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## Plains Barley

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# *Plains Barley*

AGRONOMY DEPARTMENT  
**AGRICULTURAL EXPERIMENT STATION**  
SOUTH DAKOTA STATE COLLEGE  
BROOKINGS, SOUTH DAKOTA

PLAINS BARLEY IN TEST PLOTS



# PLAINS BARLEY

By J. E. GRAFUS<sup>1</sup>

Earliness, stiff straw, resistance to stem rust and good yields are some of the desirable characteristics of Plains barley. About 1000 bushels of this variety were released by the South Dakota Agricultural Experiment Station to the South Dakota County Crop Improvement Association in the Spring of 1948. Tests in different areas of South Dakota show that Plains is well suited to central and western South Dakota where earliness to escape the midsummer heat, drouth and grasshoppers is especially desirable.

Laboratory malting tests of Plains barley indicate that malt extract content is usually high, but enzyme activities in the malts are consistently lower than desirable. Diastatic power is generally lower than found in accepted malting varieties. In samples of 1947 crop from South Dakota, Plains barley malts were substantially lower in diastatic power than Odessa malts.

Protein modification in the malts of Plains barley is low, indicating characteristics for this factor which are more nearly comparable with feed type barleys than accepted malting barley varieties. Malting quality characteristics mentioned above are based on laboratory malting results, which are reliable for these factors. The final evaluation of malting quality of Plains barley must await plant scale malting and brewing tests.

It is believed that Plains will fill an important need for an early barley variety and that farmers of South Dakota will be pleased with its performance.

## History

Plains was derived from the cross of Peatland x Dryland made at the South Dakota Experiment Station by S. P. Swenson<sup>2</sup> in 1937. The Dryland parent was selected from the cross of (Odessa x Club Mariout) x

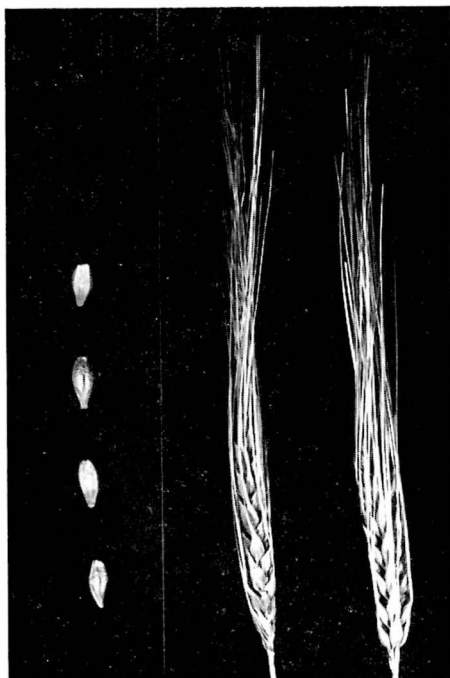


Fig. 1. Heads and threshed grain of Plains Barley

(Lion x Manchuria) made by E. S. McFadden while Peatland was selected from a bulk lot of seed from Switzerland by research workers at the Minnesota Agricultural Experiment Station.

The characteristics desired from Dryland were large kernel size, earliness, smooth beards and stiff straw while resistance to stem rust, *Puccinia graminis* Pers., and stiff straw were the important characteristics desired from the Peatland Parent.

## Plant and Seed Characteristics

Plains is a six-rowed, smooth awned, early maturing barley. It is stiff strawed and resistant to stem rust and the seeds tend to be large and plump. As a comparison with other varieties grown at the South Dakota Agricultural Experiment Station at Brookings, the seed weights per 1000 kernels in

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1947 were: Odessa (29.5 gms), Plains (33.5 gms), and Spartan (43.1 gms).

No variety is perfect and Plains is no exception. It is susceptible to several prevalent diseases, namely: loose smut, *Ustilago nuda* (Jens.) K. & S.; leaf rust, *Puccinia anomala* Rostr.; spot blotch, *Helminthosporium sativum* P.K. & B.; and to bacterial blight, *Xanthomonas* spp.

