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RESPONSE OF HARD RED SPRING WHEAT, BARLEY, DURUM, AND OATS TO CAROLINA DAKOTA SEED COATING 1984-1985

Introduction

Carolina Dakota seed coating is composed of a starch based water absorbent material and graphite which promotes adhesion to the seed. The coating has a high affinity for water and draws water from the surrounding soil for concentration around the seed. It is claimed to promote germination and stand establishment in small grains, especially under relatively dry soil conditions, and thus increase yields. This theory was tested at Dickinson and Hettinger in 1984 and at five North Dakota locations in 1985 on hard red spring wheat, durum, oats and barley.

Experimental Procedure

A split plot design with four replications was used at Hettinger and Dickinson to test for differences between treated and untreated seed of Marshall and Stoa wheat, Vic durum, Steele oats, and Azure barley at two soil nitrogen levels. Seed was treated at a rate of 1 pound seed coating per 100 pounds of seed. Seeding rates were 1,000,000 live seeds per acre for wheat (approx 1 bu/ac), and 750,000 live seeds per acre for oats and barley (approx 1.5 bu/ac oat and 1.3 bu/ac barley). Sixty pounds of 18-46-0 was broadcast applied to all main plots which served as the fertilizer variable.

Trials at Williston, Minot, and Carrington were designed as randomized complete blocks with 12 replications. These trials tested the response of Stoa wheat, Vic and Lloyd durum, and Bowman and Azure barley to Car-Dak seed coating alone. Seed treatment and planting rates were as previously stated.

All trials were planted with small plots drills having double disk openers. Plots at Hettinger measured 4 feet in width by 20 feet in length. Planting and harvest dates varied with areas according to local weather conditions and optimum

times for seeding and harvest. Weed control followed currently acceptable agronomic procedures. All data were analyzed using Analysis of Variance techniques and differences in treatment means were separated with Dunnett's procedure. (P=.05).

Results and Discussion

Results of the 1985 trials at Carrington and Williston appear in Table 1 and those for Minot are shown in Table 2. Plots containing seed treated with Car-Dak seed coating performed similarly to the untreated control. No differences (P<.05) were observed in the yield, test weight, plant population, or plant height between treated and untreated plots. None of the selected small grains benefited in terms of an increase in yield by treating the seed with Car-Dak seed coating at these three sites in 1985.

Table 1. Yield, Test Weight, and Plant Densities of Selected Cereal Grains Treated with Car-Dak Seed Coating vs. Untreated Controls at 2 North Dakota Locations. 1985.

Experimental Location	Yield (bu/ac)		TW (lbs/BU)~		Plants/ac (x 1000)		Crop Variety	
	Control`	Trt`	Control	Trt	Control	Trt		
Carrington	61.5	61.3	58.4	58.7	786	774	Stoa	hrsw
Carrington	54.4	52.9	61.1	61.6	765	790	Vic	durum
Carrington	76.3	74.7	44.7	44.8	669	669	Azure	barley
Williston	18.5	18.2	55.5	56.2	686	698	Stoa	hrsw
Williston	18.1	18.3	59.6	59.0	543	520	Lloyd	durum
Williston	32.2	32.5	48.8	49.1	650	556	Bowman	Barley

Williston test are observations from 1 rep only. All other data are means of 12 replicates.

Control = seed not treated with Car-Dak seed coating.

Trt = seed treated with Car-Dak seed coating

Table 2. Yield, Test Weight, and Plant Height of Selected Cereal Grains Treated with Car-Dak Seed Coating vs. Untreated Controls at 1 North Dakota Location. 1985.

Experimental Location	Yield (bu/ac)		TW (lbs/bu)		Plant Ht. (inches)		Crop Variety	
	Control`	Trt`	Control	Trt	Control	Trt		
Minot	49.5	49.6	59.4	59.5	30.2	29.9	Stoa	hrsw
Minot	40.6	38.4	60.5	60.3	32.1	32.3	Vic	durum
Minot	57.3	54.6	46.0	46.0	24.8	24.4	Azure	barley

Control = seed not treated with Car-Dak seed coating

Trt = seed treated with Car-Dak seed coating

Data from Dickinson for 1985 and 2 year means are represented in Table 3. Yields and test weights of the tested varieties did not respond to treatment with the seed coating or addition of nitrogen to the soil (P<.05), with one exception. Treating Stoa hard red spring wheat with Car-Dak led to an increase (P<.05) in the yield of Stoa at Dickinson in 1985. This yield increase was observed at both soil nitrogen fertility levels. While yield of Stoa increased significantly, emphasis is placed on the fact that this is only one occurrence out of 7 station years of testing or a total of only 1 significant yield increase out of 23 individual variety tests. Tests will continue in1986 at all five sites to further investigate the effects of Car-Dak seed coating on Stoa wheat and any related increases in yield.

