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Variety Tests of Oats, Barley, and Spring Wheat

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SUMMARY

The acreages of the three principal spring small-grain crops grown in Nebraska in 1930 were: oats, 2,485,000 acres; barley, 725,000 acres; and spring wheat, 188,000 acres.

The outstanding change in acreage among the spring small grains in this state has been the threefold increase in barley acreage during the last three years. The increased popularity of this crop can be ascribed largely to the introduction of superior varieties, to the greater use of the combine in harvesting, and to a growing appreciation of its relatively high productivity and feed value.

The importance of growing well-adapted varieties is illustrated by a 15 per cent superiority during a 24-year period in the average grain yield of three standard early varieties as compared with four late-maturing varieties of oats.

Nebraska No. 21 and Burt C. I. 293 are the most extensively grown varieties of oats. Certified seed of both is available in large quantities. During an eight-year period, their yield has averaged 3 per cent more than that of Kherson. Several more recently developed selections not yet available for distribution have given evidence of greater superiority.

A number of relatively new smooth-awned varieties of barley introduced from other states have proved very desirable for Nebraska conditions. This type predominates in eastern Nebraska where harvesting methods require the handling of sheaf grain. Smooth beards eliminate much annoyance and greatly increase the feeding value of the straw. In the western portion of the state where grain is extensively harvested with the combine, rough-bearded barley predominates.

Among the smooth-awned sorts, Comfort and Glabron are most extensively grown and have yielded approximately 20 per cent more than the Common Six-row, which was largely grown prior to their introduction. Trebi has proved unsurpassed during eight years of testing by the Experiment Station and is decidedly the most popular of the rough-awned sorts. Other more recently introduced varieties are promising.

Ceres has proved the most desirable of the spring-wheat varieties available for production in this state. During four years, it has yielded 18 per cent more grain per acre than Marquis. Its yield rather closely approximates that of the durum varieties. This fact together with a lower market value of the durum grain would seem to justify a more extensive substitution of Ceres for the durum varieties.

Variety Tests of Oats, Barley, and Spring Wheat

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The use of superior varieties is of first importance in the production of spring small grains. The comparative merits of the different crops and their available varieties may be best determined through tests extending over a period of years. Tests of oats, barley, and spring wheat have been made on the Experiment Station Farm of the Nebraska College of Agriculture at Lincoln.¹ Similar tests preceding 1923 were reported in Nebr. Exp. Sta. Bul. 201. Most of the less-promising sorts were discontinued in 1923. The plan has been to have these variety trials include the most promising sorts obtainable from Nebraska and other states. Most of the varieties grown have originated in the breeding experiments of various state and federal experiment stations. A number of standard varieties have been retained to serve as a measure with which to compare the newer sorts.

DISTRIBUTION AND IMPORTANCE OF THE VARIOUS SMALL GRAINS

The distribution and acreages of the various spring small grains and of winter wheat are shown in the four accompanying maps. According to the 1930 crop report of the Nebraska State and Federal Division of Agricultural Statistics, the acreages of oats, barley, and spring wheat were respectively 2,485,000, 725,000, and 188,000 acres. The acreage of oats has remained fairly constant during the last ten years, while that of spring wheat has lowered approximately 25 per cent. Spring wheat has been giving way to winter wheat. The acreage devoted to barley has increased nearly threefold in the last four years—from 246,000 acres in 1927 to 725,000 in 1930. This change is due to the introduction of superior varieties, the increased use of the combine, and to a growing recognition of the high productivity and feed value of this crop.

OATS

ADAPTATION

The most important principle to bear in mind in the choice of oats varieties to be grown in this state is that the climatic conditions normally favor the early-maturing sorts. The late varieties are at a distinct disadvantage because danger from heat, drouth, and rust increases as the season progresses.

¹ These varietal comparisons have been made in standard field plats approximating 1/30-acre areas and replicated annually two to five times according to the amount of land available. The plats were the width of a grain drill and could be harvested with one swath of the binder. Uniform cultural practices have been maintained to insure comparable results.

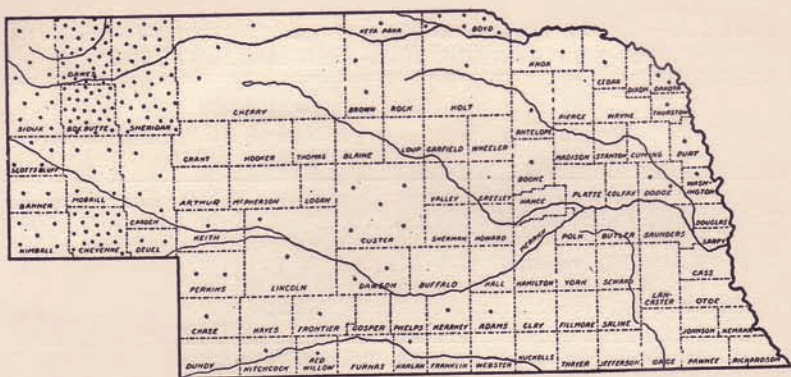


FIG. 3.—Spring wheat distribution, 1930. Total production, 188,000 acres. Each dot represents 1,000 acres. Data supplied by Nebraska State and Federal Division of Agricultural Statistics.

Lincoln. Considered as a group, the early sorts ripened an average of six days in advance of the late varieties and yielded 7.6 bushels per acre or 15 per cent more.

