

MARFED WHEAT

O. A. Vogel, S. P. Swenson, Harley D. Jacquot,
and C. S. Holton

Bulletin No. 485

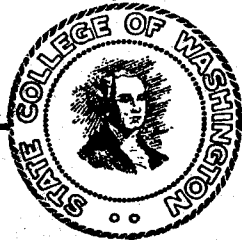
March 1947



Marfed

Federation

The State College of Washington
Institute of Agricultural Sciences
Agricultural Experiment Stations
Pullman, Washington



This bulletin is a publication by the Division of Agronomy in cooperation with the Division of Cereal Crops and Diseases, Bureau of Plant Industry, Soils, and Agricultural Engineering, Agricultural Research Administration, U. S. Department of Agriculture.

BOARD OF REGENTS

J. H. Binns, President.....	Tacoma
W. J. Robinson, Vice-President.....	Pomeroy
C. C. Williams, Treasurer.....	Kennewick
Charles E. McAllister.....	Spokane
Harry E. Goldsworthy.....	Rosalia
Wilson Compton, Secretary Ex Officio.....	Pullman

EXPERIMENT STATIONS STAFF

Administrative Officers

Wilson Compton, Ph.D., President
 J. C. Knott, Ph.D., Director, Institute of Agricultural Sciences
 M. T. Buchanan, Ph.D., Director
 S. P. Swenson, Ph.D., Assistant Director
 J. W. Kalkus, D.V.S., Vice-Director

Agronomy

S. P. Swenson, Ph.D., Geneticist and Acting Chairman of Division
 P. P. Abendroth, Field Plot and Seedhouse Foreman
 L. A. Alban, B.S., Research Assistant (Prosser)
 K. E. Baur, M.S., Associate Soil Scientist (Puyallup)
 N. Benson, M.S., Assistant Soil Scientist (Wenatchee)
 D. B. Bower, B.S., Research Assistant
 R. S. Caldecott, B.S., Research Assistant
 R. H. Fowler, B.S., Assistant in Soil Survey
 M. S. Grunder, M.S., Agronomist (Puyallup)
 R. L. Hausenbueller, B.S., Research Assistant
 G. M. Horner, Associate Agronomist and Project Supervisor, (U.S.D.A.)
 J. A. Jackobs, M.S., Assistant in Farm Crops (Prosser)
 H. D. Jacquot, B.S., Associate Agronomist (Lind)
 S. Kellenbarger, M.S., Assistant in Farm Crops
 L. G. Law, M.S., Assistant Agronomist
 R. W. Leamer, Ph.D., Associate Soil Physicist, U.S.D.A. (Prosser)
 S. J. Mech, M.S., Soil Conservationist, U.S.D.A. (Prosser)
 C. D. Moodie, B.S., Assistant in Soils
 J. Moseman, Jr., B.S., Research Assistant
 O. P. Muller, B.S., Research Assistant
 C. E. Nelson, M.S., Agronomist, U.S.D.A. (Prosser)
 S. R. Olsen, Ph.D., Soil Chemist, U.S.D.A. (Prosser)
 R. E. Ramig, B.S., Research Assistant
 H. P. Singleton, M.S., Agronomist (Prosser)
 H. W. Smith, Ph.D., Assistant Soil Scientist
 L. Smith, Ph.D., Associate Geneticist
 C. O. Stanberry, M.S., Assistant Agronomist
 T. Tremblay, M.S., Assistant in Soils (Puyallup)
 J. Unrau, M.S., Research Assistant
 S. C. Vandecaveye, Ph.D., Soil Scientist and Chairman of Soils Section
 F. G. Viets, Ph.D., Agronomist, U.S.D.A. (Prosser)
 O. A. Vogel, Ph.D., Agronomist, U.S.D.A.
 L. C. Wheeling, Ph.D., Research Professor of Soils

Plant Pathology

G. W. Fischer, Ph.D., Plant Pathologist and Chairman of Division
 E. C. Blodgett, Ph.D., Associate Plant Pathologist (Prosser)
 L. Campbell, Ph.D., Associate Plant Pathologist (Puyallup)
 C. J. Gould, Ph.D., Associate Plant Pathologist
 F. D. Heald, Ph.D., Plant Pathologist Emeritus
 C. S. Holton, Ph.D., Pathologist, U.S.D.A.
 F. Johnson, Ph.D., Associate Plant Pathologist (Puyallup)
 S. B. Locke, Ph.D., Associate Plant Pathologist
 C. V. Lowther, M.S., Research Assistant
 N. A. MacLean, B.S., Research Assistant
 G. Nyland, M.S., Assistant Plant Pathologist
 R. Sprague, Ph.D., Associate Plant Pathologist
 F. V. Stevenson, M.S., Assistant Plant Pathologist

All bulletins of the Washington State Agricultural Experiment Stations are sent free to citizens of the state on application to the Director.

