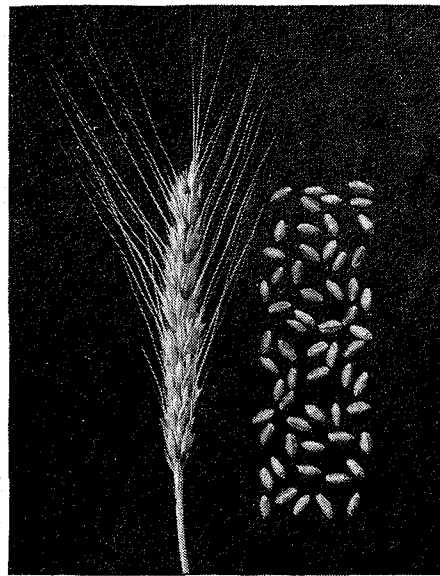

STATE COLLEGE OF WASHINGTON
AGRICULTURAL EXPERIMENT STATION
Pullman, Washington

Division of Agronomy and Division of Cereal Crops and Diseases
Bureau of Plant Industry, Soils, and Agricultural Engineering
United States Department of Agriculture,
in cooperation

Orfed Wheat

by

O. A. Vogel, S. P. Swenson and C. S. Holton



Bulletin No. 451

September, 1944

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¹ In cooperation with the United States Department of Agriculture.

² On military leave.

ORFED WHEAT¹

O. A. Vogel, S. P. Swenson and C. S. Holton²

What Is Orfed Wheat?

Orfed is a new variety of white wheat which is adapted primarily in those areas of eastern Washington where soft wheats are grown. It can be grown from either fall or spring seeding, but it probably will be grown principally as fall-sown wheat.

How Does Orfed Look?

Orfed has a bearded head with smooth white chaff. It has stiff, erect, medium fall straw which is fairly fine and somewhat wiry in appearance as contrasted to other stiff-strawed varieties which have coarse straw. Its appearance in the field is similar to that of Turkey and related varieties except that the straw is stiffer and its heads are borne in an erect rather than a nodding position.

A head and some kernels of Orfed are shown on the cover page.

Why Is Orfed Being Distributed to Farmers?

Orfed is being distributed in response to a demand in eastern Washington for a stiff-strawed, shattering-resistant variety of good quality. During six years of testing as a winter wheat, it has performed sufficiently well in comparison with the best commercial soft wheat and club varieties to warrant its release to farmers. The results of four years of testing as a spring wheat indicate that it also can be grown as a spring-sown variety to a limited extent, particularly in early seedings and to patch up fall-sown fields of Orfed which have been partially winterkilled. Such a variety makes it possible for a farmer to grow only one variety on a given field or farm, and thereby avoid mixtures of varieties and classes of wheat.

How Was Orfed Developed?

Orfed was selected from a cross between Oro and Federation, made in 1931 at the Idaho Agricultural Experiment Station, Moscow, Idaho, by Dr. V. H. Florell, at that time Associate Agronomist in the Bureau of Plant Industry, United States Department of Agriculture. Seed for the second generation was obtained by the senior author and

¹Contribution of the Washington Agricultural Experiment Station 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.

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planted at Pullman in the fall of 1932. Seed for the third generation was inoculated with several races of stinking smut and planted in the fall of 1933. Smut-free plants which were resistant to both lodging and shattering were selected in 1934 and subjected to subsequent re-selection and testing in both fall and spring plantings during the next three years.

In 1938, several uniform selections were grown in preliminary yield trials and the most promising ones advanced to the 1939 rod-row nurseries at Pullman, Pomeroy, and Walla Walla. Selection 80, later named Orfed, was advanced to the field plots at Pullman in 1940 and samples from the 1940 crop were submitted to cereal chemists for tests of milling and baking quality. In 1942, Orfed was supplied in small quantities to selected farmers for field trials and increase. It was officially released for commercial use in 1943.

How Does Orfed Perform in Comparison with Other Commercial Varieties?

Orfed has been tested as a fall-sown variety for six years (1939-44) in rod-row nurseries at Pullman, Pomeroy, and Walla Walla, for three years (1940-42) in field plots at Pullman, and for two years (1943-44) in advanced nurseries at Pullman. It has been tested as a spring-sown variety in similar trials, in the rod-row nurseries for four years (1941-44) and in the advanced nurseries for two years (1943-44).

