Set (%)
Experiment I									
Leffingwell	1712	21.8	293	149	.0420	125.0 b[1]	3.4	1.2	35.6
CONTROL	1640	21.9	323	132	.0414	140.0 a	3.6	1.0	25.9
Ortho	1556	22.2	322	123	.0412	134.0 ab	3.6	.9	25.8
C.V. (%)	6.7	1.8	17.0	21.5	2.4	5.3	5.9	17.0	23.0
Experiment II									
Pure-Gro	1867	22.3 a[1]	342	139	.0414	130.0	3.4 a[1]	1.1	32.4
CONTROL	1640	21.9 b	323	132	.0414	140.0	3.6 b	1.0	25.9
C.V. (%)	10.2	.6	21.7	23.1	1.3	8.6	2.0	13.9	14.7

[1]Values within the column with different letters are significantly different at .05 level of probability using Duncan's Multiple Range Test.

Table 4. Effects of foliar fertilization at four growth stages on seed yield and related characteristics of Merit Kentucky bluegrass, Madras, Oregon, 1983

Stage of Growth	Seed Yield (lb/A)	Bu. Wt. (lb)	Panicles/ 1000 cm^2	Seeds/ Panicle	100 Seed Wt. (mg)	Spikelets per Panicle	Florets per Spikelet	Seed Set (%)	Germination (%)
Early Boot	550	25.1	222 ab[1]	59	47.1	100	3.1	18.9	93.8
Late Boot	534	24.7	251 ab	51	47.4	98	3.2	16.5	93.8
Anthesis	598	24.3	204 b	71	47.1	101	3.0	23.7	94.3
Seed Fill	593	24.8	265 a	53	47.5	103	2.8	18.6	93.5
CONTROL	583	24.8	265 a	53	47.5	103	2.8	18.6	93.5
C.V. (%)	13.0	2.1	12.3	21.0	1.5	9.7	7.4	22.6	1.3

[1] Values within the column with different letters are significantly different at .05 level of probability using Duncan's Multiple Range Test.