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ANNUAL REPORT

TO

POTASH & PHOSPHATE INSTITUTE

Maximizing Wheat Yields In North Dakota

In A Crop Rotation System

By

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State, Province, or Country North Dakota

1. Are pH levels included as variables in this experiment? Yes _____ No X
 a. If yes, indicate target pH levels and treatments applied:

(Soil Test)

b. If no, what is target pH? 6.1 When was lime applied last? Never

2. If P, K, and Mg are not variables, when was last soil test? Fall 1983
 Indicate levels found:

	VL	L	M	H	VH	lb/A, kg/ha, ppm
P ₂ O ₅	VL	L	M	H <u>X</u>	VH	58 lb/A
K ₂ O	VL	L	M	H	VH <u>X</u>	1098 lb/A
Mg	VL	L	M	H	VH	

3. Were following elements included as experimental variables or as uniform applications in this experiment? Indicate rate(s) for applications made in either manner: (lb/A) or (kg/ha)? Circle one.

Element	Variable	Uniform	Element	Variable	Uniform
N	<u>60 or 180 lb/A</u>		Cu		
P ₂ O ₅	<u>0 or 30 lb/A</u>		Cl		
K ₂ O	<u>0 or 100 lb/A</u>		Fe		
S			Mn		
Mg			Mo		
B			Zn		

Note: 50 lb/A 18-46-0 uniform with N Stabilizer seed at planting.

4. Indicate agricultural chemicals and rates used as experimental variables or as uniform applications: (lb/A) or (kg/ha)? Circle one.

HERBICIDES	Variable	Uniform	INSECTICIDES	Variable	Uniform
Bronate		<u>1 pt/A</u>			

PLANT GROWTH REGULATORS	Variable	Uniform	OTHER	Variable	Uniform
			Dithane M-45	<u>0 or 2 lb/A (2 applications)</u>	
			Vitavax	<u>2 oz/bu</u>	
			Batan	<u>1 oz/bu</u>	

5. Indicate the cultivars used as experimental variables or as uniform

Variable	Uniform	Planting Rate(s)
<u>Vic durum</u>		<u>70 lb/A</u>
<u>Cando durum</u>		<u>70 lb/A</u>



TITLE: Maximizing Wheat Yields in North Dakota in a Crop Rotation System

PROJECT CO-LEADERS:

Dr. E. J. Deibert, Associate Professor - Soil Science Department

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PROJECT COOPERATORS:

Dr. R. Stack, Associate Professor - Plant Pathology Department

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LOCATION:

The experimental site is located on the North Central Experiment station south of Minot, North Dakota. This is the third year of the study with the durum wheat planted on Block 3 of the three year rotation (Durum - Sunflower - Flax). The soil is mainly a Williams loam (fine-loamy, mixed typic argiboroll) with a segment of a Tonka silt loam (fine, montmorillonitic, frigid argiaquic argiaboll) in the north end of replication three and four. Initial chemical and physical properties of the site are reported in the 1982 annual report. The 1984 growing season air temperature and precipitation data are summarized in Table 27 and 28.

OBJECTIVES:

1. Maximize wheat yields in central North Dakota under a crop rotation system utilizing the best current management practices that influence ultimate yield.

2. Identify and quantify those management factors studied or combination of factors that contribute to maximum yields obtained.
3. Equate the chemical properties of the plant and soil and physical condition of the soil to the maximum yields obtained.
4. Evaluate the interaction of the management factors studied with wheat diseases.

PROCEDURE AND RESULTS:

The main wheat experiment was set up in a split-split block arrangement with four replications. Individual unit plots were 24 feet x 24 feet (12 x 24 for yield measurements and 12 x 24 for plant soil and disease sampling). The two main split blocks were fertilizer treatment (F₁, F₂, F₃) and fungicide spray (S₁, S₂) with the spray treatments split by varieties (V₁, V₂). The treatments were as follows:

F₁ = Normal fertilizer rate deep placed based on soil tests and a yield goal of 35 bu/acre.

F₂ = Nitrogen and phosphorus fertilizer rates deep placed based on F₁ soil tests and a maximum yield goal of 80 bu/acre.

F₃ = Same as F₂ except a rate of K₂O broadcast as KCl was applied.

S₁ = No fungicide applied.

S₂ = Fungicide applied at head emergence and subsequently in 10 days.

V₁ = Vic durum (normal height)

V₂ = Cando durum (semidwarf)

A seed treatment variable was added in 1984. The treatments included:

A = seed treated with Vitavax at 2 ounces per bushel

B = seed treated with Baytan at 1 ounce per bushel

Soil tests of samples collected in the fall of 1983 showed only 26 lb NO₃/acre in 2 feet, P = 25 lb/acre and K = 915 lb/acre. The F₁ treatment received a fall application of 60 lb N/acre placed deep as 28-0-0 liquid with no P or K for the 35 bu/acre yield goal. F₂ and F₃ received 180 lbs N/acre and 30 lbs P₂O₅/acre also placed in a deep band utilizing liquid 28-0-0 and 10-34-0. The F₃ treatment received a spring broadcast application of 100 lb K₂O/acre as KCl. No tillage was performed prior to planting with direct seeding into the flax residue. The durum varieties were planted on May 10 with a 70 lb/acre seeding rate utilizing a no-till Haybuster drill with 6-inch row spacing. All plots received 50 lb/acre of 18-46-0 fertilizer with the seed at planting. Broadleaf weed control was achieved with a post application of 1 pt/acre Bronate (bromoxynil + MCPA).

Fungicide (Dithane M-45 at 2 lb/A with 17 gpa water and 45 psi) was applied on July 5 (boot to early heading stage) and July 13 using a small sprayer. Plant samples were collected at the soft dough stage on August 2 for total dry matter production and nutrient analysis. The durum wheat was harvested on August 17 with a small research combine (102 ft² harvested area). Gravimetric soil moisture samples were collected in the spring (April 2) and fall (August 30) for calculating crop moisture use.

The flax area of the rotation (Block 2 - sunflower stubble) was field cultivated once and planted with the Haybuster drill on May 16 with Culbert-79 flax at a rate of 40 lb/acre. No fertilizer was applied to this block area. The area was sprayed with a post application of 1

pt/acre Bronate and 3 pt/acre Hoelon for weed control. The flax was harvested on August 17. Average yields of 18.1, 15.6 and 15.9 bu/acre were obtained for the F₁, F₂ and F₃ previously treated areas. Test weights were 50.0, 48.9 and 51.5 lbs/bushel.

The sunflower area of the rotation (Block 1 - wheat stubble) was fall plowed. A 1 qt/acre of Treflan (trifluralin) was applied (incorporated with two field cultivations) for weed control. Soil tests produced values of NO₃ = 21 lb/acre in 2 ft, P = 24 lb/acre and K = 600 lb/acre on this block. No fertilizer was applied to this block area. The hybrid Jacques 503 was planted on May 30 in 30 inch spacing with a Buffalo-Till planter at a population of 18,000 plants/acre. The sunflower heads were harvested on October 15 and threshed for seed yield. Average yields of 1907, 1924 and 1850 lb/acre and oil content of 46.5, 44.8 and 46.5 percent were obtained for the previously treated F₁, F₂ and F₃ fertilizer treatment areas, respectively. Test weights were 28.8, 29.8 and 29.5 lbs/bushel while final populations were 15,800, 17,500 and 14,900 respectively for the same treatment sequence.

*Why yield depression?
H₂O?*

Statistical analysis of the data was performed on a computer utilizing the SAS procedures with tests of significance by Duncan-Waller K-Ratio T test (Bayes LSD). The data was analyzed separately for each seed treatment and combined in one analysis. Statistical results are summarized in Table 24, 25, and 26.

Plant Growth and Yield

Data on early plant stand counts, days from planting to heading, plant height, total plant dry matter (soft dough stage), grain test weight, 1000 seed kernel weight, grain yield and moisture use by Durum wheat as influenced by fertilizer, variety, fungicide spray and seed

treatment are summarized in Tables 1 through 8, respectively. Plant stand counts indicated no difference due to treatments applied, although the Cando variety had a higher stand than the Vic variety. Fertilizer, fungicide spray or variety did not affect the number of days to heading. The Baytan seed treatment significantly increased heading date (delayed two days). The Baytan seed treatment may have caused a delay in germination or emergence but this is only speculation since dates of emergence were not collected.

Plant height was significantly increased by the two high fertilizer treatments for both varieties. The normal high variety (Vic) showed the largest increase (3 to 4 inches). Total plant dry matter at the soft dough stage was increased on the average by 800 to 1200 pounds/acre by the two maximum fertilizer treatments (F₂ and F₃). Generally the dry matter production was highest where the fungicide had been applied. Seed treatment had no effect on total dry matter production.

Cando durum had lower test weight and kernel weight than the Vic variety. Neither variable was influenced by fertilizer or fungicide treatment. Kernel weight was significantly higher where the planted seed was treated with Baytan as compared to Vitavax. Although grain yields were increased by the higher fertilizer rates (additional nitrogen, phosphorus or potassium), the increases were not significant at the .05 level. The nitrogen fertilizer applied for the F₁ treatment (60 lb N/acre) was higher than required for a 35 bu/acre yield goal as indicated by the 47 bu/acre obtained. Grain yields were not significantly changed by fungicide or seed treatments or significantly different between varieties. Moisture use by the durum varieties was not affected by the fungicide or fertilizer treatments applied. Approximately 3.1

bushels were produced for each inch of moisture used which is less than in 1983 (3.8 bu/inch) but about equal to 1982 results (3.2 bu/inch). Over the last three years, the two maximum fertilizer treatments (F₂ and F₃) have produced slightly more grain (0.2 bu/inch of water used) than the F₁ treatment.

Plant Nutrient Concentrations and Uptake

Nitrogen, phosphorus and potassium concentration and uptake by the durum plants at the soft dough stage (Tables 9 to 14) were significantly increased by the higher applications of nitrogen, phosphorus and/or potassium (F₂ and F₃ treatments). Concentration and uptake by the plants of these three elements were not influenced greatly by variety or seed treatment. Potassium levels were significantly increased in the plant by the application of fungicide. The nitrogen uptake in the F₁ treated plants exceeded 100 lbs/acre indicating a large amount obtained from the residual soil N (not measured in the 2 ft full sample depth) or mineralized during the non-growing season since only 60 lb N/acre was applied as fertilizer (not all available).

The two high fertilizer rates (180 lbs N/acre in F₂ and F₃) increased nitrogen concentration and uptake by the durum seed irrespective of variety (Table 15 and 16). Phosphorus levels in the seed (Table 17 and 18) were not influenced by the treatments imposed. Potassium levels in the seed were not influenced by fertilizer rate or fungicide spray but the Cando variety contained higher levels than the Vic variety (Table 19 and 20). Seed treatment had little influence on concentration or uptake of nitrogen, phosphorus or potassium by the durum plants or seeds.

Foliar and Root Rot Diseases

Leaf spot ratings for tan spot (caused by Pyrenophora trichostoma) is summarized in Table 21. There were distinct differences in severity of tan spot among plots with high severities (rating 8-9) in some plots. However, low severity was not consistently related to protective foliar fungicide. The variability may be a result of non uniform application of the fungicide or a drought stress relationship that over shadowed the leaf spotting stress. Although not significant the average ratings were lower on the Cando variety. Tan spot ratings were significantly lower on the Baytan seed treated plots when compared to the Vitavax seed treatment.