Although the seed of these varieties has been grown continuously at the Experiment Station for 26 years, no tendency for the two groups to become more similar has been noted. The less-adapted sorts have not tended to become better acclimated because of long-continued growing under these conditions.

COMPARISON OF VARIETIES OF OATS

The annual and average yields obtained from 32 varieties

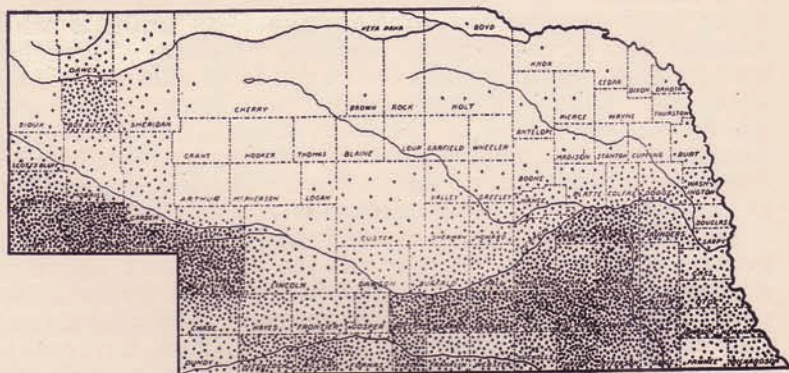


FIG. 4.—Winter wheat distribution, 1930. Total production, 3,622,000 acres. Each dot represents 1,000 acres. Data supplied by Nebraska State and Federal Division of Agricultural Statistics.

TABLE 1.—*Early vs. late-maturing varieties of oats—twenty-four-year average, 1905-1918 and 1920-1929*

Type of oats	Average time of ripening	Yield per acre	
	Date	Bushels	Per cent
Three standard early varieties ¹	7/7	50.3	100
Four standard late varieties ²	7/13	42.6	85
Difference.....	6 days	7.5	15

¹The early varieties consisted of Kherson, Burt, and Texas Red. The latter variety has been grown under this name for many years and differs from Red Texas of southern states. It somewhat resembles Burt.

²The late varieties included Swedish Select, American Banner, Lincoln, and University No. 6 (Minn. Agr. Exp. Sta. No. 6).

tested during the last eight years are reported in Table 2. Some of these have not been grown throughout the entire period but were added as they gained prominence either in our own small-grain-improvement nursery or elsewhere. The last column in the table shows the yield of each variety in percentage of the yield of ordinary Kherson oats for the same years.

Selections from the Kherson variety.—It will be noted that ten selections made by various state or federal experiment stations from Kherson oats have been included in the test. The range in yield among these has been from a decrease of 2 per cent to an increase of 5 per cent, as compared with the original variety. Nebraska No. 21 averaged 3 per cent better than Kherson. This is the only one of this group which is being grown extensively in Nebraska. Its grain is white, whereas that of the original Kherson is yellow. There have been no material differences in the yields of related Nebraska selections. Other outstanding sorts are Iowar and Iogold, which were developed by the Iowa Experiment Station, and Edkin and Kherson No. C. I. 459, which were distributed by the U. S. Department of Agriculture. The Iogold and Edkin are characterized by a high degree of resistance to stem rust.

Selections from the Burt variety.—There is somewhat greater promise in a number of the new Burt selections. Although these have been tested for only two years in field plots, their previous record in nursery tests substantiates their apparent superiority over both the original Burt and the original Kherson. The best of this group of seven relatively new Burt selections surpassed the Kherson by 15 per cent and the poorest was 3 per cent better. While seed of none of

TABLE 2.—Oats varieties—comparative results in field tests—eight years, 1923-1930