MARFED WHEAT

by

O. A. Vogel, S. P. Swenson, Harley D. Jacquot, and C. S. Holton¹

What Is Marfed Wheat?

Marfed is a new variety of soft white spring wheat which appears to be better adapted than Federation in the areas of eastern Washington where Federation is commonly grown. As shown on the cover, the head and kernel types of Marfed are somewhat similar to those of Federation. The main distinguishing characteristics, however, are the white chaff, the more inclined head, and the smoother kernel of Marfed.

How Was Marfed Developed?

Marfed was selected from a cross of Marquis-Florence and Federation, which was made in 1931 by the senior author. The original head selection was made in 1934 and the resulting line was reselected in 1935, and again in 1936. In 1938 it was tested in a preliminary yield nursery at Pullman, and in 1939 it was advanced to the rod-row nurseries at Pullman, Pomeroy, and Walla Walla. It was entered in the nursery trials at Lind in 1943 and in the advanced nurseries at Pullman in 1944. Milling and baking tests were made by chemists of western milling companies and by the quality testing laboratory, Beltsville, Maryland.

In 1946 Marfed was increased to over 2,000 bushels of foundation seed for release and distribution to seed growers located in areas where Federation is commonly grown.

How Does Marfed Yield In Comparison With Federation And Other Spring Varieties?

Marfed has been tested in spring-sown varietal nurseries at Pullman, Pomeroy, and Walla Walla during the 8-year period from 1939 to 1946, and at Lind during the 4-year period from 1943 to 1946. Yield data for each year and average yields at these four locations are given in Table 1.

In the rod rows and advanced nurseries at Pullman, it has yielded higher than either Federation or Idaed, the two commercial spring varieties in the Pullman area. During the 4-year period, 1943 to 1946,

Contribution of the Division of Agronomy, Farm Crops Section, in cooperation with the Division of Cereal Crops and Diseases, Bureau of Plant Industry, Soils, and Agricultural Engineering, Agricultural Research Administration, U. S. Department of Agriculture.

¹ Agronomist, Division of Cereal Crops and Diseases, U.S.D.A.; Geneticist, Division of Agronomy, Washington Agricultural Experiment Station; Associate Agronomist and Superintendent, Adams Branch Experiment Station; and Pathologist, Division of Cereal Crops and Diseases, U.S.D.A.

Table 1. Annual and average yields in bushels per acre of MARFED and other commercial spring varieties tested at Pullman, Pomeroy, Walla Walla, and Lind during the period 1939 to 1946, inclusive.

VARIETY	1939	1940	1941	1942	1943		1944		1945		1946		Averages		
					Early*	Late**	Early	Late	Early	Late	Early	Late	All Tests	1943 to 1946	
Pullman Rod-Row Nursery															
MARFED	49.0	44.7	35.5	73.5	68.8	65.2	64.7	64.5	61.1	42.9	48.7	48.7	55.6	60.8	55.3
Idaед	37.5	42.2	43.8	70.5	68.2	61.5	61.7	60.3	53.8	41.9	47.2	40.3	52.4	57.7	51.0
Federation	46.2	40.3	38.8	58.5	63.0	53.2	60.2	49.7	51.6	34.6	51.1	44.5	49.3	56.5	45.5
Baart	40.3	40.2	42.8	60.5	56.6	60.5	59.8	60.5	51.9	42.1	39.9	41.2	49.7	52.1	51.1
Pullman Advanced Nurseries***															
MARFED						43.5			50.9		48.1		47.5		
Idaед						42.6			51.3		40.8		44.9		
Federation						37.1			46.8		47.1		48.7		
Baart						36.9			47.6		40.3		41.6		
Walla Walla Rod-Row Nursery															
MARFED	50.0	33.7	38.2	50.0	52.5	46.7			55.2		53.0		47.4		
Federation	44.2	29.3	43.5	48.0	52.5	41.8			48.2		52.2		45.1		
Idaед	41.0	29.7	47.5	39.7	47.3	45.8			57.0		50.3		44.8		
Baart	42.2	31.2	39.5	42.3	37.8	39.4			53.8		45.7		41.5		
Pomeroy Rod-Row Nursery															
Idaед	35.5	27.3	Halted	57.7	...	37.5			9.2		31.0		33.1		
MARFED	35.7	21.7	out	49.2	...	33.0			8.2		29.5		29.6		
Federation	33.2	18.5	"	42.7	...	24.8			7.0		29.2		25.9		
Baart	32.3	20.1	"	45.0	...	20.5			7.8		27.8		25.6		
Lind Nursery															
Idaед					32.6	28.1			22.0		34.4		29.3		
Baart					32.1	25.5			21.2		31.7		27.6		
Federation					32.8	22.7			21.8		29.6		26.7		
MARFED					30.3	26.8			20.8		26.4		26.1		

* Early seeding—as soon as the land is dry enough in the spring to be worked with field equipment.

