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Varietal Tests with Wheat, Oats, Barley, Rye, and Buckwheat

by M. M. HOOVER and R. J. GARBER

A Typical Small-grain Nursery on the Agronomy Farm

AGRICULTURAL EXPERIMENT STATION
COLLEGE OF AGRICULTURE, WEST VIRGINIA UNIVERSITY
F. D. FROMME, Director
MORGANTOWN

TABLE 1.—Average yield and other characteristics of winter wheat grown (1921-1929) on the Agronomy farm at Morgantown

Name of variety	W. Va. accession number	Variety from which selected	Average percentage survival of spring	Average date headed	Fruiting period in days	Average height in inches	Spike characteristics*	Average percent hardness	Yield in bu. per acre 1921-29	Yield in bu. per acre 1922-29	Rank in bu. per acre 1922-29
Fulhio	28	Fultz	72.3	6-2	36	41.0	A W S	60.7	27.5	28.5	1
Fulcaster	15	Fulcaster	65.7	6-4	37	44.1	B W S	46.9	25.8	26.4	2
Ashland	32	Fultz	65.1	6-2	36	41.0	A W S	59.9	24.2	24.8	5
Reliable 80	22	Gypsy	61.2	6-4	36	42.1	B W S	48.7	23.4	24.7	6
Check (Trumbull)	27	Fultz	63.9	6-2	36	41.5	A W S	68.9	23.2	24.0	7
Fultz 7	13	Fultz	68.4	6-3	36	40.3	A W S	64.4	22.9	22.9	8
Ohio 13384	26	Poole	62.2	6-2	38	41.3	A R S	50.4	22.7	23.6	9
Portage	30	Poole	60.6	6-2	39	39.4	A R S	50.9	21.8	23.0	10
Kentucky		Currell's									
Selection	33	Prolific	58.3	6-2	39	40.2	A R S	61.3	21.3	21.7	12
Mammoth Red	43	Mammoth Red	60.3	6-4	38	43.3	B W S	67.6	25.1	25.1	3
Pennsylvania 44	46	Fulcaster	62.1	6-5	37	44.4	B W S	64.7			3
Currell's Prol.	40	Currell's Prolific	61.7	6-3	39	41.3	A R S	68.7		22.8	11
Bearded Purple											
Straw	42	Fulcaster	56.8	6-4	38	42.4	B W S	75.6		21.0	13
Leap's Prolific	41	Mediterranean Red	54.6	6-5	36	40.5	A W S	68.8		20.8	14

*A—awnless; B—bearded; W—white glumes; R—red glumes; S—glabrous glumes.

Harvesting the row of wheat on the Agronomy farm

Varietal Tests with Wheat, Oats, Barley, Rye, and Buckwheat

by M. M. HOOVER and R. J. GARBER

THE PURPOSE of this bulletin is to present the results obtained to date from varietal experiments conducted by the West Virginia Agricultural Experiment Station with varieties of winter wheat and rye, as well as spring barley, oats, and buckwheat.

The individual grower cannot hope adequately to test each of the crop varieties which he grows. This is the function of the experiment station, since equipment, personnel, and funds are generally available for this purpose. It should be borne in mind that the relative value of varieties does not remain constant over a period of years but fluctuates in response to environmental changes. In order to reduce these fluctuations to a minimum, varietal tests should be carried on for a number of years and during this time all other factors should be held as nearly comparable as possible.

The experiments reported in this bulletin have been carried on for nine years. It is felt that data obtained during this time are sufficient to enable one to draw trustworthy conclusions and make recommendations as to the quality and yield of the varieties tested.

EXPERIMENTAL METHODS

The varieties were grown in plots consisting of three rows spaced one foot apart and 18 ft. long. Seeding was done by hand at the following rates per acre: wheat and rye, six pecks, barley, eight pecks, and oats, ten pecks. At harvest time one foot was cut from each end of the center row and discarded as border; the remainder of the row was cut, wrapped in muslin, and later threshed. In the case of oats the center row of the plot was shortened to 15 ft. The length of row of the harvested plot was varied in order to make it possible to use a convenient factor for calculating the yield of the different crops on an acre basis. Each variety was grown in four systematically replicated plots. Check plots were grown every third to fifth plot and were seeded to a recognized, good-yielding variety of the crop under test.

The Agronomy farm at Morgantown, where the varietal experiments have been carried on, has an elevation of about 1200 ft. The soil is classed as a Dekalb silt loam of medium fertility.

Field notes were taken on stands of the fall-seeded grains before the plots went into the winter. Comparison of this note with a similar stand note taken the following spring gave the data for winter killing. Prior to harvest, notes were taken on date of heading, height, and degree lodged, as well as head characteristics of the varieties tested.

A plot was considered headed when two-thirds of the plants were headed. The fruiting period as listed in Table 1 is the time in days between the date headed and the date ripe.