Variety	Source of seed	Summary 1929-1930					Yield of grain per acre								Average		
		Date in head	Date ripe	Height	Test weight	In. (5)	Lbs. (6)	Annual								Actual	Relative
								1923	1924	1925	1926	1927	1928	1929	1930			Bu. (15)	P. ct. (16)
KHERSON																	
Kherston (common)	Nebr.	6/10	7/3	35	32.1	66.4	42.5	27.0	11.5	44.6	43.5	62.0	70.5	46.0	100		
Nebr. No. 5	Nebr.	6/9	7/3	34	32.2	69.6	45.8	26.8	10.2	45.8	43.5	65.2	71.7	46.8	102		
Nebr. No. 21	Nebr.	6/11	7/3	34	32.9	66.0	49.7	28.5	11.1	47.3	41.7	66.7	69.6	47.6	103		
Nebr. No. 23	Nebr.	6/9	7/3	34	33.3	68.9	49.4	29.5	12.0	42.5	42.3	69.0	64.7	47.3	103		
Nebr. No. 33	Nebr.	6/9	7/3	34	33.2	68.3	48.0	27.6	10.2	43.7	46.0	68.5	66.8	47.5	103		
C. I. No. 459	U. S. D. A.	6/0	7/3	33	32.9	70.1	45.7	29.5	10.2	47.5	45.5	69.4	70.2	48.5	105		
Iowa No. 103	Iowa	6/9	7/3	34	33.3	69.7	47.2	29.9	8.8	42.1	38.3	62.2	70.2	47.3	98		
Iowa No. 103	Iowa	6/13	7/3	34	31.7	70.7	47.2	26.6	9.8	42.0	41.1	64.3	66.3	47.3	103		
Gopher	Minn.	6/11	7/5	33	32.8	60.2	43.7	27.1	10.3	50.9	42.5	66.2	72.2	46.4	104		
Loggold	Iowa	6/10	7/4	33	32.5	60.2	43.7	27.1	10.3	47.3	40.7	68.5	71.3	46.4	104		
Edkin	U. S. D. A.	6/11	7/4	31	34.4	60.2	43.7	27.1	10.3	47.3	40.7	65.7	71.4	46.4	103		
BURT																	
Burt (common)	Nebr.	6/6	7/3	34	33.7	69.9	42.2	28.8	8.8	43.5	42.9	64.1	76.1	47.1	102		
C. I. No. 293	U. S. D. A.	6/8	7/3	34	36.2	70.8	47.7	24.9	9.1	45.3	44.4	66.8	74.4	47.9	104		
Nebr. No. 517	Nebr.	6/7	7/3	35	32.9	66.0	45.8	28.5	11.1	47.3	41.7	66.7	74.4	47.9	115		
Nebr. No. 218	Nebr.	6/6	7/1	36	34.2	66.0	45.8	28.5	11.1	47.3	41.7	66.7	74.4	47.9	115		
Nebr. No. 519	Nebr.	6/8	7/1	36	35.4	66.0	45.8	28.5	11.1	47.3	41.7	66.7	74.4	47.9	109		
Nebr. No. 520	Nebr.	6/8	7/2	34	35.2	66.0	45.8	28.5	11.1	47.3	41.7	66.7	74.4	47.9	107		
Nebr. No. 521	Nebr.	6/6	7/2	35	33.4	66.0	45.8	28.5	11.1	47.3	41.7	66.7	74.4	47.9	110		
Nebr. No. 521	Nebr.	6/6	7/2	35	33.4	66.0	45.8	28.5	11.1	47.3	41.7	66.7	74.4	47.9	108		
C. I. No. 2491	U. S. D. A.	6/7	6/30	33	34.0	66.0	45.8	28.5	11.1	47.3	41.7	66.7	74.4	47.9	103		
Akron No. 6076-16	U. S. D. A.	6/8	7/4	34	35.1	66.0	45.8	28.5	11.1	47.3	41.7	66.7	74.4	47.9	110		
MISCELLANEOUS EARLY VARIETIES																	
Texas Red	Nebr.	6/10	7/5	34	33.8	68.4	41.6	27.9	10.7	48.5	45.1	66.6	72.7	47.7	104		
Kanana	Kan.	6/11	7/5	33	35.3	71.7	30.1	23.6	9.9	45.3	33.9	61.3	70.4	43.3	94		
Red Rust Proof	Mo.	6/12	7/7	37	33.2	65.4	30.2	29.5	13.5	46.9	43.6	60.4	67.2	44.6	97		
Alaska	Canada	6/8	7/1	39	37.7	65.4	30.2	29.5	13.5	46.9	43.6	60.4	67.2	44.6	86		
MISCELLANEOUS LATE VARIETIES																	
Swedish Select	Nebr.	6/16	7/9	37	31.3	63.5	29.3	29.7	14.0	45.9	47.9	50.2	56.3	42.1	91		
Red Algerian	Kan.	6/11	7/8	35	32.8	49.6	24.5	27.7	11.5	48.4	39.9	54.2	64.5	40.0	87		
Green Russian	Nebr.	6/16	7/8	36	31.8	61.7	27.1	26.7	10.3	52.9	45.3	52.2	62.4	42.3	92		
Iogren	Iowa	6/17	7/8	36	32.3	61.7	27.1	26.4	8.6	45.2	46.3	49.3	59.2	42.3	91		
Markton	U. S. D. A.	6/15	7/8	36	32.9	61.7	27.1	26.4	8.6	45.2	46.3	49.3	59.2	42.3	93		
New Victory	Nebr.	6/18	7/13	38	34.8	61.7	27.1	26.4	12.3	44.6	42.1	58.2	68.3	45.7	75		
HULLESS																	
Liberty	Minn.	6/10	7/4	37	45.4	61.7	31.7	32.4	9.4	43.3	42.9	59.4	77.7	45.7	98		
S. Dak. No. 7	S. Dak.	6/7	7/3	35	41.7	61.7	31.7	32.4	9.4	43.3	42.9	59.4	77.7	45.7	108		

The yields of hullless oats have been calculated on the basis of 30 per cent hull and 32 pounds per bushel.



FIG. 5.—Test of oats varieties. Left, Nebraska No. 21; center, Burt C. I. No. 2491; and right, Burt C. I. No. 293. The Nebraska No. 21 and Burt C. I. No. 293 are the most extensively grown varieties in this state.

these is now available commercially, it is probable that several will be increased for co-operative tests on farms.

The common Burt has been grown at the Nebraska station since 1905, while the Burt C. I. 293 was obtained from the experimental farm at Amarillo, Texas, in 1916. The Burt C. I. 293 variety is being rather extensively grown on Nebraska

TABLE 3.—Average yield of selections from Kherson oats in comparison with the original Kherson and other early varieties—14 years, 1916-1918 and 1920-1930.