A new durum disease "N" appeared in trace to scattered amounts on Cando. The ratings are given in Table 22. The plots that the "N" disease were observed also had low tan spot ratings. This suggests that the new disease is unresponsive to fungicide and possibly bacterial in origin. Also its pattern of development in the fields resembles that of the bacterial diseases found on wheat in North Dakota. The funding from this project has helped identify the cause of the new durum disease "N" and its nature. Information on this new disease should be published within a year.

In 1984, as in 1982, common root rot ratings were not obtained because subcrown internodes on the plants were absent (caused by shallow planting). Fusarium root rot ratings (based on the incidence of symptomatic plants) were collected (Table 23). Isolations were also made from some of the plants to confirm the presence of Fusarium culmorum which causes root rot. The incidence was very low in 1984, just over one-half of a percent, thus differences are really inconsequential among

the treatments with only a significant difference between varieties. As indicated previously, the combination of a three-year rotation and use of resistant or tolerant varieties keeps root and common rot to a very low level in this experiment.

YIELD LIMITING FACTORS:

The 1984 growing season started out to be ideal with normal temperatures and adequate stored soil moisture. The durum crop looked excellent, however yields obtained were much lower than expected. The below normal precipitation in May and especially July during grain development and filling definitely reduced yields. The excellent early growth coupled with the hot temperatures in late July and early August depletes soil moisture reserves. The cumulative growing degree days (GDD) for 1984 (Figure 1) were similar to those obtained in 1983 with extremely high temperatures during the flowering period (July 8-15) and grain filling period (July 15-August 15). The delay in maturity associated with the Baytan seed treatment was a minor factor since average yields were lower on this treatment as compared to the Vitavax seed treatment.

PLANNED CHANGES FOR NEXT YEAR:

The maximum wheat trial will be continued in 1985 to allow an evaluation of durum planted on an initial durum plot area after completing the 3 year crop rotation cycle. The basic fertilizer plan for the study will remain the same. No fertilizer was applied this fall because of wet conditions. Fertilizer treatments will be applied in the spring. An extensive soil profile sampling will be conducted on the site area to identify the residual N source that consistently gives such excellent yields (in excess of 35 bu/acre) on the F₁ fertilizer treatment. Some

reduction in variable inputs (less plot numbers) and data collection is anticipated. The fungicide treatment will probably be applied to the whole plot area and thus eliminated as a variable. The seed treatment will probably be continued. A change to newer varieties is also being considered for the coming year.

DATA CITATION AND ECONOMIC EVALUATION:

The data as reported is available for use by PPI/FAR, the project supporter. No economic evaluation was conducted on this data.

*Seed size
affects.*

Table 1. Stand of Durum Wheat Plants as Influenced by Fertilizer Treatment, Variety, Fungicide Spray and Seed Treatment: Minot, ND - 1984.

Fertilizer Treatment ^{1/}	Fungicide Spray Treatment ^{2/}						Variety ^{3/}		
	S ₁		Ave.	S ₂		Ave.	V ₁	V ₂	Ave.
	V ₁	V ₂		V ₁	V ₂				
Plants per 3 foot row									
Seed Treatment: Vitavax ^{4/}									
F ₁	26	29	<u>27</u>	27	29	<u>28</u>	26	29	<u>28</u>
F ₂	24	26	<u>25</u>	27	28	<u>27</u>	25	27	<u>26</u>
F ₃	26	26	<u>26</u>	26	30	<u>28</u>	26	28	<u>27</u>
Ave.	25	27	<u>26</u>	26	29	<u>28</u>	<u>26</u>	<u>28</u>	27
Seed Treatment: Baytan ^{5/}									
F ₁	26	29	<u>27</u>	27	29	<u>28</u>	26	29	<u>28</u>
F ₂	24	27	<u>25</u>	27	28	<u>27</u>	25	27	<u>26</u>
F ₃	26	26	<u>26</u>	26	30	<u>28</u>	26	28	<u>27</u>
Ave.	25	27	<u>26</u>	26	29	<u>28</u>	<u>26</u>	<u>28</u>	<u>27</u>

1/Fertilizer treatment

F₁ = Normal fertilizer rate based on soil tests and yield goal of 35 bu/acre (60 lb N/acre deep placed in the fall).

F₂ = Nitrogen (180 lb N/acre) and phosphorus (30 lb P₂O₅/acre) fertilizer rate fall deep placed based on F₁ soil tests and maximum yield goal of 80 bu/acre.

F₃ = Same as F₂ except 100 lb/acre K₂O fertilizer as KCl applied broadcast in the spring.

Note: All treatments received 50 lb/acre 18-46-0 applied with the seed at planting.

2/Fungicide spray treatment

S₁ = No fungicide applied.

S₂ = Fungicide applied in two applications at recommended rates of Dithane M-45 (2 lb/acre). (First applied July 5 and second on July 13 with 17 gpa water at 45 psi).

3/Variety

V₁ = Vic durum (normal height).

V₂ = Cando durum (semidwarf).

4/Seed treated with Vitavax 200 at 2 oz/bu.

5/Seed treated with Baytan at 1 oz/bu.

Table 2. Days to Heading of Durum Wheat Plants as Influenced by Fertilizer Treatment, Variety, Fungicide Spray and Seed Treatment: Minot, ND - 1984.

Fertilizer Treatment ^{1/}	Fungicide Spray Treatment ^{2/}						Variety ^{3/}		
	S ₁		Ave.	S ₂		Ave.	V ₁	V ₂	Ave.
	V ₁	V ₂		V ₁	V ₂				
number									
	Seed Treatment: Vitavax ^{4/}								
F ₁	59	59	<u>59</u>	59	59	<u>59</u>	59	59	<u>59</u>
F ₂	60	60	<u>60</u>	60	59	<u>60</u>	60	60	<u>60</u>
F ₃	59	59	<u>59</u>	60	59	<u>59</u>	59	59	<u>59</u>
Ave.	59	59	<u>59</u>	60	59	<u>59</u>	<u>59</u>	<u>59</u>	<u>59</u>
	Seed Treatment: Baytan ^{5/}								
F ₁	61	60	<u>60</u>	61	61	<u>61</u>	61	60	<u>61</u>
F ₂	61	61	<u>61</u>	61	61	<u>61</u>	61	61	<u>61</u>
F ₃	60	61	<u>61</u>	61	61	<u>61</u>	61	61	<u>61</u>
Ave.	61	61	<u>61</u>	61	61	<u>61</u>	<u>61</u>	<u>61</u>	<u>61</u>

1/Fertilizer treatment

F₁ = Normal fertilizer rate based on soil tests and yield goal of 35 bu/acre (60 lb N/acre deep placed in the fall).

F₂ = Nitrogen (180 lb N/acre) and phosphorus (30 lb P₂O₅/acre) fertilizer rate fall deep placed based on F₁ soil tests and maximum yield goal of 80 bu/acre.

F₃ = Same as F₂ except 100 lb/acre K₂O fertilizer as KCl applied broadcast in the spring.

Note: All treatments received 50 lb/acre 18-46-0 applied with the seed at planting.

2/Fungicide spray treatment

S₁ = No fungicide applied.

S₂ = Fungicide applied in two applications at recommended rates of Dithane M-45 (2 lb/acre). (First applied July 5 and second on July 13 with 17 gpa water at 45 psi).

3/Variety

V₁ = Vic durum (normal height).

V₂ = Cando durum (semidwarf).

4/Seed treated with Vitavax 200 at 2 oz/bu.

5/Seed treated with Baytan at 1 oz/bu.

Table 3. Height of Durum Wheat Plants as Influenced by Fertilizer Treatment, Variety, Fungicide Spray and Seed Treatment: Minot, ND - 1984.

Fertilizer Treatment ^{1/}	Fungicide Spray Treatment ^{2/}						Variety ^{3/}		
	S ₁			S ₂			V ₁	V ₂	Ave.
	V ₁	V ₂	Ave.	V ₁	V ₂	Ave.			
inches									
	Seed Treatment: Vitavax ^{4/}								
F ₁	43.9	32.1	<u>38.0</u>	43.4	34.2	<u>38.8</u>	43.7	33.1	<u>38.4</u>
F ₂	48.0	34.2	<u>41.1</u>	47.4	33.9	<u>40.6</u>	47.7	34.1	<u>40.9</u>
F ₃	47.2	33.6	<u>40.4</u>	46.9	34.1	<u>40.5</u>	47.1	33.8	<u>40.5</u>
Ave.	46.4	33.3	<u>39.8</u>	45.9	34.0	<u>40.0</u>	<u>46.2</u>	<u>33.7</u>	<u>39.9</u>
	Seed Treatment: Baytan ^{5/}								
F ₁	44.0	32.7	<u>38.3</u>	45.9	33.2	<u>39.5</u>	44.9	32.9	<u>38.9</u>
F ₂	47.0	33.3	<u>40.2</u>	48.4	33.4	<u>40.9</u>	47.7	33.3	<u>40.5</u>
F ₃	47.1	34.0	<u>40.6</u>	47.7	34.9	<u>41.3</u>	47.4	34.4	<u>40.9</u>
Ave.	46.1	33.3	<u>39.7</u>	47.3	33.8	<u>40.6</u>	<u>46.7</u>	<u>33.6</u>	<u>40.1</u>

1/Fertilizer treatment

F₁ = Normal fertilizer rate based on soil tests and yield goal of 35 bu/acre (60 lb N/acre deep placed in the fall).

F₂ = Nitrogen (180 lb N/acre) and phosphorus (30 lb P₂O₅/acre) fertilizer rate fall deep placed based on F₁ soil tests and maximum yield goal of 80 bu/acre.

F₃ = Same as F₂ except 100 lb/acre K₂O fertilizer as KCl applied broadcast in the spring.

Note: All treatments received 50 lb/acre 18-46-0 applied with the seed at planting.

2/Fungicide spray treatment

S₁ = No fungicide applied.

S₂ = Fungicide applied in two applications at recommended rates of Dithane M-45 (2 lb/acre). (First applied July 5 and second on July 13 with 17 gpa water at 45 psi).

3/Variety

V₁ = Vic durum (normal height).

V₂ = Cando durum (semidwarf).

4/Seed treated with Vitavax 200 at 2 oz/bu.

5/Seed treated with Baytan at 1 oz/bu.

Table 4. Total Dry Matter of Durum Wheat Plants at the Soft Dough Stage as Influenced by Fertilizer Treatment, Variety, Fungicide Spray and Seed Treatment: Minot, ND - 1984.