In all of these trials, Orfed has been grown in comparison with all of the leading commercial varieties as well as with several promising new ones. The rod-row nurseries are made up of three replications of each variety, grown in a three-row plot with rows one foot apart and 20 feet long. The field plots were one-fortieth of an acre in size, seven feet wide and 155.6 feet long, grown in duplicate on both fallow and pea ground. The advanced nurseries which replaced the field plots in 1943 are rod-row nurseries grown in three replications under each of four different conditions of topography and previous treatment, south slope fallow, south slope pea ground, north slope fallow, and north slope pea ground. Thus, a total of 12 replications is used in the advanced nursery trials.

The yields and other agronomic data from the various trials and periods of testing are given in Tables 1 to 4, inclusive, for Orfed and five other important commercial varieties.

How Well Does It Yield?

The data in Table 1 show that in fall seedings, Orfed compares very favorably in yield with the leading fall-sown wheat varieties. Over a five-year period in the field plots and advanced nurseries at Pullman, it ranks first among the five varieties shown in the table.

Table 1. Annual and average yields of ORFED and other commercial fall-sown varieties tested at Pullman, Pomeroy, and Walla Walla during the period 1939 to 1944, inclusive.

Variety	Yield bushels per acre							
	1939	1940	1941	1942	1943*	1943†	1944	Av.
Pullman Field Plots And Advanced Nurseries								
		Field Plots			Advanced Nurseries			
ORFED		54.8	63.1	53.9		83.5	46.4	60.3
Triplet		45.2	51.6	55.2		89.0	43.0	56.3
Golden		40.2	58.9	51.9		72.5	43.5	53.4
Rex		47.7	61.9	49.6		62.8	38.5	52.1
Hymar		42.6	43.1	47.1		65.5	44.8	48.6
Pullman Rod Row Nursery								
Rex	61.0	70.5	76.7	86.2	78.0	68.0	64.8	72.2
Triplet	67.2	76.0	60.7	72.8	71.7	74.3	74.2	71.0
ORFED	68.7	73.3	65.8	83.0	56.3‡	69.2	70.7	69.6**
Hymar	61.0	76.0	40.2	71.5	84.3	74.7	65.8	67.6
Golden	56.3	72.2	66.3	78.0	70.0	57.0	69.7	67.1
Pomeroy Rod Row Nursery								
Triplet	36.5	35.7	Hilled	54.3	41.3		49.0	43.4
ORFED	28.5	34.8	out	52.7	46.3		50.0	42.5
Rex	35.2	35.3	"	55.5	40.8		44.5	42.4
Golden	44.2	37.2	"	46.7	31.8		41.7	40.3
Hymar	40.7	29.5	"	47.0	43.8		35.7	39.3
Walla Walla Rod Row Nursery								
Federation	61.0	37.3	43.0	47.7	56.8		51.0	49.5
Golden	54.3	36.3	44.8	56.3	57.7		41.8	48.5
Triplet	56.8	34.5	48.8	45.5	55.5		45.8	47.8
Rex	58.0	37.7	50.7	48.3	48.2		43.2	47.7
ORFED	50.0	38.3	45.5	47.7	55.2		45.7	47.1
Hymar	50.3	37.2	40.3	41.8	57.5		42.2	44.9

* Early seeding, irrigated at Pullman to obtain early emergence.

† Late seeding.

‡ Severely winterkilled in this early seeding.

** Average includes severely winterkilled early seeding in 1943.

It ranks third in the Pullman rod-row nursery, largely because of severe winterkilling in the early seeding in 1943. If the yields from this seeding are omitted from the averages for all five varieties, Orfed ranks first, Rex second, Triplet third, Golden fourth, and Hymar fifth. It will be pointed out later that Orfed should not be sown too early because its spring habit of growth may cause it to advance beyond the stage of maximum winter hardiness before the arrival of winter.

At Pomeroy, Orfed is exceeded in yield by Triplet by only 0.9 bushel. Four varieties exceed it at Walla Walla where Federation is commonly sown in the fall and for this reason has been included for comparison. However, the yield of Orfed still can be considered as

Table 2. Annual and average yields of ORFED and Federation from spring-sown tests at Pullman, Pomeroy, and Walla Walla during the period 1941 to 1944, inclusive.

Variety	Yield bushels per acre						Av.
	1941	1942	1943*	1943†	1944*	1944†	
	Pullman Advanced Nurseries						
Federation				39.5		37.0	38.3
ORFED				40.2		32.0	36.1
	Pullman Row Nursery						
ORFED	46.2	66.2	66.7	60.3	63.0	50.8	58.9
Federation	38.8	58.5	63.0	53.2	60.2	49.7	53.9
	Pomeroy Rod Row Nursery						
Federation	Hilled	42.7	Not		24.8		33.8
ORFED	out	41.5	planted		23.3		32.4
	Walla Walla Rod Row Nursery						
Federation	43.4	48.0	53.5		41.8		46.7
ORFED	41.3	46.0	46.7		45.0		44.8

* Early seeding.