Variety	Yield per acre	
	Actual	Relative
	<i>Bushels</i>	<i>Per cent</i>
Kherson, Nebraska Common	46.7	100.0
Kherson, Nebraska No. 5	48.3	103.5
Kherson, Nebraska No. 21	48.9	104.7
Kherson, Nebraska No. 23	48.6	104.0
Kherson, Nebraska No. 33	48.4	103.6
Kherson, Iowa No. 103	47.2	101.1
Iowar		103.9 ¹
Kherson, C. I. No. 459	47.8	102.4
Burt, Nebraska Common	47.0	100.7
Burt, C. I. No. 293	49.2	105.3
Texas Red	48.6	104.1
Kanota		94.2 ¹

¹Iowar and Kanota have been in the test 10 and 12 years, respectively, and their relative yields have been calculated on the basis of Common Kherson for the time grown.

farms, having been distributed from the Agricultural College in 1927. With the exception of a small percentage of black kernels, the grain is white. It has been hand-picked several times to reduce the proportion of dark seed.

The U. S. Department of Agriculture selection known as Burt C. I. 2491 is the earliest-maturing sort of oats grown in the Nebraska field-plat tests and appears to be extremely lodge resistant. It would seem to merit trial under conditions where oats are subject to severe lodging, such as fertile bottom lands or following legume crops.

Miscellaneous varieties.—While most of the promising varieties tested have been of Kherson or Burt origin, a number of others, some of which have gained prominence here or elsewhere, have been included in the tests. The most productive of these is a reddish-grained variety which has been grown at the Nebraska station under the name of Texas Red for about thirty years. This must not be confused with the late-maturing Red Rust Proof grown in southern states. Because of its dark color and failure to excel in yield, it does not seem to merit farm distribution. Although Kanota has proved admirably suited to Kansas, where it was distributed by the Experiment Station several years ago, it has averaged only 94 per cent as high in yield as Kherson in the Nebraska tests during eight years. This variety normally requires very early planting (Table 4) for best results.

Seed of the Alaska variety was obtained from the Macdonald College, Canada, in 1928. Although the yield has been 14 per cent below that of Kherson, it is quite outstanding in that it ripens unusually early and yet is the tallest growing of all the different sorts tested. Markton, developed in Oregon, is distinctive in that it has proved entirely resistant to local smut throughout the five years that it has been tested in this state. It might be of value for trial wherever medium-late varieties such as Green Russian and Iogren are in favor. Victory is a popular Canadian variety recently brought to this state by a local seedhouse. It ripens altogether too late for Nebraska conditions and yields only 75 per cent as much as Kherson.

Hulless oats.—Two varieties which thresh free from hull, as does wheat, have been tested for several years. One of these, known as South Dakota No. 7, has yielded 8 per cent more than Kherson during a four-year period, with allowance made for 30 per cent of hull, which is the approximate percentage for Kherson and similar varieties. In case the feed value of hulless oats proves satisfactory, such a high-yielding variety may be attractive as a special-purpose crop.

RECOMMENDED VARIETIES

Of all the varieties tested by the Nebraska Experiment Station, Nebraska No. 21 and Burt C. I. 293 oats are the only sorts that are extensively grown on Nebraska farms. As shown in Table 3, these have ranked highest in yield during the period, 1916-1930. The Nebraska No. 21 should prove somewhat more lodge resistant than the Burt in case of severe lodging conditions. While several others are about equally productive, they do not merit substitution on the basis of present indications. These will be continued for a number of years, together with other promising new selections which are about to be advanced from the nursery breeding plats to the larger field tests. An extensive oat-breeding program is maintained at this station which, together with similar work at other state and federal institutions, should prove a continual source of new improved varieties.

VARIETAL RESPONSE TO TIME OF PLANTING

Comparative tests of Nebraska No. 21 and Kanota oats planted during each of the last three years at early, medium, and late dates indicate a rather striking difference in varietal response to such treatment (Table 4). As an average for the period, the Kanota has ripened four days earlier than Nebraska No. 21 when planted early in March, and one day later when planted April 21.

Although the yields have varied somewhat with the seasons, the averages for the period indicate a greater advantage from early planting in the case of Kanota. In 1930, Kanota surpassed Nebraska No. 21 by 8.7 bushels per acre when sown early in March, while it yielded 13.8 bushels less than Nebraska No. 21 when sown near the middle of April. As an average for the three years, the two varieties yielded equally when sown early, while the Nebraska No. 21 excelled by five bushels per acre, or 10 per cent, when sown late. Both varieties decreased in yield with delayed planting, but the Kanota more than the Nebraska No. 21.

These differences in behavior may be associated with their respective winter and spring growth habits, since the Kanota is typically a southern-grown winter variety and is less suited to normal northern conditions.

BARLEY

ADAPTATION

The adaptation of barley to Nebraska conditions is much better established now that decidedly superior varieties have been developed and distributed for farm use. Prior to about 1920 the prevailing varieties were Common Six-row, Man-

churian (Minnesota 184), and Oderbrucker. These three sorts are now surpassed 15 to 20 per cent by a number of improved and better adapted varieties which are of recent origin and have come into extensive farm use since that time. Their introduction was an important stimulus to the increase of barley acreage from one-tenth to nearly one-third that of oats since 1927. While barley appears to be a suitable crop wherever oats are grown, its relatively more extensive production in western Nebraska suggests a special adaptation in that region.