Fertilizer Treatment ^{1/}	Fungicide Spray Treatment ^{2/}						Variety ^{3/}		
	S ₁		Ave.	S ₂		Ave.	V ₁	V ₂	Ave.
	V ₁	V ₂		V ₁	V ₂				
pounds per acre									
	Seed Treatment: Vitavax ^{4/}								
F ₁	6985	7042	<u>7014</u>	7724	8199	<u>7961</u>	7354	7620	<u>7487</u>
F ₂	9153	8261	<u>8707</u>	8314	8338	<u>8326</u>	8734	8299	<u>8517</u>
F ₃	8338	7090	<u>7714</u>	8909	8582	<u>8746</u>	8623	7836	<u>8230</u>
Ave.	8159	7464	<u>7812</u>	8315	8373	<u>8344</u>	<u>8237</u>	<u>7918</u>	<u>8078</u>
	Seed Treatment: Baytan ^{5/}								
F ₁	6841	6870	<u>6855</u>	7057	8132	<u>7594</u>	6949	7501	<u>7225</u>
F ₂	9355	8371	<u>8863</u>	8837	7848	<u>8342</u>	9096	8110	<u>8603</u>
F ₃	7585	7738	<u>7661</u>	9139	8525	<u>8832</u>	8362	8132	<u>8247</u>
Ave.	7927	7660	<u>7793</u>	8344	8170	<u>8256</u>	<u>8136</u>	<u>7914</u>	<u>8025</u>

1/Fertilizer treatment

F₁ = Normal fertilizer rate based on soil tests and yield goal of 35 bu/acre (60 lb N/acre deep placed in the fall).

F₂ = Nitrogen (180 lb N/acre) and phosphorus (30 lb P₂O₅/acre) fertilizer rate fall deep placed based on F₁ soil tests and maximum yield goal of 80 bu/acre.

F₃ = Same as F₂ except 100 lb/acre K₂O fertilizer as KCl applied broadcast in the spring.

Note: All treatments received 50 lb/acre 18-46-0 applied with the seed at planting.

2/Fungicide spray treatment

S₁ = No fungicide applied.

S₂ = Fungicide applied in two applications at recommended rates of Dithane M-45 (2 lb/acre). (First applied July 5 and second on July 13 with 17 gpa water at 45 psi).

3/Variety

V₁ = Vic durum (normal height).

V₂ = Cando durum (semidwarf).

4/Seed treated with Vitavax 200 at 2 oz/bu.

5/Seed treated with Baytan at 1 oz/bu.

Table 5. Test Weight of Durum Wheat Grain as Influenced by Fertilizer Treatment, Variety, Fungicide Spray and Seed Treatment: Minot, ND - 1984.

Fertilizer Treatment ^{1/}	Fungicide Spray Treatment ^{2/}						Variety ^{3/}		
	S ₁		Ave.	S ₂		Ave.	V ₁	V ₂	Ave.
	V ₁	V ₂		V ₁	V ₂				
pounds per bushel									
Seed Treatment: Vitavax ^{4/}									
F ₁	60.8	58.2	<u>59.5</u>	61.0	58.0	<u>59.5</u>	60.9	58.1	<u>59.5</u>
F ₂	60.2	57.2	<u>58.8</u>	60.0	56.2	<u>58.1</u>	60.1	56.8	<u>58.4</u>
F ₃	59.5	56.2	<u>57.9</u>	60.0	57.0	<u>58.5</u>	59.8	56.6	<u>58.2</u>
Ave.	60.2	57.2	<u>58.7</u>	60.3	57.1	<u>58.7</u>	<u>60.2</u>	<u>57.2</u>	<u>58.7</u>
Seed Treatment: Baytan ^{5/}									
F ₁	60.5	57.5	<u>59.0</u>	60.5	58.2	<u>59.4</u>	60.5	57.9	<u>59.2</u>
F ₂	60.0	57.8	<u>58.9</u>	60.0	57.5	<u>58.8</u>	60.0	57.6	<u>58.8</u>
F ₃	60.5	57.8	<u>59.1</u>	60.2	57.2	<u>58.8</u>	60.4	57.5	<u>58.9</u>
Ave.	60.3	57.7	<u>59.0</u>	60.2	57.7	<u>59.0</u>	<u>60.3</u>	<u>57.7</u>	<u>59.0</u>

1/Fertilizer treatment

F₁ = Normal fertilizer rate based on soil tests and yield goal of 35 bu/acre (60 lb N/acre deep placed in the fall).

F₂ = Nitrogen (180 lb N/acre) and phosphorus (30 lb P₂O₅/acre) fertilizer rate fall deep placed based on F₁ soil tests and maximum yield goal of 80 bu/acre.

F₃ = Same as F₂ except 100 lb/acre K₂O fertilizer as KCl applied broadcast in the spring.

Note: All treatments received 50 lb/acre 18-46-0 applied with the seed at planting.

2/Fungicide spray treatment

S₁ = No fungicide applied.

S₂ = Fungicide applied in two applications at recommended rates of Dithane M-45 (2 lb/acre). (First applied July 5 and second on July 13 with 17 gpa water at 45 psi).

3/Variety

V₁ = Vic durum (normal height).

V₂ = Cando durum (semidwarf).

4/Seed treated with Vitavax 200 at 2 oz/bu.

5/Seed treated with Baytan at 1 oz/bu.

Table 6. Kernel Weight of Durum Wheat Seed as Influenced by Fertilizer Treatment, Variety, Fungicide Spray and Seed Treatment: Minot, ND - 1984.

Fertilizer Treatment ^{1/}	Fungicide Spray Treatment ^{2/}						Variety ^{3/}		
	S ₁		Ave.	S ₂		Ave.	V ₁	V ₂	Ave.
	V ₁	V ₂		V ₁	V ₂				
grams per 1000									
Seed Treatment: Vitavax ^{4/}									
F ₁	39.3	31.2	<u>35.2</u>	38.8	30.8	<u>34.8</u>	39.0	31.0	<u>35.0</u>
F ₂	40.1	30.5	<u>35.3</u>	39.8	28.6	<u>34.2</u>	39.9	29.5	<u>34.7</u>
F ₃	38.0	28.0	<u>33.0</u>	36.8	27.6	<u>32.2</u>	37.4	27.8	<u>32.6</u>
Ave.	39.1	29.9	<u>34.5</u>	38.5	29.0	<u>33.7</u>	<u>38.8</u>	<u>29.4</u>	<u>34.1</u>
Seed Treatment: Baytan ^{5/}									
F ₁	40.1	30.0	<u>35.0</u>	41.8	31.4	<u>36.6</u>	41.0	30.7	<u>35.8</u>
F ₂	40.8	31.8	<u>36.3</u>	40.6	29.5	<u>35.1</u>	40.7	30.6	<u>35.7</u>
F ₃	39.1	30.2	<u>34.7</u>	38.6	30.4	<u>34.5</u>	38.8	30.3	<u>34.6</u>
Ave.	40.0	30.6	<u>35.3</u>	40.3	30.4	<u>35.4</u>	<u>40.2</u>	<u>30.5</u>	<u>35.4</u>

1/Fertilizer treatment

F₁ = Normal fertilizer rate based on soil tests and yield goal of 35 bu/acre (60 lb N/acre deep placed in the fall).

F₂ = Nitrogen (180 lb N/acre) and phosphorus (30 lb P₂O₅/acre) fertilizer rate fall deep placed based on F₁ soil tests and maximum yield goal of 80 bu/acre.

F₃ = Same as F₂ except 100 lb/acre K₂O fertilizer as KCl applied broadcast in the spring.

Note: All treatments received 50 lb/acre 18-46-0 applied with the seed at planting.

2/Fungicide spray treatment

S₁ = No fungicide applied.

S₂ = Fungicide applied in two applications at recommended rates of Dithane M-45 (2 lb/acre). (First applied July 5 and second on July 13 with 17 gpa water at 45 psi).

3/Variety

V₁ = Vic durum (normal height).

V₂ = Cando durum (semidwarf).

4/Seed treated with Vitavax 200 at 2 oz/bu.

5/Seed treated with Baytan at 1 oz/bu.

Table 7. Grain Yield of Durum Wheat as Influenced by Fertilizer Treatment, Variety, Fungicide Spray and Seed Treatment: Minot, ND - 1984.

Fertilizer Treatment ^{1/}	Fungicide Spray Treatment ^{2/}						Variety ^{3/}		
	S ₁		Ave.	S ₂		Ave.	V ₁	V ₂	Ave.
	V ₁	V ₂		V ₁	V ₂				
bushels per acre									
Seed Treatment: Vitavax ^{4/}									
F ₁	47.7	45.1	<u>46.4</u>	51.1	47.0	<u>49.1</u>	49.4	46.1	<u>47.7</u>
F ₂	51.6	54.8	<u>53.2</u>	53.4	53.2	<u>53.3</u>	52.5	54.0	<u>53.2</u>
F ₃	52.0	46.1	<u>49.0</u>	48.6	49.9	<u>49.2</u>	50.3	48.0	<u>49.1</u>
Ave.	50.4	48.6	<u>49.5</u>	51.0	50.0	<u>50.5</u>	<u>50.7</u>	<u>49.3</u>	<u>50.0</u>
Seed Treatment: Baytan ^{5/}									
F ₁	44.4	42.0	<u>43.2</u>	51.0	44.9	<u>48.0</u>	47.7	43.5	<u>45.6</u>
F ₂	51.7	52.7	<u>52.2</u>	52.4	53.2	<u>52.8</u>	52.0	53.0	<u>52.5</u>
F ₃	49.8	48.1	<u>49.0</u>	50.3	50.5	<u>50.4</u>	50.1	49.3	<u>49.7</u>
Ave.	48.6	47.6	<u>48.1</u>	51.2	49.6	<u>50.4</u>	<u>49.9</u>	<u>48.6</u>	<u>49.3</u>

1/Fertilizer treatment

F₁ = Normal fertilizer rate based on soil tests and yield goal of 35 bu/acre (60 lb N/acre deep placed in the fall).

F₂ = Nitrogen (180 lb N/acre) and phosphorus (30 lb P₂O₅/acre) fertilizer rate fall deep placed based on F₁ soil tests and maximum yield goal of 80 bu/acre.

F₃ = Same as F₂ except 100 lb/acre K₂O fertilizer as KCl applied broadcast in the spring.

Note: All treatments received 50 lb/acre 18-46-0 applied with the seed at planting.

2/Fungicide spray treatment

S₁ = No fungicide applied.

S₂ = Fungicide applied in two applications at recommended rates of Dithane M-45 (2 lb/acre). (First applied July 5 and second on July 13 with 17 gpa water at 45 psi).

3/Variety

V₁ = Vic durum (normal height).

V₂ = Cando durum (semidwarf).

4/Seed treated with Vitavax 200 at 2 oz/bu.

5/Seed treated with Baytan at 1 oz/bu.

Table 8. Total Moisture Use by Durum Wheat Plants as Influenced by Fertilizer Treatment, Variety, and Fungicide Spray: Minot, ND - 1984.

Fertilizer Treatment ^{1/}	Fungicide Spray Treatment ^{2/}						Variety ^{3/}		
	S ₁		Ave.	S ₂		Ave.	V ₁	V ₂	Ave.
	V ₁	V ₂		V ₁	V ₂				
	inches								
	Moisture Use ^{4/}								
F ₁	15.4	15.0	<u>15.2</u>	16.0	16.2	<u>16.1</u>	15.7	15.6	<u>15.6</u>
F ₂	15.7	16.1	<u>15.9</u>	16.3	15.8	<u>16.0</u>	16.0	15.9	<u>16.0</u>
F ₃	16.8	16.6	<u>16.7</u>	16.2	16.3	<u>16.2</u>	16.5	16.4	<u>16.4</u>
Ave.	16.0	15.9	<u>15.9</u>	16.2	16.1	<u>16.1</u>	<u>16.1</u>	<u>16.0</u>	<u>16.0</u>

1/Fertilizer treatment

F₁ = Normal fertilizer rate based on soil tests and yield goal of 35 bu/acre (60 lb N/acre deep placed in the fall).