Data on relative maturity, plant height, reaction to stem rust, lodging and test weight are given in table 1. The earliness, resistance to stem rust and lodging, and high test weight are points in favor of this variety. However, Plains is slightly shorter strawed than the standard varieties with which it has been compared.

Anyone actively associated with barley varieties under South Dakota conditions will realize that the date of maturity is not a good criterion of earliness. Under usual conditions ripening is caused by the growing season ending abruptly due to heat, drouth and diseases. For this reason early varieties are frequently good crop insurance for the years when this abrupt ripening period comes early in the season.

Table 3 presents the data on relative grasshopper resistance as measured by the percentage of heads clipped by these insects. This criterion was the only measurement used. There are, however, other criteria of grasshopper damage. It will be noted that Plains does have the ability to partially escape or resist grasshopper attack.

## Yield and Test Weight

In selecting for earliness the plant breeder must sacrifice potential yielding ability in years where the growing season is long and optimum growing conditions prevail. The objective of the barley breeding program has been to obtain varieties which will produce well in the greatest number of years rather than varieties which will produce exceptionally high yields only in some years. Plains shows some sacrifice in yielding ability due to earliness but shows a gain in stability of yield in the drier areas of the state.

The yield of Plains in comparison with five standard varieties is shown in tables 1 and 2. It will be noted that on the basis of yield, Plains appears to be best adapted to the central and western areas—the areas where earliness is especially important.

The stability of yield as compared with other varieties can best be illustrated by tables 4 and 5. The plus marks indicate the years in which the variety exceeded the yield of Spartan by a statistically significant difference, while zero equals no significant difference and minus equals significantly less. It will be noted that Plains was the most consistently productive variety at Vivian and Cottonwood and that Plains and Feebar were equally consistently productive at Highmore. At Eureka four of the six varieties had the same stability average, while at Brookings, where the growing season is usually more favorable to the later varieties, Plains performed rather poorly.

Examination of table 4 reveals that at Brookings in 1946 the yield for Plains was significantly lower than that of Spartan. This low yield was caused by frost injury due to a severe freeze in the middle of May after the early varieties had started to joint. Whether Plains is inherently more susceptible to freezing than the other varieties with which it was compared or whether it was in a more susceptible stage due to earliness is not known. In other years when freezing took place when the plants were in a less mature stage, no differential freezing injury was observed.

By the use of tables 4 and 5 together with the average yields for the same period, it is believed that a satisfactory estimate of the value of early varieties can be made. Such a procedure will tend to eliminate both the varieties which are erratic in production and those which are consistently low. This procedure will tend to select the varieties that produce good yields in the greatest number of years and at the same time have an acceptable yield average. On this basis Plains appears to be best adapted to central and western South Dakota.

**Table 1. Summary of tests of Plains barley in comparison with five standard varieties grown at the South Dakota Experiment Station (Brookings) for the years 1943—1947**

Variety	Date Headed	Date Ripe	Height Inches	Stem Rust	Lodging† % Degree	Test Wt. lbs./bu.	Average Yield in Bu/Acre			
							46-47	45-47	44-47	43-47
Plains .....	6/22	7/24	27	R*	Tr†	44.6	37.7	43.4	43.2	39.6
Feebar .....	6/24	7/26	28	R		42.3	45.3	47.6	46.0	43.7
Odessa .....	6/25	7/27	32	S	100 42	44.0	48.5	52.1	49.1	47.1
Trebi .....	6/26	7/26	28	S	100 25	40.4	58.5	54.8	49.2	45.4
Spartan .....	6/21	7/25	31	S		46.5	39.1	43.4	37.6	34.9
Wisc 38 .....	6/27	7/28	35	S	100 40	41.5	43.2	47.4	40.8	39.2
Least significant difference										3.2