Barley grown in this state is used largely as feed for livestock. Feeding experiments recently reported by W. J. Loeffel² of the Animal Husbandry Department indicate that the coarsely ground grain has 84 per cent of the feeding value of shelled corn, pound for pound, when fed to hogs. Because of its early ripening, this crop may provide a satisfactory corn substitute far in advance of the time that corn matures.

Prior to the recent development of the smooth-awned varieties, barley straw has been considered objectionable. Rough awns or beards are likely to injure the mouths of livestock, and may cause much annoyance in the handling of sheaf grain or straw. Straw of the smooth-awned sorts is a satisfactory roughage and approaches oats straw in value.

COMPARISON OF BARLEY VARIETIES

The results from testing 23 varieties of barley at the Experiment Station during the last seven years are reported in Table 5. An effort has been made to bring together in this collection the most promising varieties available for this state. These naturally fall into three groups: rough-awned, smooth-awned, and awnless. Some of these have been grown during only a portion of the period. Since Common Six-row was included throughout the test, it is used in the last column of the table as a basis (100 per cent) for evaluating the other varieties during the years that they were grown.

Rough-awned varieties.—Four of the rough-awned varieties that have been grown for the entire six years, namely, Odessa, Coast, Trebi, and McClymont, yielded from 17 to 25 per cent more than the Common Six-row. The McClymont, which is a Lincoln county variety, is exceptionally lodge susceptible. A selection made by the North Platte, Nebraska, Experiment Station Farm from McClymont and known as North Platte No. 1 yielded very well in the one-year test. Of the varieties in this group that have been tested during the entire period, Trebi yielded the most with a 25 per cent greater yield than Common Six-row. This is a comparatively stiff-strawed and

² See Nebr. Exp. Sta. Bulletin 251, *Barley as Hog Feed*.

TABLE 5.—*Barley varieties—comparative results in field tests—six years, 1924-1930*¹

Variety	Source of seed	Summary 1928-1930						Yield of grain per acre					Average			
		Date in head	Date ripe	Plant height	Lodging		Test weight	Annual					Actual	Relative		
					1928	1930		1924	1925	1927	1928	1929			1930	
(1)	(2)	(3)	(4)	In., (5)	P. ct., (6)	P. ct., (7)	Lbs., (8)	Bu., (9)	Bu., (10)	Bu., (11)	Bu., (12)	Bu., (13)	Bu., (14)	Bu., (15)	P. ct., (16)	
ROUGH-AWNED VARIETIES																
Common six-row.	Nebr.	6/10	7/6	33	23	0	46.5	15.8	10.0	42.7	51.4	34.1	40.5	32.4	100	
Minnesota 184.	Minn.	6/10	7/6	36	35	0	46.1	16.6	13.4	38.8	55.2	34.9	41.2	33.4	103	
Oderbrucker.	N. Dak.	6/9	7/6	35	32	0	47.2	16.3	10.1	48.9	51.0	35.5	44.9	34.5	106	
Odessa.	S. Dak.	6/10	7/6	33	47	8	46.9	17.0	11.5	52.4	58.2	42.0	45.4	37.8	117	
Marion.	California.	6/3	7/4	29	1	0	42.3	11.6	7.9	38.4	41.1	40.7	52.0	32.0	99	
Coast.	Nebr.	6/9	7/6	31	15	2	40.5	17.2	12.1	43.3	59.6	47.0	58.6	39.6	122	
Trebi.	Nebr.	6/10	7/7	32	27	0	43.8	19.6	13.5	52.7	55.9	53.1	58.3	40.5	125	
McClymont.	Nebr.	6/7	7/6	33	55	11	48.1	20.4	9.8	45.6	61.6	46.3	56.3	39.5	122	
McClymont, North Platte No. 1.	Nebr.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	138
Horn.	Mont.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	119
SMOOTH-AWNED VARIETIES																
Comfort.	Minn.	6/10	7/7	34	11	1	46.1	18.3	13.3	54.0	61.2	37.2	47.7	38.6	119	
Vulgar x Smooth Awn 450	Minn.	6/10	7/6	30	18	8	46.6	18.9	15.0	51.3	52.8	42.7	61.7	40.4	125	
Flynn.	U. S. D. A.	6/4	7/3	30	3	1	43.0	10.9	9.1	48.5	48.4	38.1	64.0	36.5	113	
Valvet.	Minn.	6/11	7/7	35	27	0	47.1	13.6	8.1	47.3	57.1	31.8	28.9	31.1	96	
Black Barbless.	Mitch.	6/9	7/7	30	18	0	46.2	13.4	10.5	49.3	55.9	45.2	45.2	36.6	113	
Glabron.	Minn.	6/10	7/6	36	3	0	46.8	.....	.....	54.9	62.2	39.3	51.5	123	
Bon Ami.	Ohio.	6/8	7/6	36	5	0	47.6	.....	.....	.....	52.6	33.7	50.2	.....	108
Spartan.	Mich.	6/5	7/5	32	2	1	48.8	.....	.....	.....	49.0	38.1	55.4	.....	113
White Barbless No. 37.	Wis.	6/6	7/5	32	87	10	46.0	.....	.....	.....	57.1	49.4	51.8	.....	126
Vaughan.	California.	6/11	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	128
Ezond.	Idaho.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	129
AWNLESS VARIETIES																
Hullss ² .	Minn.	6/10	7/8	32	6	28	56.2	8.7	9.4	23.1	38.0	29.1	39.2	24.6	76	
Colless.	Colorado	6/7	7/5	32	0	0	42.8	.....	.....	42.5	52.3	46.1	50.8	.....	114

¹Crop destroyed by chinch bugs in 1926.