F₂ = Nitrogen (180 lb N/acre) and phosphorus (30 lb P₂O₅/acre) fertilizer rate fall deep placed based on F₁ soil tests and maximum yield goal of 80 bu/acre.

F₃ = Same as F₂ except 100 lb/acre K₂O fertilizer as KCl applied broadcast in the spring.

Note: All treatments received 50 lb/acre 18-46-0 applied with the seed at planting.

2/Fungicide spray treatment

S₁ = No fungicide applied.

S₂ = Fungicide applied in two applications at recommended rates of Dithane M-45 (2 lb/acre). (First applied July 5 and second on July 13 with 17 gpa water at 45 psi).

3/Variety

V₁ = Vic durum (normal height).

V₂ = Cando durum (semidwarf).

4/Moisture use by the crop is total evapotranspiration as determined by the equation: MU = (initial soil moisture + precipitation - final soil moisture) where soil moisture is determined gravimetrically in the 4-foot soil profile and precipitation is the amount received between initial (preplant) and final (after harvest) soil sampling dates.

Table 9. Nitrogen Concentration of Durum Wheat Plants as Influenced by Fertilizer Treatment, Variety, Fungicide Spray and Seed Treatment: Minot, ND - 1984.

Fertilizer Treatment ^{1/}	Fungicide Spray Treatment ^{2/}						Variety ^{3/}		
	S ₁		Ave.	S ₂		Ave.	V ₁	V ₂	Ave.
	V ₁	V ₂		V ₁	V ₂				
percent									
	Seed Treatment: Vitavax ^{4/}								
F ₁	1.54	1.48	<u>1.51</u>	1.28	1.57	<u>1.42</u>	1.41	1.52	<u>1.47</u>
F ₂	1.48	1.79	<u>1.64</u>	1.40	1.82	<u>1.61</u>	1.44	1.80	<u>1.62</u>
F ₃	1.52	1.76	<u>1.64</u>	1.61	1.80	<u>1.70</u>	1.56	1.78	<u>1.67</u>
Ave.	1.52	1.68	<u>1.60</u>	1.43	1.72	<u>1.58</u>	<u>1.47</u>	<u>1.70</u>	<u>1.59</u>
	Seed Treatment: Baytan ^{5/}								
F ₁	1.35	1.66	<u>1.50</u>	1.62	1.55	<u>1.59</u>	1.48	1.60	<u>1.54</u>
F ₂	1.36	1.67	<u>1.52</u>	1.52	1.73	<u>1.62</u>	1.44	1.70	<u>1.57</u>
F ₃	1.72	1.62	<u>1.67</u>	1.80	1.52	<u>1.66</u>	1.76	1.57	<u>1.67</u>
Ave.	1.48	1.65	<u>1.56</u>	1.65	1.60	<u>1.62</u>	<u>1.56</u>	<u>1.62</u>	<u>1.59</u>

1/Fertilizer treatment

F₁ = Normal fertilizer rate based on soil tests and yield goal of 35 bu/acre (60 lb N/acre deep placed in the fall).

F₂ = Nitrogen (180 lb N/acre) and phosphorus (30 lb P₂O₅/acre) fertilizer rate fall deep placed based on F₁ soil tests and maximum yield goal of 80 bu/acre.

F₃ = Same as F₂ except 100 lb/acre K₂O fertilizer as KCl applied broadcast in the spring.

Note: All treatments received 50 lb/acre 18-46-0 applied with the seed at planting.

2/Fungicide spray treatment

S₁ = No fungicide applied.

S₂ = Fungicide applied in two applications at recommended rates of Dithane M-45 (2 lb/acre). (First applied July 5 and second on July 13 with 17 gpa water at 45 psi).

3/Variety

V₁ = Vic durum (normal height).

V₂ = Cando durum (semidwarf).

4/Seed treated with Vitavax 200 at 2 oz/bu.

5/Seed treated with Baytan at 1 oz/bu.

Table 10. Nitrogen Uptake by Durum Wheat Plants as Influenced by Fertilizer Treatment, Variety, Fungicide Spray and Seed Treatment: Minot, ND - 1984.

Fertilizer Treatment ^{1/}	Fungicide Spray Treatment ^{2/}						Variety ^{3/}		
	S ₁			S ₂			V ₁	V ₂	Ave.
	V ₁	V ₂	Ave.	V ₁	V ₂	Ave.			
pounds per acre									
Seed Treatment: Vitavax ^{4/}									
F ₁	108	104	<u>106</u>	99	130	<u>114</u>	103	117	<u>110</u>
F ₂	136	148	<u>142</u>	116	152	<u>134</u>	126	150	<u>138</u>
F ₃	126	125	<u>125</u>	144	154	<u>149</u>	135	139	<u>137</u>
Ave.	123	125	<u>124</u>	120	145	<u>132</u>	<u>121</u>	<u>136</u>	<u>128</u>
Seed Treatment: Baytan ^{5/}									
F ₁	93	111	<u>102</u>	113	126	<u>119</u>	103	118	<u>111</u>
F ₂	128	140	<u>133</u>	132	135	<u>134</u>	130	137	<u>134</u>
F ₃	130	125	<u>127</u>	162	130	<u>146</u>	145	128	<u>137</u>
Ave.	117	125	<u>121</u>	136	130	<u>133</u>	<u>126</u>	<u>128</u>	<u>127</u>

1/Fertilizer treatment

F₁ = Normal fertilizer rate based on soil tests and yield goal of 35 bu/acre (60 lb N/acre deep placed in the fall).

F₂ = Nitrogen (180 lb N/acre) and phosphorus (30 lb P₂O₅/acre) fertilizer rate fall deep placed based on F₁ soil tests and maximum yield goal of 80 bu/acre.

F₃ = Same as F₂ except 100 lb/acre K₂O fertilizer as KCl applied broadcast in the spring.

Note: All treatments received 50 lb/acre 18-46-0 applied with the seed at planting.

2/Fungicide spray treatment

S₁ = No fungicide applied.

S₂ = Fungicide applied in two applications at recommended rates of Dithane M-45 (2 lb/acre). (First applied July 5 and second on July 13 with 17 gpa water at 45 psi).

3/Variety

V₁ = Vic durum (normal height).

V₂ = Cando durum (semidwarf).

4/Seed treated with Vitavax 200 at 2 oz/bu.

5/Seed treated with Baytan at 1 oz/bu.

Table 11. Phosphorus Concentration of Durum Wheat Plants as Influenced by Fertilizer Treatment, Variety, Fungicide Spray and Seed Treatment: Minot, ND - 1984.

Fertilizer Treatment ^{1/}	Fungicide Spray Treatment ^{2/}						Variety ^{3/}		
	S ₁		Ave.	S ₂		Ave.	V ₁	V ₂	Ave.
	V ₁	V ₂		V ₁	V ₂				
percent									
	Seed Treatment: Vitavax ^{4/}								
F ₁	.175	.172	<u>.174</u>	.148	.172	<u>.160</u>	.161	.172	<u>.167</u>
F ₂	.162	.195	<u>.179</u>	.145	.192	<u>.169</u>	.154	.194	<u>.174</u>
F ₃	.162	.195	<u>.179</u>	.162	.190	<u>.176</u>	.162	.192	<u>.178</u>
Ave.	.167	.188	<u>.177</u>	.152	.185	<u>.168</u>	<u>.159</u>	<u>.186</u>	<u>.173</u>
	Seed Treatment: Baytan ^{5/}								
F ₁	.158	.182	<u>.170</u>	.178	.178	<u>.178</u>	.168	.180	<u>.174</u>
F ₂	.132	.180	<u>.156</u>	.168	.205	<u>.186</u>	.150	.192	<u>.171</u>
F ₃	.202	.185	<u>.194</u>	.190	.182	<u>.186</u>	.196	.184	<u>.190</u>
Ave.	.164	.182	<u>.173</u>	.178	.188	<u>.183</u>	<u>.171</u>	<u>.185</u>	<u>.178</u>

1/Fertilizer treatment

F₁ = Normal fertilizer rate based on soil tests and yield goal of 35 bu/acre (60 lb N/acre deep placed in the fall).

F₂ = Nitrogen (180 lb N/acre) and phosphorus (30 lb P₂O₅/acre) fertilizer rate fall deep placed based on F₁ soil tests and maximum yield goal of 80 bu/acre.

F₃ = Same as F₂ except 100 lb/acre K₂O fertilizer as KCl applied broadcast in the spring.

Note: All treatments received 50 lb/acre 18-46-0 applied with the seed at planting.

2/Fungicide spray treatment

S₁ = No fungicide applied.

S₂ = Fungicide applied in two applications at recommended rates of Dithane M-45 (2 lb/acre). (First applied July 5 and second on July 13 with 17 gpa water at 45 psi).

3/Variety

V₁ = Vic durum (normal height).

V₂ = Cando durum (semidwarf).

4/Seed treated with Vitavax 200 at 2 oz/bu.

5/Seed treated with Baytan at 1 oz/bu.

Table 12. Phosphorus Uptake by Durum Wheat Plants as Influenced by Fertilizer Treatment, Variety, Fungicide Spray and Seed Treatment: Minot, ND - 1984.

Fertilizer Treatment ^{1/}	Fungicide Spray Treatment ^{2/}						Variety ^{3/}		
	S ₁		Ave.	S ₂		Ave.	V ₁	V ₂	Ave.
	V ₁	V ₂		V ₁	V ₂				
pounds per acre									
	Seed Treatment: Vitavax ^{4/}								
F ₁	12.2	12.1	<u>12.1</u>	11.4	14.3	<u>12.8</u>	11.8	13.2	<u>12.5</u>
F ₂	14.9	16.1	<u>15.5</u>	12.1	16.1	<u>14.1</u>	13.5	16.1	<u>14.8</u>
F ₃	13.3	13.8	<u>13.6</u>	14.5	16.4	<u>15.4</u>	13.9	15.1	<u>14.5</u>
Ave.	13.4	14.0	<u>13.7</u>	12.7	15.6	<u>14.1</u>	<u>13.1</u>	<u>14.8</u>	<u>13.9</u>
	Seed Treatment: Baytan ^{5/}								
F ₁	10.9	12.3	<u>11.6</u>	12.2	14.4	<u>13.4</u>	11.6	13.4	<u>12.5</u>
F ₂	12.4	15.0	<u>13.7</u>	14.8	15.9	<u>15.3</u>	13.6	15.4	<u>14.5</u>
F ₃	15.5	14.3	<u>14.9</u>	16.7	15.5	<u>16.1</u>	16.1	14.9	<u>15.5</u>
Ave.	12.9	13.8	<u>13.4</u>	14.6	15.2	<u>14.9</u>	<u>13.8</u>	<u>14.5</u>	<u>14.2</u>

1/Fertilizer treatment

F₁ = Normal fertilizer rate based on soil tests and yield goal of 35 bu/acre (60 lb N/acre deep placed in the fall).