Table 3. Yield and Test Weight of Selected Cereal Grains Treated with Car-Dak Seed Coating vs. Untreated

Controls at 2 Soil Nitrogen Fertility Levels. Dickinson1985.

Variety	Treatment		Yield (bu/ac)		TW (lbs/bu)	
			1985	2 Yr Mean	1985	2 Yr Mean
Marshall hrsw	NO`	TO`	38.7	36.5	59.5	59.4
	NO	T1	37.5	35.3	59.5	59.3
	N1	TO	37.4	36.0	58.5	58.7
	N1	T1	38.9	36.1	58.0	58.7
Steele oat	NO	TO	71.1	67.9	37.5	36.8
	NO	T1	66.6	66.3	38.0	36.7
	N1	TO	66.0	64.1	37.0	36.5
	N1	T1	64.3	61.8	37.5	38.4
Azure barley	NO	TO	81.0	66.8	46.0	47.0
	NO	T1	79.9	66.9	46.5	47.8
	N1	TO	84.3	67.8	46.0	46.8
	N1	T1	85.3	67.0	46.0	46.3
Vic durum	NO	TO	37.6	---	59.5	---
	NO	T1	39.4	---	59.5	---
	N1	TO	42.2	---	59.0	---

	N1	T1	40.3	---	59.0	---
Stoa hrsw	NO	TO	38.7a~	---	58.5	---
	NO	T1	41.2b	---	58.0	---
	N1	TO	40.4a	---	57.5	---
	N1	T1	42.7b	---	57.5	

`NO = No nitrogen fertilizer

N1 = Fertilized with nitrogen

TO = Seed not treated

T1 = Seed treated with Car-Dak

~Means within nitrogen levels followed by different letters are significantly different (P<.05)

The data from Hettinger contained in Table 4 shows much the same results as previously discussed. No significant differences were observed in the yield, test weight, or % grain protein of Marshall wheat, Steele oat, or Azure barley between treated and untreated seed fertilized and unfertilized plots. Droughty conditions throughout the 1985 growing season contributed to relatively low test weights, high % grain proteins, and the inability of the grains to respond to application of nitrogen fertilizer in terms of increased yields. In 1984, Azure barley yielded significantly less when treated with Car-Dak. Such a decrease in yield due to the seed coating did not occur in 1985.

Table 4. Yield, Test Weight, and % Grain Protein of Selected Cereal Grains Treated with Car-Dak Seed Coating vs. Untreated Controls at 2 Soil Nitrogen Fertility Levels. Hettinger 1985.

Variety	Treatment	Yield (bu/ac)		TW (lbs/ac)		% Grain Protein	
		1985	2 Yr Mean	1985	2 Yr Mean	1985	2 Yr Mean

Marshall hrsw	NO~	TO~	20.5	28.6	54.1	56.6	17.5	15.9
	NO	T1	20.3	28.8	53.6	56.5	17.2	15.9
	N1	TO	23.9	33.5	53.8	56.5	17.0	15.6
	N1	T1	20.8	33.4	50.3	54.7	17.7	15.8
Steele oat	NO	TO	36.6	51.6	32.6	33.6	14.6	14.8
	NO	T1	35.8	51.7	32.7	33.7	15.0	15.1
	N1	TO	39.4	57.2	32.2	33.5	15.1	15.1
	N1	T1	37.4	51.8	31.4	33.0	14.8	14.9
Azure barley	NO	TO	38.7	42.4	41.7	44.1	15.3	14.2
	NO	T1	36.0	38.3	41.9	44.0	15.3	14.4
	N1	TO	42.5	50.0	40.6	43.5	15.4	14.4
	N1	T1	41.8	44.1	41.3	43.7	15.4	14.4

~NO = No nitrogen fertilizer

N1 = Fertilized with nitrogen

TO = Seed not treated

T1 = Seed treated with Car-Dak

Conclusions

The majority of data from these 7 station years of testing on Car-Dak seed coating do not support claims that increased yields will be realized by treating the seed of tested small grains. Except for one instance where the seed coating lead to an increase in yield of Stoa wheat at Dickinson, none of the other variety tests (22 of 23 total) provide statistical significance proving a yield benefit resulting from treating the tested small grains with Car-Dak seed coating. An additional year's field research will be conducted before final conclusions are made as to the product's beneficial use for small grain crops in North Dakota.

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