** Late seeding—3 weeks later than the early date.

*** Advanced nurseries were seeded at an intermediate date.

in the rod row nursery at Pullman, Marfed averaged 4.3 bushels higher than Federation from early seeding (average date, April 12) and 9.8 bushels higher from later seedings (average date, May 3). The later seeding was at approximately the same time that many farmers start seeding spring wheat in the Pullman area. In the late seeding, Marfed also averaged 4.3 bushels higher than Idaed, the variety generally recommended for the later seedings.

At Walla Walla, Marfed yielded only slightly more than Federation, the principal spring variety grown in that area.

At Pomeroy, the yield of Marfed was higher than that of Federation, but was appreciably lower than that of Idaed which is becoming increasingly popular in the Pomeroy area because of its early maturity.

At Lind, where Baart is generally grown, Marfed ranks the lowest and Idaed the highest in yield per acre.

How Does Marfed Yield In Comparison With Federation In Fall Seedings?

Federation is commonly sown in the fall in the Walla Walla area and is occasionally fall-sown in the Pullman area. During the 3-year period, 1944 to 1946, Marfed and Federation were tested in the fall-sown nurseries at Walla Walla, Pomeroy, and Pullman. The data in Table 2 show that, in fall seedings, Marfed has yielded only slightly higher than Federation at Walla Walla and Pomeroy. These differences, however, are not considered as significant as the difference in favor of Marfed at Pullman where Marfed has averaged six bushels per acre higher than Federation.

It is of interest to note that Federation yielded higher than Marfed in two out of ten comparisons at the three locations. Both of these

Table 2. Annual and average yields, in bushels per acre, of MARFED and Federation in fall-sown tests at Walla Walla, Pomeroy, and Pullman during the period 1944 to 1946, inclusive.

Variety	1944	1945	1946	Av.
Walla Walla Rod-Row Nursery				
MARFED	54.8	60.3	72.7	62.6
Federation	51.0	63.3	69.0	61.1
Pomeroy Rod-Row Nursery				
MARFED	50.7	12.0	37.8	33.5
Federation	48.7	11.5	33.8	31.3
Pullman Rod-Row Nursery				
MARFED	74.0	67.9	82.3	72.0
Federation	70.3	53.1	84.7	66.0

cases occurred in relatively early fall seedings, indicating that Marfed probably should not be seeded earlier than the date at which Federation is normally sown in the fall. Marfed generally stools much more than Federation and therefore appears to produce excessive straw when seeded early.

Does Marfed Have Good Test Weight?

The data in columns 1 and 2 of Table 3 show that Marfed averaged between 0.7 and 1.2 pounds higher in test weight than Federation in spring seedings at Pullman, Pomeroy, and Walla Walla, and 0.5 pound lower at Lind. In the fall seedings, Marfed averaged between 0.5 and 1.0 pound higher than Federation.

How Tall Does It Grow?

The average height of Marfed is similar to that of Federation in both fall and spring seedings, as shown in columns 3 and 4 of Table 3. However, their relative heights have varied slightly from season to season.

Is It Resistant To Lodging?

As shown in columns 5 and 6 of Table 3, Marfed was approximately equal to Federation in per cent of lodging for all spring seedings and for the fall seedings at Pullman and Pomeroy. In the fall seedings at Walla Walla, Marfed averaged 38 per cent as compared with 5 per cent for Federation. This difference resulted from unusually heavy lodging in 1945 when all commercial winter wheat varieties in the nursery lodged 100 per cent while Federation lodged only 8 per cent. The 1945 nursery was planted early on soil whose fertility level was considerably above average in the Walla Walla area. The data do suggest, however, that if sown too early and too thickly on rich soil, Marfed may lodge more easily than Federation.

How About Shattering And Threshing?

Marfed has been equal to Federation in resistance to shattering in both fall and spring seedings. In threshability, it generally appeared to be equal to if not slightly better than Federation.

Is It An Early Or Late Variety?