F₂ = Nitrogen (180 lb N/acre) and phosphorus (30 lb P₂O₅/acre) fertilizer rate fall deep placed based on F₁ soil tests and maximum yield goal of 80 bu/acre.

F₃ = Same as F₂ except 100 lb/acre K₂O fertilizer as KCl applied broadcast in the spring.

Note: All treatments received 50 lb/acre 18-46-0 applied with the seed at planting.

2/Fungicide spray treatment

S₁ = No fungicide applied.

S₂ = Fungicide applied in two applications at recommended rates of Dithane M-45 (2 lb/acre). (First applied July 5 and second on July 13 with 17 gpa water at 45 psi).

3/Variety

V₁ = Vic durum (normal height).

V₂ = Cando durum (semidwarf).

4/Seed treated with Vitavax 200 at 2 oz/bu.

5/Seed treated with Baytan at 1 oz/bu.

Table 13. Potassium Concentration of Durum Wheat Plants as Influenced by Fertilizer Treatment, Variety, Fungicide Spray and Seed Treatment: Minot, ND - 1984.

Fertilizer Treatment ^{1/}	Fungicide Spray Treatment ^{2/}						Variety ^{3/}		
	S ₁		Ave.	S ₂		Ave.	V ₁	V ₂	Ave.
	V ₁	V ₂		V ₁	V ₂				
percent									
Seed Treatment: Vitavax ^{4/}									
F ₁	1.03	1.10	<u>1.06</u>	0.95	1.33	<u>1.14</u>	0.99	1.22	<u>1.10</u>
F ₂	1.18	1.36	<u>1.27</u>	1.28	1.52	<u>1.40</u>	1.23	1.44	<u>1.33</u>
F ₃	1.48	1.40	<u>1.44</u>	1.35	1.43	<u>1.39</u>	1.42	1.42	<u>1.42</u>
Ave.	1.23	1.28	<u>1.26</u>	1.19	1.43	<u>1.31</u>	<u>1.21</u>	<u>1.36</u>	<u>1.28</u>
Seed Treatment: Baytan ^{5/}									
F ₁	1.02	1.13	<u>1.07</u>	1.21	1.18	<u>1.20</u>	1.11	1.15	<u>1.13</u>
F ₂	1.34	1.27	<u>1.31</u>	1.29	1.46	<u>1.38</u>	1.32	1.37	<u>1.34</u>
F ₃	1.37	1.43	<u>1.40</u>	1.49	1.41	<u>1.45</u>	1.43	1.42	<u>1.42</u>
Ave.	1.24	1.28	<u>1.26</u>	1.33	1.35	<u>1.34</u>	<u>1.28</u>	<u>1.31</u>	<u>1.30</u>

1/Fertilizer treatment

F₁ = Normal fertilizer rate based on soil tests and yield goal of 35 bu/acre (60 lb N/acre deep placed in the fall).

F₂ = Nitrogen (180 lb N/acre) and phosphorus (30 lb P₂O₅/acre) fertilizer rate fall deep placed based on F₁ soil tests and maximum yield goal of 80 bu/acre.

F₃ = Same as F₂ except 100 lb/acre K₂O fertilizer as KCl applied * broadcast in the spring.

Note: All treatments received 50 lb/acre 18-46-0 applied with the seed at planting.

2/Fungicide spray treatment

S₁ = No fungicide applied.

S₂ = Fungicide applied in two applications at recommended rates of Dithane M-45 (2 lb/acre). (First applied July 5 and second on July 13 with 17 gpa water at 45 psi).

3/Variety

V₁ = Vic durum (normal height).

V₂ = Cando durum (semidwarf).

4/Seed treated with Vitavax 200 at 2 oz/bu.

5/Seed treated with Baytan at 1 oz/bu.

Table 14. Potassium Uptake by Durum Wheat Plants as Influenced by Fertilizer Treatment, Variety, Fungicide Spray and Seed Treatment: Minot, ND - 1984.

Fertilizer Treatment ^{1/}	Fungicide Spray Treatment ^{2/}						Variety ^{3/}		
	S ₁		Ave.	S ₂		Ave.	V ₁	V ₂	Ave.
	V ₁	V ₂		V ₁	V ₂				
pounds per acre									
Seed Treatment: Vitavax ^{4/} 19.4									
F ₁	72	78	<u>75</u>	73	111	<u>92</u>	73	94	<u>84</u>
F ₂	110	113	<u>112</u>	106	127	<u>117</u>	108	120	<u>114</u>
F ₃	125	100	<u>112</u>	118	122	<u>120</u>	122	111	<u>116</u>
Ave.	102	97	<u>100</u>	100	120	<u>110</u>	<u>101</u>	<u>108</u>	<u>105</u>
Seed Treatment: Baytan ^{5/}									
F ₁	70	76	<u>73</u>	84	96	<u>90</u>	77	86	<u>82</u>
F ₂	126	108	<u>117</u>	113	116	<u>115</u>	120	112	<u>116</u>
F ₃	103	111	<u>107</u>	137	122	<u>130</u>	120	117	<u>118</u>
Ave.	100	98	<u>99</u>	112	111	<u>112</u>	<u>106</u>	<u>105</u>	<u>105</u>

1/Fertilizer treatment

F₁ = Normal fertilizer rate based on soil tests and yield goal of 35 bu/acre (60 lb N/acre deep placed in the fall).

F₂ = Nitrogen (180 lb N/acre) and phosphorus (30 lb P₂O₅/acre) fertilizer rate fall deep placed based on F₁ soil tests and maximum yield goal of 80 bu/acre.

F₃ = Same as F₂ except 100 lb/acre K₂O fertilizer as KCl applied broadcast in the spring.

Note: All treatments received 50 lb/acre 18-46-0 applied with the seed at planting.

2/Fungicide spray treatment

S₁ = No fungicide applied.

S₂ = Fungicide applied in two applications at recommended rates of Dithane M-45 (2 lb/acre). (First applied July 5 and second on July 13 with 17 gpa water at 45 psi).

3/Variety

V₁ = Vic durum (normal height).

V₂ = Cando durum (semidwarf).

4/Seed treated with Vitavax 200 at 2 oz/bu.

5/Seed treated with Baytan at 1 oz/bu.

Table 15. Nitrogen Concentration of Durum Wheat Seed as Influenced by Fertilizer Treatment, Variety, Fungicide Spray and Seed Treatment: Minot, ND - 1984.

Fertilizer Treatment ^{1/}	Fungicide Spray Treatment ^{2/}						Variety ^{3/}		
	S ₁		Ave.	S ₂		Ave.	V ₁	V ₂	Ave.
	V ₁	V ₂		V ₁	V ₂				
percent									
Seed Treatment: Vitavax ^{4/}									
F ₁	2.83	2.69	<u>2.76</u>	2.88	2.73	<u>2.80</u>	2.86	2.71	<u>2.78</u>
F ₂	2.96	2.90	<u>2.93</u>	2.98	2.94	<u>2.96</u>	2.97	2.92	<u>2.94</u>
F ₃	2.90	2.89	<u>2.90</u>	3.11	3.19	<u>3.15</u>	3.01	3.04	<u>3.02</u>
Ave.	2.90	2.83	<u>2.86</u>	2.99	2.95	<u>2.97</u>	<u>2.94</u>	<u>2.84</u>	<u>2.92</u>
Seed Treatment: Baytan ^{5/}									
F ₁	2.84	2.75	<u>2.80</u>	2.85	2.74	<u>2.80</u>	2.85	2.75	<u>2.80</u>
F ₂	2.99	2.86	<u>2.92</u>	2.96	2.91	<u>2.94</u>	2.98	2.88	<u>2.93</u>
F ₃	2.98	2.79	<u>2.88</u>	3.10	3.08	<u>3.09</u>	3.04	2.94	<u>2.99</u>
Ave.	2.94	2.80	<u>2.87</u>	2.97	2.91	<u>2.94</u>	<u>2.95</u>	<u>2.86</u>	<u>2.90</u>

1/Fertilizer treatment

F₁ = Normal fertilizer rate based on soil tests and yield goal of 35 bu/acre (60 lb N/acre deep placed in the fall).

F₂ = Nitrogen (180 lb N/acre) and phosphorus (30 lb P₂O₅/acre) fertilizer rate fall deep placed based on F₁ soil tests and maximum yield goal of 80 bu/acre.

F₃ = Same as F₂ except 100 lb/acre K₂O fertilizer as KCl applied broadcast in the spring.

Note: All treatments received 50 lb/acre 18-46-0 applied with the seed at planting.

2/Fungicide spray treatment

S₁ = No fungicide applied.

S₂ = Fungicide applied in two applications at recommended rates of Dithane M-45 (2 lb/acre). (First applied July 5 and second on July 13 with 17 gpa water at 45 psi).

3/Variety

V₁ = Vic durum (normal height).

V₂ = Cando durum (semidwarf).

4/Seed treated with Vitavax 200 at 2 oz/bu.

5/Seed treated with Baytan at 1 oz/bu.

Table 16. Nitrogen Uptake by Durum Wheat Seed as Influenced by Fertilizer Treatment, Variety, Fungicide Spray and Seed Treatment: Minot, ND - 1984.

Fertilizer Treatment ^{1/}	Fungicide Spray Treatment ^{2/}						Variety ^{3/}		
	S ₁		Ave.	S ₂		Ave.	V ₁	V ₂	Ave.
	V ₁	V ₂		V ₁	V ₂				
pounds per acre									
Seed Treatment: Vitavax ^{4/}									
F ₁	71	63	<u>67</u>	77	68	<u>72</u>	74	65	<u>70</u>
F ₂	80	83	<u>81</u>	83	81	<u>82</u>	81	82	<u>81</u>
F ₃	79	70	<u>74</u>	80	84	<u>82</u>	79	77	<u>78</u>
Ave.	76	72	<u>74</u>	80	77	<u>79</u>	<u>78</u>	<u>75</u>	<u>76</u>
Seed Treatment: Baytan ^{5/}									
F ₁	66	60	<u>63</u>	76	65	<u>71</u>	71	63	<u>67</u>
F ₂	81	78	<u>79</u>	81	80	<u>81</u>	81	79	<u>80</u>
F ₃	78	71	<u>74</u>	82	81	<u>82</u>	80	76	<u>78</u>
Ave.	75	70	<u>72</u>	80	76	<u>78</u>	<u>77</u>	<u>73</u>	<u>75</u>

1/Fertilizer treatment

F₁ = Normal fertilizer rate based on soil tests and yield goal of 35 bu/acre (60 lb N/acre deep placed in the fall).

F₂ = Nitrogen (180 lb N/acre) and phosphorus (30 lb P₂O₅/acre) fertilizer rate fall deep placed based on F₁ soil tests and maximum yield goal of 80 bu/acre.

F₃ = Same as F₂ except 100 lb/acre K₂O fertilizer as KCl applied broadcast in the spring.

Note: All treatments received 50 lb/acre 18-46-0 applied with the seed at planting.

2/Fungicide spray treatment

S₁ = No fungicide applied.