\*R—resistant, S—susceptible; †Tr—trace; †only three year average

**Table 2. Summary of Plains barley in comparison with four standard varieties grown at Highmore, Eureka, Vivian and Cottonwood substations for the years 1943—1947**

Variety	Highmore*				Eureka				Vivian and Cottonwood†			
	Av. Yield in Bu/acre				Av. Yield in Bu/acre				Av. Yield in Bu/acre			
	45-47	44-47	43-47	46-47	45-47	44-47	43-47	46-47	45-47	44-47	43-47	46-47
Plains .....	37.4	38.8	35.1	30.8	29.7	27.0	28.0	42.2	34.1	29.6	27.5	
Feebar .....	42.0	42.8	39.8	36.6	32.7	35.3	35.3	36.8	31.6	29.2	26.1	
Odessa .....	36.6	32.3	29.7	26.8	25.5	25.4	26.6	35.8	31.6	26.9	23.3	
Trebi .....	40.6	38.5	37.6	36.4	34.1	33.0	33.2	36.1	33.9	29.4	27.9	
Spartan .....	31.9	32.0	26.9	30.9	25.0	20.7	19.3	28.6	22.5	19.3	17.0	
Wisc 38 .....	34.1	30.6	28.2	30.4	29.0	30.1	31.9	37.8	32.2	25.8	22.3	
Least significant difference			4.0				3.6				3.8	

\*1946 crop destroyed by hail; †43—44 data from Vivian, 45—47 data from Cottonwood.

**Table 3. Varietal resistance to grasshoppers as measured by percentage of barley heads removed under field conditions.**

Variety	Resistance to grasshoppers in average percent of barley heads removed					
	Highmore		Vivian and Cottonwood*		Average of all locations	
	1943	1944	1943	1944	1945	
Plains .....	3	10	10	15	25	13
Feebar .....	10	3	Tr	6	17	7
Odessa .....	18	12	10	45	38	25
Trebi .....	3	10	Tr	18	20	10
Spartan .....	15	5	5	25	42	18
Wisc 38 .....	22	35	80	90	47	55

\*1943 Data from Vivian, 44 and 45 from Cottonwood.

**Table 4. The stability of yield of six varieties of barley at Brookings and Eureka, 1943—1947**

Variety	1943	Brookings				Total years above Spartan	Total years below Spartan	1943	1944	Eureka 1945	1946	1947	Total years above Spartan	Total years below Spartan
		1944	1945	1946	1947									
Plains .....	0*	+	0	—	0	1	1	+	+	+	0	0	3	0
Feebar .....	+	+	0	+	0	3	0	+	+	+	0	0	3	0
Odessa .....	+	+	+	+	0	4	0	+	+	+	0	0	3	0
Trebi .....	+	+	0	+	+	4	0	+	+	+	0	0	3	0
Spartan .....	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wisc 38 .....	+	0	0	+	0	2	0	+	+	+	—	0	2	1

\*0 = yield statistically equal to Spartan; + = yield statistically greater than Spartan; — = yield statistically less than Spartan.

**Table 5. The stability of yield of six varieties of barley at Highmore and Cottonwood,<sup>1</sup> 1943—1947**

Variety	1943	Highmore				Total years above Spartan	Total years below Spartan	1943	1944	Cottonwood				Total years above Spartan	Total years below Spartan
		1944	1945	1947	1947					1944	1945	1946	1947		
Plains .....	+	+	+	+	+	4	0	+	+	+	+	+	0	4	0
Feebar .....	+	+	+	+	0	4	0	0	+	+	+	+	0	3	0
Odessa .....	+	+	+	+	0	2	1	0	0	+	+	0	0	1	0
Trebi .....	+	0	+	+	+	3	0	+	+	+	+	0	0	3	0
Spartan .....	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wisc 38 .....	+	—	0	0	0	1	1	0	0	+	+	+	0	2	0

<sup>1</sup>1943-44 yields from Vivian; \*Symbols the same as for table 4.