† Late seeding.

satisfactory at Walla Walla considering that it is not as likely to winterkill as Federation.

The yields of Orfed in spring seedings with Federation are given in Table 2. Only two years' data are available from the advanced nurseries where Federation has slightly outyielded Orfed. In the rod-row nursery at Pullman which usually is planted earlier than the advanced nurseries, Orfed has outyielded Federation. At Pomeroy and Walla Walla, Federation has yielded slightly more than Orfed but the differences are not great.

Does It Have Good Test Weight?

The data in the first column of Table 3 show that in the fall-sown trials, Orfed has the highest average test weight in all locations except at Walla Walla where it is exceeded only by Rex.

In the spring-sown trials, it has a higher test weight than Federation in all instances.

Does It Have Satisfactory Winterhardiness?

With the exception of Federation, the varieties listed in Table 3 survive most of the winters with little or no winterkilling at all of the locations. Consequently, average stand percentages as shown in the second column of Table 3 are all relatively high and do not reveal marked differences in winter survival. For this reason, it is desirable to use survival data only from years in which differential winterkilling occurs to evaluate the relative winterhardiness of wheat varieties.

Table 3. Summary of data on characters other than yield of ORFED and other commercial fall-sown varieties tested at Pullman, Pomeroy, and Walla Walla during the period 1939 to 1944, inclusive.

Variety	Average for years indicated							
	Test weight lbs.	Winter survival		Date headed	Date ripe	Height in.	Lodging per cent	Shattering per cent
		per cent						
	Pullman Field Plots And Advanced Nurseries (1940-44)							
ORFED	63.1	92	6-9	7-28	46	3	0.0	
Triplet	62.7	92	6-11	7-26	50	28	0.1	
Rex	62.0	83	6-7	7-27	47	2	Trace	
Hymar	61.6	94	6-18	7-28	53	7	0.1	
Golden	60.2	90	6-15	7-27	47	13	2.0	
	Pullman Rod Row Nursery (1939-44)							
ORFED	63.4	86	6-3		48	11	0.1	
Triplet	63.4	95	6-6		51	26	0.1	
Rex	62.5	94	6-2		48	9	0.0	
Hymar	62.2	97	6-12		55	21	0.0	
Golden	60.7	88	6-10		51	29	3.0	
	Pomeroy Rod Row Nursery (1939-44)							
ORFED	62.7	92			39	2	0.4	
Triplet	61.3	92			42	10	0.4	
Rex	59.9	91			41	4	0.2	
Hymar	59.1	95			43	2	0.4	
Golden	58.0	85			42	8	5.0	
	Walla Walla Rod Row Nursery (1939-44)							
Rex	61.9	100			46	7	0.0	
ORFED	61.3	100			44	5	0.0	
Triplet	61.3	100			47	14	0.5	
Federation	59.9	94			43	4	0.5	
Hymar	59.6	100			51	12	0.1	
Golden	58.1	100			46	14	5.0	

Severe winterkilling of winter wheat was experienced in only one of the six years during which Orfed has been tested when subzero temperatures without snow cover occurred during the winter of 1942-43. Fortunately, the rod-row nursery at Pullman was planted in the fall of 1942 in both an early (September 25) and a late (October 16) seeding so the reaction of varieties to cold injury could be studied at two different stages of development. Because the seedbed was extremely dry, the early seeding was irrigated in order to obtain early emergence on October 6. The late seeding did not emerge until December 14 because of the late arrival of the fall rains. As noted in Table 5, differential winterkilling also occurred in the other trials which did not emerge until early December except at Walla Walla where emergence occurred about October 27.

The severe winterkilling in Orfed in the early seeding of the Pullman rod-row nursery probably occurred because of its spring habit of growth which caused it to advance in the fall beyond the two-or three-leaf stage of maximum hardiness to the tillering stage. In the later seeding of the rod-rows, it survived better than Rex and Golden

Table 4. Summary of data on characters other than yield of ORFED and Federation from spring-sown tests at Pullman, Pomeroy, and Walla Walla during the period 1941 to 1944, inclusive

Variety	Average for years indicated					
	Test weight lbs.	Date headed	Date ripe	Height in.	Lodging per cent	Shattering per cent
Pullman Advanced Nurseries (1943-44)						
ORFED	63.3	7-16	8-14	40	Trace	0.2
Federation	60.0	7-10	8-10	41	Trace	0.3
Pullman Rod Row Nursery (1941-44)						
ORFED	63.0	7-5	.....	48	0	0
Federation	59.1	6-30	.....	46	0	0
Pomeroy Rod Row Nursery (1942-44)						
ORFED	59.7	.....	.....	42	0	0
Federation	55.1	.....	.....	43	0	0
Walla Walla Rod Row Nursery (1941-44)						
ORFED	61.4	.....	.....	43	0	0
Federation	59.8	.....	.....	41	0	0

while on the fallow of the advanced nurseries and at Pomeroy, it was equal or superior to Rex and Golden. Its winterhardiness is definitely superior to that of Federation at all places.