S₂ = Fungicide applied in two applications at recommended rates of Dithane M-45 (2 lb/acre). (First applied July 5 and second on July 13 with 17 gpa water at 45 psi).

3/Variety

V₁ = Vic durum (normal height).

V₂ = Cando durum (semidwarf).

4/Seed treated with Vitavax 200 at 2 oz/bu.

5/Seed treated with Baytan at 1 oz/bu.

Table 17. Phosphorus Concentration of Durum Wheat Seed as Influenced by Fertilizer Treatment, Variety, Fungicide Spray and Seed Treatment: Minot, ND - 1984.

Fertilizer Treatment ^{1/}	Fungicide Spray Treatment ^{2/}						Variety ^{3/}		
	S ₁			S ₂			V ₁	V ₂	Ave.
	V ₁	V ₂	Ave.	V ₁	V ₂	Ave.			
percent									
Seed Treatment: Vitavax ^{4/}									
F ₁	.338	.350	<u>.344</u>	.322	.320	<u>.321</u>	.330	.335	<u>.332</u>
F ₂	.338	.338	<u>.338</u>	.340	.348	<u>.344</u>	.339	.342	<u>.341</u>
F ₃	.355	.352	<u>.354</u>	.368	.378	<u>.372</u>	.361	.365	<u>.363</u>
Ave.	.343	.347	<u>.345</u>	.343	.348	<u>.346</u>	<u>.343</u>	<u>.348</u>	<u>.345</u>
Seed Treatment: Baytan ^{5/}									
F ₁	.342	.342	<u>.342</u>	.348	.318	<u>.332</u>	.345	.330	<u>.338</u>
F ₂	.342	.325	<u>.333</u>	.347	.332	<u>.340</u>	.345	.329	<u>.337</u>
F ₃	.360	.325	<u>.342</u>	.370	.352	<u>.361</u>	.365	.339	<u>.352</u>
Ave.	.348	.331	<u>.340</u>	.355	.334	<u>.345</u>	<u>.352</u>	<u>.332</u>	<u>.342</u>

1/Fertilizer treatment

F₁ = Normal fertilizer rate based on soil tests and yield goal of 35 bu/acre (60 lb N/acre deep placed in the fall).

F₂ = Nitrogen (180 lb N/acre) and phosphorus (30 lb P₂O₅/acre) fertilizer rate fall deep placed based on F₁ soil tests and maximum yield goal of 80 bu/acre.

F₃ = Same as F₂ except 100 lb/acre K₂O fertilizer as KCl applied broadcast in the spring.

Note: All treatments received 50 lb/acre 18-46-0 applied with the seed at planting.

2/Fungicide spray treatment

S₁ = No fungicide applied.

S₂ = Fungicide applied in two applications at recommended rates of Dithane M-45 (2 lb/acre). (First applied July 5 and second on July 13 with 17 gpa water at 45 psi).

3/Variety

V₁ = Vic durum (normal height).

V₂ = Cando durum (semidwarf).

4/Seed treated with Vitavax 200 at 2 oz/bu.

5/Seed treated with Baytan at 1 oz/bu.

Table 18. Phosphorus Uptake by Durum Wheat Seed as Influenced by Fertilizer Treatment, Variety, Fungicide Spray and Seed Treatment: Minot, ND - 1984.

Fertilizer Treatment ^{1/}	Fungicide Spray Treatment ^{2/}						Variety ^{3/}		
	S ₁			S ₂			V ₁	V ₂	Ave.
	V ₁	V ₂	Ave.	V ₁	V ₂	Ave.			
pounds per acre									
Seed Treatment: Vitavax ^{4/}									
F ₁	8.3	8.3	<u>8.3</u>	8.6	7.9	<u>8.2</u>	8.4	8.1	<u>8.3</u>
F ₂	8.9	9.6	<u>9.2</u>	9.4	9.6	<u>9.5</u>	9.2	9.6	<u>9.4</u>
F ₃	9.6	8.6	<u>9.1</u>	9.4	9.9	<u>9.6</u>	9.5	9.2	<u>9.4</u>
Ave.	8.9	8.8	<u>8.9</u>	9.1	9.1	<u>9.1</u>	<u>9.0</u>	<u>9.0</u>	<u>9.0</u>
Seed Treatment: Baytan ^{5/}									
F ₁	7.9	7.5	<u>7.7</u>	9.3	7.5	<u>8.4</u>	8.6	7.5	<u>8.1</u>
F ₂	9.1	8.9	<u>9.0</u>	9.5	9.2	<u>9.3</u>	9.3	9.0	<u>9.2</u>
F ₃	9.4	8.2	<u>8.8</u>	9.9	9.3	<u>9.6</u>	9.6	8.8	<u>9.2</u>
Ave.	8.8	8.2	<u>8.5</u>	9.5	8.7	<u>9.1</u>	<u>9.2</u>	<u>8.4</u>	<u>8.8</u>

^{1/}Fertilizer treatment

F₁ = Normal fertilizer rate based on soil tests and yield goal of 35 bu/acre (60 lb N/acre deep placed in the fall).

F₂ = Nitrogen (180 lb N/acre) and phosphorus (30 lb P₂O₅/acre) fertilizer rate fall deep placed based on F₁ soil tests and maximum yield goal of 80 bu/acre.

F₃ = Same as F₂ except 100 lb/acre K₂O fertilizer as KCl applied broadcast in the spring.

Note: All treatments received 50 lb/acre 18-46-0 applied with the seed at planting.

^{2/}Fungicide spray treatment

S₁ = No fungicide applied.

S₂ = Fungicide applied in two applications at recommended rates of Dithane M-45 (2 lb/acre). (First applied July 5 and second on July 13 with 17 gpa water at 45 psi).

^{3/}Variety

V₁ = Vic durum (normal height).

V₂ = Cando durum (semidwarf).

^{4/}Seed treated with Vitavax 200 at 2 oz/bu.

^{5/}Seed treated with Baytan at 1 oz/bu.

Table 19. Potassium Concentration of Durum Wheat Seed as Influenced by Fertilizer Treatment, Variety, Fungicide Spray and Seed Treatment: Minot, ND - 1984.

Fertilizer Treatment ^{1/}	Fungicide Spray Treatment ^{2/}						Variety ^{3/}		
	S ₁		Ave.	S ₂		Ave.	V ₁	V ₂	Ave.
	V ₁	V ₂		V ₁	V ₂				
	percent								
	Seed Treatment: Vitavax ^{4/}								
F ₁	.360	.422	<u>.391</u>	.355	.408	<u>.381</u>	.358	.415	<u>.386</u>
F ₂	.350	.405	<u>.378</u>	.348	.400	<u>.374</u>	.349	.402	<u>.376</u>
F ₃	.365	.430	<u>.398</u>	.398	.465	<u>.431</u>	.381	.448	<u>.414</u>
Ave.	.358	.419	<u>.389</u>	.367	.424	<u>.395</u>	<u>.362</u>	<u>.422</u>	<u>.392</u>
	Seed Treatment: Baytan ^{5/}								
F ₁	.365	.408	<u>.386</u>	.365	.405	<u>.385</u>	.365	.406	<u>.386</u>
F ₂	.342	.400	<u>.371</u>	.335	.395	<u>.365</u>	.339	.398	<u>.368</u>
F ₃	.378	.415	<u>.396</u>	.398	.452	<u>.425</u>	.388	.434	<u>.411</u>
Ave.	.362	.408	<u>.385</u>	.366	.418	<u>.392</u>	<u>.364</u>	<u>.412</u>	<u>.388</u>

1/Fertilizer treatment

F₁ = Normal fertilizer rate based on soil tests and yield goal of 35 bu/acre (60 lb N/acre deep placed in the fall).

F₂ = Nitrogen (180 lb N/acre) and phosphorus (30 lb P₂O₅/acre) fertilizer rate fall deep placed based on F₁ soil tests and maximum yield goal of 80 bu/acre.

F₃ = Same as F₂ except 100 lb/acre K₂O fertilizer as KCl applied broadcast in the spring.

Note: All treatments received 50 lb/acre 18-46-0 applied with the seed at planting.

2/Fungicide spray treatment

S₁ = No fungicide applied.

S₂ = Fungicide applied in two applications at recommended rates of Dithane M-45 (2 lb/acre). (First applied July 5 and second on July 13 with 17 gpa water at 45 psi).

3/Variety

V₁ = Vic durum (normal height).

V₂ = Cando durum (senidwarf).

4/Seed treated with Vitavax 200 at 2 oz/bu.

5/Seed treated with Baytan at 1 oz/bu.

Table 20. Potassium Uptake by Durum Wheat Seed as Influenced by Fertilizer Treatment, Variety, Fungicide Spray and Seed Treatment: Minot, ND - 1984.

Fertilizer Treatment ^{1/}	Fungicide Spray Treatment ^{2/}						Variety ^{3/}		
	S ₁		Ave.	S ₂		Ave.	V ₁	V ₂	Ave.
	V ₁	V ₂		V ₁	V ₂				
pounds per acre									
Seed Treatment: Vitavax ^{4/}									
F ₁	9.1	10.0	<u>9.6</u>	9.6	10.1	<u>9.8</u>	9.4	10.0	<u>9.7</u>
F ₂	9.5	11.6	<u>10.5</u>	9.7	11.1	<u>10.4</u>	9.6	11.4	<u>10.5</u>
F ₃	9.9	10.5	<u>10.2</u>	10.2	12.2	<u>11.2</u>	10.0	11.3	<u>10.7</u>
Ave.	9.5	10.7	<u>10.1</u>	9.8	11.1	<u>10.5</u>	<u>9.7</u>	<u>10.9</u>	<u>10.3</u>
Seed Treatment: Baytan ^{5/}									
F ₁	8.6	8.9	<u>8.7</u>	9.8	9.6	<u>9.7</u>	9.2	9.3	<u>9.2</u>
F ₂	9.3	11.0	<u>10.2</u>	9.2	11.0	<u>10.1</u>	9.2	11.0	<u>10.1</u>
F ₃	9.9	10.5	<u>10.2</u>	10.6	12.0	<u>11.3</u>	10.2	11.3	<u>10.8</u>
Ave.	9.2	10.1	<u>9.7</u>	9.9	10.9	<u>10.4</u>	<u>9.6</u>	<u>10.5</u>	<u>10.0</u>

1/Fertilizer treatment

F₁ = Normal fertilizer rate based on soil tests and yield goal of 35 bu/acre (60 lb N/acre deep placed in the fall).

F₂ = Nitrogen (180 lb N/acre) and phosphorus (30 lb P₂O₅/acre) fertilizer rate fall deep placed based on F₁ soil tests and maximum yield goal of 80 bu/acre.

F₃ = Same as F₂ except 100 lb/acre K₂O fertilizer as KCl applied broadcast in the spring.

Note: All treatments received 50 lb/acre 18-46-0 applied with the seed at planting.

2/Fungicide spray treatment

S₁ = No fungicide applied.

S₂ = Fungicide applied in two applications at recommended rates of Dithane M-45 (2 lb/acre). (First applied July 5 and second on July 13 with 17 gpa water at 45 psi).

3/Variety

V₁ = Vic durum (normal height).