²The yields of hullless barley have been calculated on the basis of 15 per cent hull, and 48 pounds per bushel.

very productive variety developed by the U. S. Department of Agriculture. It has come to be the most widely grown barley in the western half of Nebraska. Although at first recommended only for irrigated land in western Nebraska, it has also proved especially well suited for dry-land culture in all parts of the state. The rough awns are not so much of a factor in the western portion of the state where combine harvesting is more common.

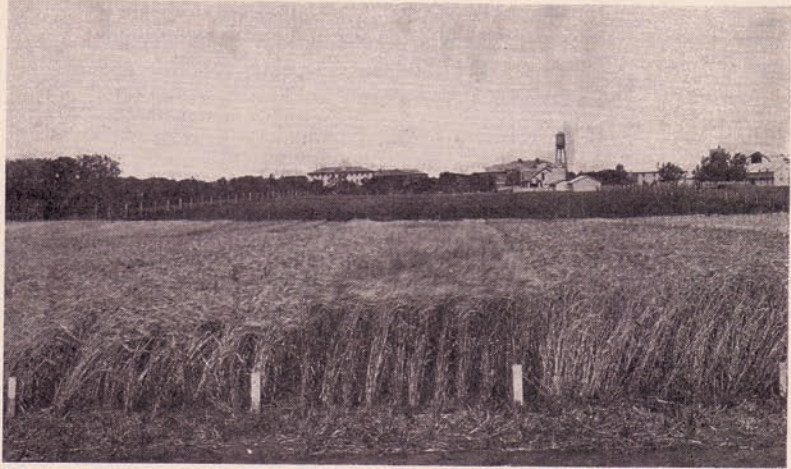


FIG. 6.—Comparison of varieties of barley. Left, Flynn; center, Spartan; right, Comfort. During the three years, 1928-1930, the respective yields of these varieties have averaged 50.2, 47.5, and 48.7 bushels per acre.

Smooth-awned varieties.—During the last few years, the smooth-awned type of barley has come to predominate in the eastern half of Nebraska. This is quite remarkable when one recalls that the first tests in this state were made by the Experiment Station in 1923. Of the eleven smooth-awned varieties grown in 1930, five have been included in the tests since 1924, while the other six have been added at various times since. Most of these have recently originated as hybrids in the breeding nurseries of several state experiment stations and the U. S. Department of Agriculture.

Of the smooth-awned varieties tested for six years, Comfort and Minnesota No. 450 have been outstanding in yield. These have averaged 19 and 25 per cent higher yield than the Common Six-row. The Comfort was distributed for farm use in 1927 because of its somewhat smoother awns and greater uniformity as to type. Another selection of the Comfort which does not grow quite so tall and whose yields averaged 1 per

cent more during a two-year comparison, 1928 and 1929, has also been distributed within the state. These have come to be designated as Tall Comfort and Short Comfort. The former ripens somewhat later, is more lodge resistant and smoother awned, and is the type grown in other states as Comfort.

Flynn is the earliest-ripening variety of the entire collection. Although it has averaged only 13 per cent better yield during the six years than that of Common Six-row, it was the highest-yielding variety in 1930. The climatic conditions of that year especially favored the early-ripening sorts. This short, stiff-strawed, early-maturing variety should probably be tested more extensively in the state.



FIG. 7.—New varieties of barley are continually being introduced from other states and compared with standard local varieties. Left, Velvet; center, Ezond; right, Vaughan. The last two were first grown here in 1930, when these three varieties gave the respective yields of 28.9, 52.1; and 51.8 bushels, as compared with 47.7 bushels for Comfort and 48.3 bushels for Trebi.

The Glabron variety is a decidedly stiff-strawed, tall Minnesota selection with extremely smooth beards. It ripens at about the same time as Comfort. During the four years that it has been grown in these tests, it has yielded 23 per cent more than the Common Six-row. It has a strong tendency to shed its beards when ripe and should be cut when still slightly green in order to avoid shattering. The Spartan is a very attractive Michigan hybrid of the two-row type. Its average yield for the last three years has been 13 per cent above Common Six-row.

A high-yielding variety known as White Barbless No. 37 from Wisconsin has proved rather lodge susceptible on very fertile soils. The Vaughan and Ezond varieties obtained from the California and Idaho Experiment Stations and tested here for the first time in 1930 exhibited attractive vegetative characteristics and yielded 128 and 129 per cent of the Common Six-row.

Awnless varieties.—Hulless barley which threshes free from the chaff the same as wheat is not suited to Nebraska conditions. In the six-year test, it has yielded only 76 per cent as much as Common Six-row, with a 15 per cent allowance made for the hull. Colsess is an early-maturing, stiff-strawed, hooded, hybrid selection made by the Colorado Experiment Station. It has averaged 14 per cent better than the Common Six-row for the last six years.

So far as is known, awned varieties in general surpass the awnless sorts with respect to yield.