Seeded in the fall or in early spring, Marfed and Federation usually mature at the same time, despite the fact that Marfed heads two to five days later than Federation. However, in spring seedings made on dates comparable with the seeding time of commercial growers in the Palouse area, Marfed was two to three days earlier than Federation both in heading and in maturity.

Table 3. Summary of data on characters other than yield of MARFED and other commercial spring varieties of wheat tested at Pullman, Pomeroy, Walla Walla, and Lind during the period 1939 to 1946, inclusive.

VARIETY	Test weight		Plant height		Lodging		Shattering		Date headed		Date ripe	
	Spring-sown lbs.	Fall-sown lbs.	Spring-sown inches	Fall-sown inches	Spring-sown per cent	Fall-sown per cent	Spring-sown per cent	Fall-sown per cent	Spring-sown	Fall-sown	Spring-sown	Fall-sown
Baart	62.7	.....	48	.....	14	.....	Trace*	.....	6-26	.....	8-6	.....
Idaed	61.3	.....	40	.....	1	.....	Trace	.....	6-20	.....	8-3	.....
MARFED	60.8	62.3	41	43	Trace*	15	Trace	0	6-29	6-6	8-6	7-23
Federation	59.6	61.3	42	42	Trace	13	Trace	0	6-27	6-2	8-7	7-22
Baart	62.4	.....	46	.....	7	.....	0	.....	7-4	.....	8-10	.....
Idaed	60.8	.....	40	.....	1	.....	Trace	.....	6-27	.....	8-6	.....
MARFED	60.6	.....	41	.....	0	.....	Trace	.....	7-6	.....	8-10	.....
Federation	59.9	.....	41	.....	0	.....	1	.....	7-8	.....	8-12	.....
Idaed	59.6	.....	36	.....	1	.....	Trace	.....			
Baart	59.1	.....	39	.....	4	.....	Trace	.....			
MARFED	57.9	57.6	32	31	0	1	0	1				
Federation	56.8	57.1	33	30	0	1	0	1				
Baart	62.3	.....	45	.....	8	.....	0	.....			
Idaed	61.0	.....	38	.....	1	.....	0	.....			
MARFED	60.1	61.8	39	41	0	38	0	0				
Federation	59.3	61.1	40	43	0	5	0	0				
Baart	60.2	.....	29	.....	34	.....	0	.....	6-8	.....	6-8	.....
Idaed	58.7	.....	28	.....	14	.....	0	.....	6-8	.....	6-8	.....
Federation	57.2	.....	26	.....	6	.....	0	.....	6-5	.....	6-5	.....
MARFED	56.7	.....	23	.....	8	.....	0	.....	6-8	.....	6-8	.....

* Trace is less than one-half per cent

Does It Have Good Quality?

Marfed, as determined from five years' tests, has not always been equal to Federation in milling quality. Although usually satisfactory in milling, some lots of Marfed have produced flour that has been difficult to bolt or sieve. It would appear also that Marfed may be somewhat variable in milling quality, usually because of seasonal variation. The flour from Marfed generally has averaged lower in ash but about the same in protein as compared with the flour from comparably grown samples of Federation. The baking quality of both varieties has been approximately the same except that the cookies from Marfed generally have not been as good as the cookies from comparably grown samples of Federation.

Does It Have Disease Resistance?

In tests of reaction to 25 races of common bunt, Marfed was found to be moderately to highly resistant to 13 races as compared with nine for Federation². Marfed also has exhibited moderate resistance to powdery mildew in the field while Federation has been highly susceptible.

How About Its Winterhardiness?

Marfed appears to be slightly more winterhardy than Federation. The only good comparison which has been observed was in the Pullman rod-row nursery in 1945 when 12 per cent of the plants of Federation were winterkilled and the remaining plants exhibited severe frost damage. In the same nursery, all of the plants of Marfed survived with only slight frost damage to the leaf tips.

How Is Marfed Being Distributed?

Approximately 2000 bushels of foundation seed will be distributed by the Division of Agronomy, Washington Agricultural Experiment Station, to selected farmers for seed production in 1947. The seed is being allocated to counties on a pro rata basis with the cooperation of the Washington State Crop Improvement Association and the county Extension agents who select qualified seed growers and determine allocations within each county. The growers selected agree to produce certified seed and make it available to other farmers at the prevailing prices of certified seed.

A list of growers will be available on request from the Secretary of the Washington State Crop Improvement Association, Extension Service, The State College of Washington, Pullman, Washington.

² Rodenhiser, H. A. and Holton, C. S. "Distribution of races of *Tilletia caries* and *T. foetida* and their relative virulence on certain varieties and selections of wheat." *Phytopathology* 33: 955-969. 1945.