V₂ = Cando durum (semidwarf).

4/Seed treated with Vitavax 200 at 2 oz/bu.

5/Seed treated with Baytan at 1 oz/bu.

Table 21. Tan Spot Disease Ratings of Durum Wheat Plants as Influenced by Fertilizer Treatment, Variety, Fungicide Spray and Seed Treatment: Minot, ND - 1984.

Fertilizer Treatment ^{1/}	Fungicide Spray Treatment ^{2/}						Variety ^{3/}		
	S ₁			S ₂			V ₁	V ₂	Ave.
	V ₁	V ₂	Ave.	V ₁	V ₂	Ave.			
numerical rating ^{6/}									
Seed Treatment: Vitavax ^{4/}									
F ₁	6.4	5.0	<u>5.7</u>	4.4	3.9	<u>4.1</u>	5.4	4.4	<u>4.9</u>
F ₂	3.6	3.0	<u>3.3</u>	3.7	3.6	<u>3.7</u>	3.7	3.3	<u>3.5</u>
F ₃	5.1	3.8	<u>4.4</u>	7.2	5.5	<u>6.4</u>	6.2	4.6	<u>5.4</u>
Ave.	5.0	3.9	<u>4.5</u>	5.1	4.3	<u>4.7</u>	<u>5.1</u>	<u>4.1</u>	<u>4.6</u>
Seed Treatment: Baytan ^{5/}									
F ₁	6.1	4.9	<u>5.5</u>	3.1	3.8	<u>3.4</u>	4.6	4.3	<u>4.5</u>
F ₂	3.2	2.2	<u>2.8</u>	3.2	2.9	<u>3.1</u>	3.2	2.6	<u>2.9</u>
F ₃	4.2	3.2	<u>3.8</u>	5.6	4.1	<u>4.9</u>	4.9	3.7	<u>4.3</u>
Ave.	4.5	3.5	<u>4.0</u>	4.0	3.6	<u>3.8</u>	<u>4.3</u>	<u>3.5</u>	<u>3.9</u>

1/Fertilizer treatment

F₁ = Normal fertilizer rate based on soil tests and yield goal of 35 bu/acre (60 lb N/acre deep placed in the fall).

F₂ = Nitrogen (180 lb N/acre) and phosphorus (30 lb P₂O₅/acre) fertilizer rate fall deep placed based on F₁ soil tests and maximum yield goal of 80 bu/acre.

F₃ = Same as F₂ except 100 lb/acre K₂O fertilizer as KCl applied broadcast in the spring.

Note: All treatments received 50 lb/acre 18-46-0 applied with the seed at planting.

2/Fungicide spray treatment

S₁ = No fungicide applied.

S₂ = Fungicide applied in two applications at recommended rates of Dithane M-45 (2 lb/acre). (First applied July 5 and second on July 13 with 17 gpa water at 45 psi).

3/Variety

V₁ = Vic durum (normal height).

V₂ = Cando durum (semidwarf).

4/Seed treated with Vitavax 200 at 2 oz/bu.

5/Seed treated with Baytan at 1 oz/bu.

6/Data analyzed were first averaged over two subplot ratings. Rating 0-9 (0 = no spotting, 9 = severe spotting including the flag leaf) for Tan Spot on July 23 at late milk stage.

Table 22. Ratings of a New Leaf Spotting Disease on Cando Durum Wheat Plants as Influenced by Fertilizer Treatment, Fungicide Spray and Seed Treatment: Minot, ND - 1984.

Fertilizer Treatment ^{1/}	Fungicide Spray Treatment ^{2/}							
	S ₁				S ₂			
	Rep 1	2	3	4	Rep 1	2	3	4
	Subplot numerical rating ^{3/}							
Seed Treatment: Vitavax ^{4/}								
F ₁	1	7p	7p			6p		
	2		6s					
F ₂	1		7p		6s		7p	
	2	7s	7p		6p			
F ₃	1							
	2	7s						
Seed Treatment: Baytan ^{5/}								
F ₁	1		7p		6s	7s		
	2	6t	7p	6s				7p
F ₂	1	7p			7s			
	2	7s	6p	7p	7p		7p	
F ₃	1	7p			6p		6p	
	2	8s					7p	

1/Fertilizer treatment

F₁ = Normal fertilizer rate based on soil tests and yield goal of 35 bu/acre (60 lb N/acre deep placed in the fall).

F₂ = Nitrogen (180 lb N/acre) and phosphorus (30 lb P₂O₅/acre) fertilizer rate fall deep placed based on F₁ soil tests and maximum yield goal of 80 bu/acre.

F₃ = Same as F₂ except 100 lb/acre K₂O fertilizer as KCl applied broadcast in the spring.

Note: All treatments received 50 lb/acre 18-46-0 applied with the seed at planting. Subplot: 1 = north 2 = south.

2/Fungicide spray treatment

S₁ = No fungicide applied.

S₂ = Fungicide applied in two applications at recommended rates of Dithane M-45 (2 lb/acre). (First applied July 5 and second on July 13 with 17 gpa water at 45 psi).

3/A new leaf spot disease that appears on Cando (V₂) but not on Vic (V₁).

Severity of spotting rating 0-9 (0 = no spotting, 9 = severe spotting):
t = trace, p = pocket in plot and s = scattered in plot.

4/Seed treated with Vitavax 200 at 2 oz/bu.

5/Seed treated with Baytan at 1 oz/bu.

Table 23. Fusarium Root Rot Incidence of Durum Wheat Plants as Influenced by Fertilizer Treatment, Variety, Fungicide Spray and Seed Treatment: Minot, ND - 1984.

Fertilizer Treatment ^{1/}	Fungicide Spray Treatment ^{2/}						Variety ^{3/}		
	S ₁			S ₂			V ₁	V ₂	Total
	V ₁	V ₂	Total	V ₁	V ₂	Total			
	number infected ^{6/}								
	Seed Treatment: Vitavax ^{4/}								
F ₁	2	11	<u>13</u>	4	9	<u>13</u>	<u>6</u>	<u>20</u>	<u>26</u>
F ₂	7	9	<u>16</u>	10	9	<u>19</u>	<u>17</u>	<u>18</u>	<u>35</u>
F ₃	4	5	<u>9</u>	0	15	<u>15</u>	<u>4</u>	<u>20</u>	<u>24</u>
Total	<u>13</u>	<u>25</u>	<u>38</u>	<u>14</u>	<u>33</u>	<u>47</u>	<u>27</u>	<u>58</u>	<u>85</u>
	Seed Treatment: Baytan ^{5/}								
F ₁	5	14	<u>19</u>	7	12	<u>19</u>	<u>12</u>	<u>26</u>	<u>38</u>
F ₂	13	11	<u>24</u>	2	5	<u>7</u>	<u>15</u>	<u>16</u>	<u>31</u>
F ₃	3	14	<u>17</u>	1	9	<u>10</u>	<u>4</u>	<u>23</u>	<u>27</u>
Total	<u>21</u>	<u>39</u>	<u>60</u>	<u>10</u>	<u>26</u>	<u>36</u>	<u>31</u>	<u>65</u>	<u>96</u>

^{1/}Fertilizer treatment

F₁ = Normal fertilizer rate based on soil tests and yield goal of 35 bu/acre (60 lb N/acre deep placed in the fall).

F₂ = Nitrogen (180 lb N/acre) and phosphorus (30 lb P₂O₅/acre) fertilizer rate fall deep placed based on F₁ soil tests and maximum yield goal of 80 bu/acre.

F₃ = Same as F₂ except 100 lb/acre K₂O fertilizer as KCl applied broadcast in the spring.

Note: All treatments received 50 lb/acre 18-46-0 applied with the seed at planting.

^{2/}Fungicide spray treatment

S₁ = No fungicide applied.

S₂ = Fungicide applied in two applications at recommended rates of Dithane M-45 (2 lb/acre). (First applied July 5 and second on July 13 with 17 gpa water at 45 psi).

^{3/}Variety

V₁ = Vic durum (normal height).

V₂ = Cando durum (semidwarf).

^{4/}Seed treated with Vitavax 200 at 2 oz/bu.

^{5/}Seed treated with Baytan at 1 oz/bu.

^{6/}Single values (not underlined) are the total number of plants infected per 1200 plants (4 reps at 300 plants each).

Table 24. Tests of Significance for Variables Measured in the Maximum Durum Wheat Yield Study as Influenced by Fertilizer Treatment, Variety, Fungicide Spray and Subsequent Interactions - Seed Treatment (Vitagax): Minot, ND - 1984.

Variable	Source						C.V.
	Fertilizer	Spray	Variety	Variety X Spray	Fertilizer X Spray	Fertilizer X Variety	
Grain Yield (bu/acre)	NS	NS	NS	NS	NS	NS	10.0
Grain Test Weight (lb/bu)	NS	NS	***	NS	NS	NS	1.8
Plant Height (inches)	1.6	NS	***	NS	NS	0.9	2.3
Plant Dry Matter (lb/acre)	693	NS	NS	NS	NS	NS	13.2
Plant Nutrients							
Concentration							
N (%)	.14	NS	*	NS	NS	NS	8.8
P (%)	NS	NS	*	NS	NS	NS	12.3
K (%)	NS	NS	NS	NS	NS	NS	19.8
Uptake (lb/acre)							
N	19	NS	NS	NS	NS	NS	15.0
P	NS	NS	*	NS	NS	NS	15.3
K	24	NS	NS	NS	NS	NS	28.9
Seed Nutrients							
Concentration (%)							
N	.19	**	NS	NS	.15	NS	4.5
P	NS	NS	NS	NS	.02	NS	6.3
K	.02	NS	***	NS	NS	NS	6.8
Uptake (lb/acre)							
N	8	NS	NS	NS	NS	NS	11.7
P	NS	NS	NS	NS	NS	NS	12.8
K	NS	NS	*	NS	NS	NS	16.1
Kernel Weight (gm/1000)	NS	NS	***	NS	NS	NS	6.4
Plant Stand (number)	NS	NS	*	NS	NS	NS	10.9
Days to Heading (number)	NS	NS	NS	NS	NS	NS	0.6
Tan Spot (rating)	NS	NS	NS	NS	1.7	NS	34.1

Statistical analysis run on the computer using SAS procedures. Tests of significance were determined by Waller-Duncan K-Ratio T Test (Bayes LSD) at the .05 level of significance. NS = non significant, * = comparing only two means with significance at .05 level (** = .01 level and *** = .001 level), Number value = unit of difference required to be significant at the .05 level according to Bayes LSD.

Table 25. Tests of Significance for Variables Measured in the Maximum Durum Wheat Yield Study as Influenced by Fertilizer Treatment, Variety, Fungicide Spray and Subsequent Interactions - Seed Treatment (Baytan): Minot, ND - 1984.