RECOMMENDED VARIETIES

The varieties recommended by the Nebraska Station as outstandingly productive under Nebraska conditions are Trebi, Comfort, and Glabron. Certified seed of all of these is available in large quantities from members of the Nebraska Crop Growers' Association, which has its central office at Lincoln. The Trebi is especially popular under irrigation. But it is also unsurpassed in productivity under dry-land conditions elsewhere in the state. Trebi may be regarded as better suited for combine harvesting than any other available sort.

Comfort has given satisfaction wherever handling of the sheaf grain is required and where the straw is needed for feed. The relative merits of the tall and short types of this variety have not yet been fully established. Both are extensively grown and have yielded exceptionally well. Glabron has been the latest of the smooth-awned varieties to be distributed in its home state, Minnesota, where it is recognized as unsurpassed. The splendid performance of this variety in Nebraska tests gives it a very favorable endorsement.

Undoubtedly we may expect still greater improvements in the group of smooth-awned barley varieties since their development has been of such recent origin.

SPRING WHEAT

ADAPTATION

Spring wheat is better suited to western and northern Nebraska than to any other part of the state. Even there it is gradually giving way to winter wheat, which is more productive. The medium-early varieties are better adapted than

the extremely late sorts. This may be well illustrated by the fact that the late-ripening Blue Stem variety (Table 6) has yielded only 69 per cent as much as Marquis during eight years. On the other hand, Prelude (Table 7), which has ripened 10 days earlier than Marquis, has yielded only 80 per cent as much as Marquis.

VARIETIES OF SPRING WHEAT

Awnless varieties.—Marquis was for many years regarded as the leading variety in both Canada and the United States. Among the common spring wheats tested at the Nebraska Experiment Station prior to 1925, it was surpassed only by Kearney, which is a bearded variety. A more recently developed early-maturing variety known as Garnet has been distributed in Canada and has been tested in Nebraska. During the last four years it has yielded 14 per cent more grain than Marquis.

Awned varieties.—A number of recently introduced awned varieties have given promise of being well suited and productive in this state. Kearney, Progress, and Java all appear about equally well adapted, and have yielded from 14 to 20 per cent above Marquis. The Kearney originated in 1911 as an unidentified early-maturing variety grown in Kearney county, Nebraska. It proved exceptionally resistant to Hessian fly in 1930. The Java herein reported was grown from seed introduced into Colorado from Kearney county, Nebraska, and closely resembles the Kearney except that it has matured slightly later. In an earlier test, during the years 1916 to 1922, the Kearney ripened two to three days earlier than Java from six other sources and yielded approximately two bushels more per acre. Progress is a selection made by the Wisconsin Experiment Station from Java wheat. Ceres, a new variety of hybrid origin which is rather resistant to stem-rust, has recently been distributed by the North Dakota Experiment Station. Because of its good performance in Nebraska, it is now also being grown as a certified seed crop. During the last four years it has yielded 18 per cent more than Marquis. Two other promising North Dakota selections, N. Dak. No. 1656.84 and No. 1656.48, have yielded 24 and 28 per cent, respectively, more than Marquis during the three- and one-year periods that they have been tested at the Experiment Station.

A rather new variety by the name of Hope yielded only 73 per cent as much as Marquis in the Experiment Station tests in 1930. Since this variety is being exploited to some extent elsewhere its inferiority may well be borne in mind. The chief

TABLE 6.—Spring wheat varieties—comparative results in field tests—eight years, 1923-1930

Variety	Source of seed	Summary 1927-1930					Yield of grain per acre										Average	
		Date in head	Date ripe	Plant Height	Test weight	1923	Annual										Act-ual	Rela-tive
							1924	1925	1926	1927	1928	1929	1930	Bu.	P. ct.			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)			
COMMON Awnless Varieties																		
Marquis (home grown)	Nebr.	6/16	7/11	35	57.4	18.5	10.9	3.8	1.0	10.8	15.2	20.3	13.8	11.8	100			
Marquis (northern grown)	Minn.	6/16	7/11	36	57.3	18.2	8.9	4.2	1.1	12.6	16.3	19.9	12.5	11.7	99			
Bluestem	Minn.	6/21	7/15	34	51.8	13.4	8.2	2.9	1.3	5.6	14.2	15.1	4.6	8.2	69			
Garnet	Canada	6/8	7/6	33	58.0	.....	.....	.....	.....	16.5	19.1	16.9	15.8	.....	114
COMMON Awned Varieties																		
Kearney	Nebr.	6/10	7/7	35	57.8	19.6	12.3	6.5	2.4	14.3	14.4	16.4	22.0	13.5	114			
Preston	Minn.	6/15	7/13	36	59.2	17.2	9.9	5.2	1.8	11.6	18.2	16.8	15.0	12.0	102			
Kota C. I. 6248	U. S. D. A.	6/16	7/11	36	58.9	13.1	8.4	2.9	0.6	7.0	13.0	15.9	13.7	9.3	79			
Progress	Wis.	6/13	7/9	36	60.0	.....	.....	4.9	1.2	15.3	16.8	18.5	16.8	.....	114
Java	Colo.	6/11	7/9	36	57.9	.....	.....	.....	2.2	13.4	16.6	18.8	22.7	.....	120
Ceres	N. Dak.	6/13	7/11	35	59.0	.....	.....	.....	.....	15.8	18.7	22.8	13.7	.....	119
N. D. 1656.84	N. Dak.	.....	.....	.....	.....	.....	.....	.....	.....	.....	20.7	25.2	15.2	.....	124
N. D. 1656.48	N. Dak.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	17.6	.....	128
Hope	S. Dak.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	10.1	.....	73
DURUM Varieties																		
Arnautka C. I. 1493	Akron, Colo.	6/14	7/13	39	59.8	19.2	11.6	6.6	2.2	15.6	19.2	25.6	18.9	14.9	126			
Kubanka C. I. 1440	Dickinson, N. D.	6/16	7/13	39	58.9	19.4	11.6	4.3	1.6	12.7	20.2	25.0	18.0	14.1	119			
Peliss.	North Platte	6/15	7/13	39	57.9	.....	7.9	5.4	1.5	11.3	17.7	23.4	18.5	.....	113	