With the possible exception of Hymar, Orfed probably is as winterhardy as most of the leading commercial varieties of soft wheat, provided it is not sown too early in the fall.

Is It An Early Or Late Variety?

The average heading dates in the third column of Table 3 show that Orfed is an early variety when fall-sown, being nearly as early as Rex. When spring-sown, Orfed is six days later in date of heading than Federation, as seen from the data in Table 4.

How Tall Does It Grow?

Orfed is a medium tall variety as seen from the average heights given in the fifth column of Table 3 and the fourth column of Table 4. It grows slightly shorter than Rex when fall-sown and slightly taller than Federation when spring-sown.

Table 5. Summary of data on winter survival of ORFED and other commercial fall-sown varieties at Pullman, Pomeroy, and Walla Walla after the winter of 1942-43.

Variety	Per cent winter survival in indicated trials					
	Pullman			Pomeroy Rod Rows	Walla Walla Rod Rows	Av.
	Advanced Nursery	Rod Rows				
	on fallow	Early seeding*	Late seeding	Rod Rows	Rod Rows	Av.
Hymar	97	98	83	73	100	90
Triplet	88	93	75	60	100	83
Rex	58	93	63	57	100	74
ORFED	80	27	73	58	100	68
Golden	80	70	47	25	100	64
Federation	.....	0	0	0	70	18

* Irrigated to obtain early emergence.

Is It Resistant To Lodging?

The average lodging percentages in the sixth column of Table 3 show that Orfed is approximately as resistant to lodging as Rex. In 1941, when severe lodging occurred at Pullman, Orfed and Rex lodged relatively little while Triplet, Golden, and Hymar were badly lodged.

Is It Resistant To Shattering?

Orfed is highly resistant to shattering and is about equal to Rex in this respect. Unlike Rex which is sometimes difficult to thresh, Orfed is relatively easy to thresh. The shattering percentages given in the last columns of Tables 3 and 4 show that it has exhibited little or no shattering except at Pomeroy where severe shattering frequently occurs.

Is Orfed Resistant to Smut?

Orfed is classed as a smut-resistant variety but this does not mean that it can be grown safely without seed treatment. Like the Oro parent, it is highly resistant to all except two of the 26 known races of common bunt. This high natural resistance to the majority of bunt races greatly reduces the smut hazard in Orfed but careful seed treatment must be practiced because of its high susceptibility to the two so-called Oro races, T-16 and L-8.

The limited information available on the reaction of Orfed to dwarf bunt (also called sucker smut and stubble smut and controllable only by growing resistant varieties) indicates that it is more susceptible than Hymar and Rex but more resistant than Triplet and Golden. It probably is not sufficiently resistant, however, to effectively combat this disease in areas of severe infestation.

Does Orfed Have Good Quality?

Since 1940, samples of Orfed from the different trials discussed in this bulletin and from increase fields on different farms in eastern Washington have been sent to several cereal chemists for milling and baking tests. These chemists have found its quality to be satisfactory and have pronounced it a desirable variety for milling and baking purposes.

What Is The Best Time To Sow Orfed?

As pointed out under the discussion of its winterhardiness, Orfed should not be sown too early in the fall. A safe recommendation appears to be that it should not be sown before October 15.

If sown in the spring, Orfed should be sown as early as possible because of its relatively late maturity as a spring-sown variety.

What Is The Best Rate of Seeding For Orfed?

Orfed should not be sown at a rate exceeding 60 pounds per acre because it produces a large number of tillers and resumes growth early in the spring. The kernels have a smooth surface and run through the drill fairly rapidly; consequently, the drill setting should be reduced from the rate used for Golden, Triplet, or Federation.

Where Can Orfed Seed Be Obtained?

Several selected farmers grew seed of Orfed in 1944 under agreements requiring them to keep the seed as pure as possible and to make their increases available as seed to other farmers for 1945. Some foundation seed also is available from the Division of Agronomy, Washington Agricultural Experiment Station, Pullman, Washington.

A list of growers is available on request from the Division of Agronomy, Washington Agricultural Experiment Station, Pullman, Washington.