Variable	Source						C.V.
	Fertilizer	Spray	Variety	Variety X Spray	Fertilizer X Spray	Fertilizer X Variety X Spray	
Grain Yield (bu/acre)	NS	NS	NS	NS	NS	NS	9.4
Grain Test Weight (lb/bu)	NS	NS	***	NS	NS	NS	1.6
Plant Height (inches)	1.2	NS	***	NS	NS	0.9	2.1
Plant Dry Matter (lb/acre)	893	NS	NS	NS	NS	NS	17.1
Plant Nutrients Concentration (%)							
N	NS	*	NS	NS	NS	NS	16.6
P	NS	NS	NS	NS	NS	NS	20.2
K	.13	NS	NS	NS	NS	NS	15.1
Uptake (lb/acre)							
N	12	*	NS	NS	NS	21	14.5
P	1.8	NS	NS	NS	NS	NS	14.6
K	20	***	NS	NS	NS	NS	24.6
Seed Nutrients Concentration (%)							
N	.15	**	*	NS	NS	NS	4.9
P	NS	NS	NS	NS	NS	NS	5.7
K	NS	NS	***	NS	NS	NS	6.4
Uptake (lb/acre)							
N	8	NS	NS	NS	NS	NS	11.1
P	NS	NS	NS	NS	NS	NS	12.0
K	NS	NS	*	NS	NS	NS	13.9
Kernel Weight (gm/1000)	NS	NS	***	NS	NS	NS	5.3
Plant Stand (number)	NS	NS	*	NS	NS	NS	11.0
Days to Heading (number)	NS	NS	NS	NS	NS	NS	0.7
Tan Spot (rating)	NS	NS	NS	NS	1.4	NS	34.9

Statistical analysis run on the computer using SAS procedures. Tests of significance were determined by Waller-Duncan K-Ratio T Test (Bayes LSD) at the .05 level of significance. NS = non significant, * = comparing only two means with significance at .05 level (** = .01 level and *** = .001 level), Number value = unit of difference required to be significant at the .05 level according to Bayes LSD.

Table 26. Tests of Significance for Variables Measured in the Maximum Durum Wheat Yield Study as Influenced by Fertilizer Treatment, Variety, Fungicide Spray, Seed Treatment and Subsequent Interactions - Minot, ND - 1984.

Variable	Source												C.V.		
	F	S	V	T	F	S	V	T	F	S	V	T			
Grain Yield	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Grain Test Weight	NS	NS	***	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Plant Height	1.3	NS	***	NS	0.6	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Plant Dry Matter	673	NS	NS	NS	870	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Plant Nutrients															
Concentration															
N	.08	NS	NS	NS	.15	NS	NS	.12	NS	NS	NS	NS	NS	NS	NS
P	.01	NS	*	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
K	.18	**	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Uptake															
N	9	NS	NS	NS	14	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
P	1.2	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
K	16	*	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Seed Nutrients															
Concentration															
N	.17	**	NS	NS	.09	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
P	NS	NS	NS	NS	.01	NS	NS	.02	NS	NS	NS	NS	NS	NS	NS
K	.03	NS	***	NS	.02	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Uptake															
N	7	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
P	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
K	NS	NS	**	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Kernel Weight	NS	NS	***	***	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Moisture Use	NS	NS	NS	--	NS	NS	--	NS	--	NS	--	NS	--	--	--
Plant Stand	NS	NS	*	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Days to Heading	NS	NS	NS	***	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Tan Spot	NS	NS	NS	**	0.9	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

Statistical analysis run on the computer using SAS procedures. Tests of significance were determined by Waller-Duncan K-Ratio T Test (Bayes LSD) at the .05 level of significance. NS = non significant, * = comparing only two means with significance at .05 level (** = .01 level and *** = .001 level), Number value = unit of difference required to be significant at the .05 level according to Bayes LSD.

Table 27. Daily Growing Season Precipitation Received at the Maximum Wheat Yield Trial: Minot, ND - 1984.

Day	Month						
	April	May	June	July	August	September	October
	inches						
1			T	.05		T	
2			T			.14	
3							
4				T	T	.02	
5		.08	.68	.03			
6		T	.01	T	.11		.84
7			.50		.55	.35	.15
8		T	.13	.09		.15	.01
9			.34			.18	T
10	.03		.05			.01	T
11	.18					.01	
12	1.37		.03			.02	
13	1.35*	T	.03			T	
14	T		.25	T	.12	.02	.01
15			.02		T		
16	.01		.02	.13			.81*
17			.05				
18							
19							
20					.18		.46*
21		.05	.41	.02		.04	.12*
22			.44	T		T	T*
23		T	T				
24	T					.20*	
25				.04		.09*	
26	.01*	T				.01*	
27	1.28*		.02				.17*
28	1.55*		T				.10*
29							
30				.15			
31				T			
* Snow							
Total (1984)	5.78	.13	2.98	.51	.96	1.24	2.67
Average (1905-1980)	1.53	2.18	3.15	2.19	1.94	1.53	0.89

Table 28. Daily Growing Season Maximum and Minimum Air Temperatures at the Maximum Wheat Yield Trial: Minot, ND - 1984.

Day	April		May		June		July		August		September		October	
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
1	46	29	45	25	86	51	72	48	81	64	67	50	59	33
2	50	28	52	23	70	49	81	56	85	59	57	43	72	39
3	54	30	52	29	76	45	84	53	(89)	61	70	41	73	37
4	53	30	56	33	79	49	79	53	85	59	69	34	71	37
5	59	36	55	32	58	51	76	55	(88)	66	68	34	71	38
6	64	37	59	35	70	52	73	44	(90)	62	76	45	69	53
7	63	37	59	27	64	52	75	45	(93)	62	83	46	57	45
8	65	38	51	30	79	52	78	52	(88)	55	64	45	58	42
9	60	41	55	32	64	47	(87)	51	78	53	61	46	63	43
10	46	40	61	40	62	43	84	53	81	53	54	38	61	45
11	49	37	65	37	64	44	84	54	85	54	53	33	66	50
12	46	37	62	37	61	46	(89)	57	(93)	63	61	35	74	56
13	40	31	75	37	68	45	(94)	61	(91)	62	64	47	73	44
14	43	34	67	41	75	44	(93)	55	(97)	62	55	40	65	42
15	55	30	73	42	64	53	81	51	(88)	52	61	39	54	40
16	57	33	74	52	79	53	84	56	82	52	68	45	42	30
17	62	33	87	50	85	60	78	47	(89)	62	76	46	39	27
18	62	32	70	47	79	48	79	47	86	59	87	49	41	24
19	65	34	74	44	78	50	74	54	(87)	62	82	55	43	24
20	61	34	74	44	75	52	86	53	(88)	62	79	38	34	33
21	67	34	76	45	77	55	(96)	60	79	51	59	40	35	32
22	69	37	69	41	84	59	(92)	64	73	41	67	42	36	21
23	68	36	62	41	77	54	79	55	74	45	50	28	38	27
24	69	39	79	43	75	52	78	57	86	55	39	29	43	30
25	59	31	60	34	83	62	79	60	92	57	35	26	44	26
26	54	29	50	30	(90)	57	80	57	96	57	43	28	45	27
27	32	21	63	33	77	51	(88)	56	93	63	47	25	55	25
28	30	20	68	39	78	53	(89)	58	96	61	42	25	26	7
29	41	18	69	48	84	54	(91)	67	88	46	55	28	33	10
30	42	22	78	49	84	58	(96)	69	74	47	58	25	20	2
31			90	54			(94)	63	67	53			26	2
Mean (1984)	54	32	66	37	75	52	84	55	85	54	60	38	51	32
Mean (1905-1980)	53	28	66	40	75	50	82	55	81	52	70	42	57	32

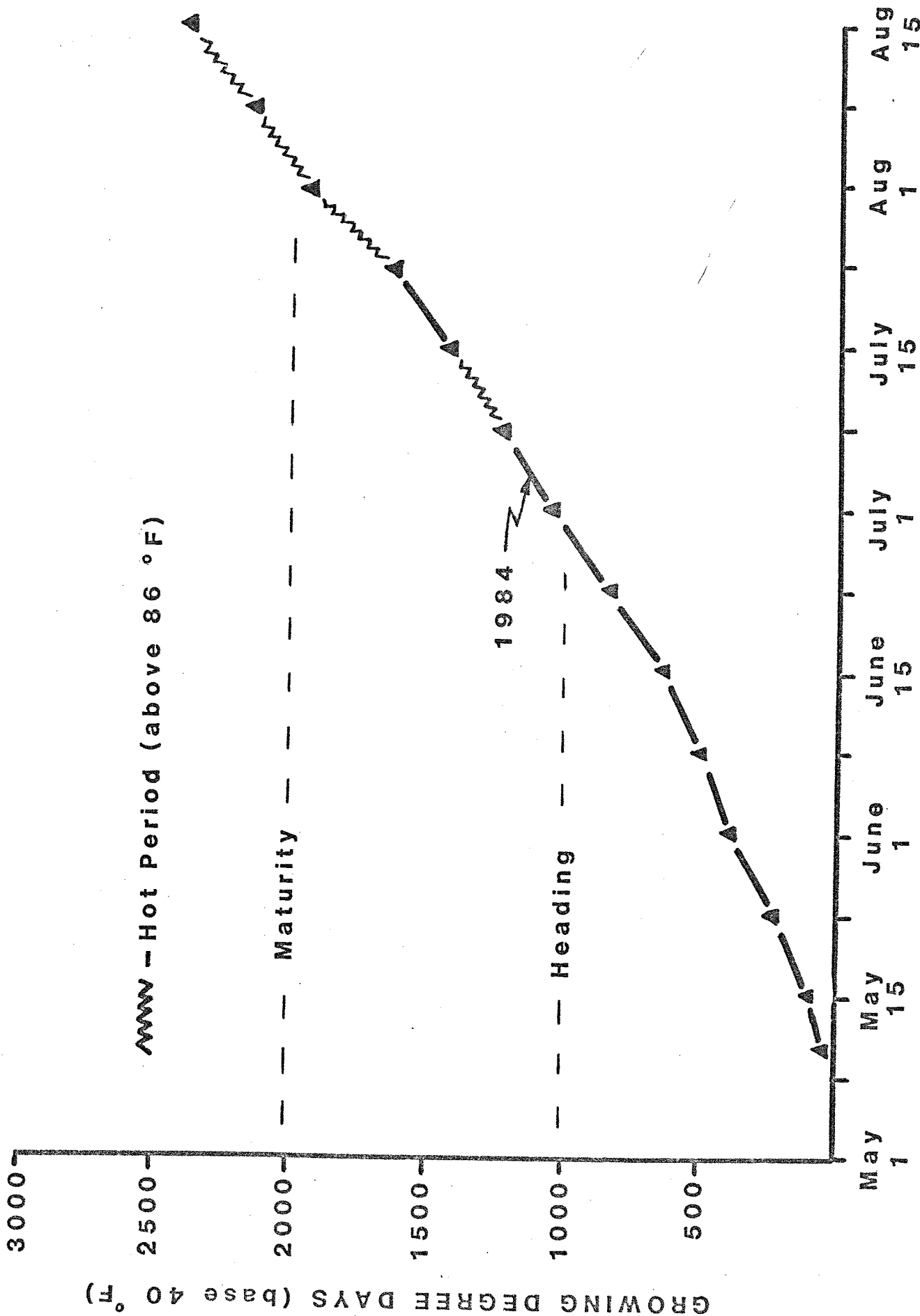


Figure 1. Accumulative Growing Degree Days - Maximum Wheat Yield Trial
Minot, ND