TABLE 7.—*Spring wheat varieties discontinued after 1929*

Variety	Years in test	Yield per acre, relative to Marquis (100%) for time in test
		<i>Per cent</i>
Red fife.....	7	85
Red Bobs C. I. 6255.....	9	84
Red Bobs 222.....	3	80
Red Bobs Supreme.....	3	79
Early Triumph.....	3	81
Java, Lancaster Co.....	15	97
Java, Minnesota.....	15	94
Prelude.....	11	80
Norka C. I. 4377.....	9	82
Romanow.....	7	61
Sevier.....	6	72

merit of Hope wheat seems to be its extreme resistance to stem-rust, which makes it of special value as a parent in hybridization experiments.

Durum varieties.—The Arnautka and Kubanka varieties of durum wheat have been tested throughout the last eight years. In comparison with Marquis, their respective yields have been 26 and 19 per cent greater. Due to the superior market value and high yield of several recently introduced varieties of common spring wheat, these will doubtless replace the durums in this state.



FIG. 8.—The two most popular varieties of spring wheat grown in Nebraska. Left, Marquis, and right, Ceres.

Discontinued varieties.—Eleven varieties grown for various periods in these station tests but discontinued in 1929 because of apparent inferiority are reported in Table 7. This list may prove of interest since some of the varieties have gained considerable publicity elsewhere.

RECOMMENDED VARIETIES

Of the varieties available for farm planting, Ceres is recommended as outstanding in productivity, and is desirable in other respects. Marquis is a standard, extensively-grown variety of excellent milling quality and may be grown until replaced as a result of local experience with more productive sorts.

NORTHERN VS. HOME-GROWN SEED

Inquiry is frequently made concerning the comparative seed value of home-grown and imported seed wheat. Such a comparison with Marquis spring wheat was made during the 11-year period, 1920 to 1930, between seed grown continuously

TABLE 8.—*Comparison of the crop from home-grown seed and northern-grown Marquis spring wheat—eleven years, 1920-1930*¹

Crop characters	First six years 1920-1925		Last five years 1926-1930		Av. for 11 years, 1920-1930	
	Home grown	Northern grown	Home grown	Northern grown	Home grown	Northern grown
Date in head.....	6/13	6/14	6/15	6/15	6/14	6/15
Date ripe.....	7/9	7/9	7/11	7/11	7/10	7/10
Plant height (inches).....	25	25	35	36	30	30
Test weight (pounds).....	58.1	58.2	57.4	57.3	57.8	57.8
Yield per acre (bushels).....	11.8	11.5	12.2	12.5	12.0	12.0
Relative yields (per cent).....	100	97	100	102	100	99

¹Marquis seed obtained annually from Minnesota

on the Experiment Station Farm and northern-grown seed introduced each year from Minnesota. The similarity of results reported in Table 8 indicates that the locality of seed production has had no effect upon the seed value and the crop has undergone no hereditary changes which may be associated with a change of environment.

COMPARISON OF VARIOUS SMALL GRAIN CROPS

An eleven-year summary of crop yields on the Experiment Station Farm is shown in Table 9. This period has included several very unfavorable crop years. Although oats yielded the most in terms of bushels, winter wheat and winter rye actually produced the greatest number of pounds of grain per acre. Since some of the grains are regularly threshed free of the chaff or hull, and others vary in the percentage of hull

TABLE 9.—Comparative grain yields of various crops—eleven years, 1920-1930

Kind of crop	Standard weight per bushel	Yield per acre			
		As threshed		Without hull ¹	
	Pounds	Bu.	Lbs.	Lbs.	P. ct.
Oats, Nebraska No. 21	32	53	1709	1196	100
Hulless oats, Liberty	45	22	1008	1008	84
Barley, Comfort	48	33	1573	1337	112
Hulless barley	56	14	768	768	64
Spring emmer, white	48	21	991	753	63
Spring rye, common	56	18	1019	1019	85
Spring wheat, Java	60	17	1001	1001	84
Winter wheat, Nebraska 60	60	36	2189	2189	183
Winter rye, Rosen	56	35	1948	1948	163

¹Oats, barley, and emmer are regarded as having 30, 15, and 24 per cent hull, respectively.

left adhering to the kernel, the best comparison of the grain yields of the different crops is in pounds per acre of hull-free grain. On this hull-free basis, the order of yields is as follows: (1) winter wheat, (2) winter rye, (3) Comfort barley, (4) Nebraska No. 21 oats, (5) spring rye, (6) hulless oats, (7) white spring emmer, and (8) hulless barley.

[5M]