The percentage and degree of lodging note was taken to give an idea of the portion of the entire plot that was lodged as well as the degree of the lodging. Percentage of lodging, therefore, varies from 0 to 100, while the degree will vary from 0 to 90°. Thus a plot that was completely flat would be recorded as 90° lodged, whereas a plot which had one-third of its plants standing at an angle halfway between erect and horizontal would have recorded a note of 33%—45°.

Harvesting was done by cutting the center row of the plot with a sickle, and wrapping the bundle in muslin with the stake and tag which marked the variety in the field. The four bundles from the four plots of each variety were tied together, placed in a drying shed for several weeks, and then threshed.

Threshing of the varieties was done with a Minnesota type of rodrow thresher. In this type of machine only the heads of the grain are threshed. The thresher is so constructed that it can be quickly cleaned after the threshing of the four plots of a variety. The weight of threshed grain was recorded in grams, and by using a proper factor, this was converted to yield of bushels per acre.

Each sample of threshed wheat was inspected and a note taken on the percentage of hardness. This note was an estimate of the relative amount of corneousness of the threshed sample as compared with standards made up of definite numbers of hard and soft wheat.

Seed for the varieties was obtained from seed plots. These plots were usually grown in a separate part of the nursery and were carefully rogued and handled in such a manner as to reduce to a minimum the chance of mixture with other varieties. Yield data were not taken on these seed plots. Their only purpose was the production of pure seed from each variety represented in the variety test.

WHEAT VARIETIES

Soft Red Winter is the type of wheat generally grown in West Virginia. Statistics compiled by the United States Department of Agriculture show that the acreage of winter wheat has decreased in this state since about 1900; at that time 362,000 was the reported acreage for winter wheat. There was a very pronounced decrease in acreage between 1920 and 1928. The figures given are 219,000 acres in 1920 as compared to 122,000 acres in 1928. The average bushel yield per acre is given as 13. Although West Virginia produces only 0.3 percent of the wheat grown annually within the United States, the wheat crop within the state ranks next to corn in importance among the cereal crops produced.

In all, 18 named varieties of winter wheat were grown on the Agronomy farm. Nine of these varieties were grown for the full nine-year period. Six were grown for eight years, while V. P. I. No. 131, Forward, and Purkoff were grown for six, three, and two years, respectively.

The different named varieties are listed with the names under which they were introduced. These generally represent the better varieties from their respective states. Reliable 80, Fulcaster, and Fultz 7 were grown on the Agronomy farm before 1920. Fulhio, Ohio 13384, Trumbull, Portage, and Gladden were introduced from the Ohio Station; Ashland and Kentucky Selection from the Kentucky Station; Bearded Purple Straw, Currell's Prolific, Mammoth Red, and Leap's Prolific from the Maryland Station; Pennsylvania 44 from the Pennsylvania Station; V. P. I. No. 131 from the Virginia Station; Forward from Cornell University; and Purkoff from the Purdue Station.

In Table 1 are listed the average yield and other characteristics of 14 varieties of winter wheat grown at Morgantown during the years 1921 to 1929, inclusive. Nine of these varieties were grown for the entire nine years and can be considered as having grown under comparable conditions for this time. The highest-yielding variety, Fulhio, a pure-line selection of Fultz, made in 1912 at the Ohio Station, gave an average yield of 28.5 bushels. Fulcaster was second with an average yield of 26.4 bushels for this period. Kentucky Selection, a pure line from Currell's Prolific, made at the Kentucky Station, gave the lowest yield of the varieties that were grown for the entire period. It is of interest to note that the order of the varieties is but slightly changed when the five additional varieties which were grown in the varietal yield test for eight years are considered along with the nine varieties that were grown for the full period. The column in the table headed "Rank" (of varieties for yield per acre) gives the ranking of all varieties for the eight-year period.

When the average yields of the 14 varieties are studied critically it is found that a difference of 7.7 bushels is represented between the highest-yielding variety, Fulhio, and the lowest-yielding variety, Leap's Prolific. If these yield figures for the eight years are analyzed statistically it is found that this difference of 7.7 bushels is not as significant as one might expect. The reason for this is that the differences in yield between the varieties fluctuate considerably during the period of the experiment. In fact, the variety giving the lowest average yield during the 8-year period in one of the years actually produced a higher yield than the other one. This is of interest particularly when considered from the standpoint of the origin of the different varieties under test.

Four of these varieties—Fulhio, Ashland, Trumbull, and Fultz 7—represent pure-line selections from Fultz; Fulcaster, Penn. 44, Bearded Purple Straw, and Mammoth Red represent pure-line selections from Fulcaster or closely related types. Clark *et al* in their classification of American Wheat Varieties state that Mammoth Red is hardly distinguishable from Fulcaster, although from unpublished data Mammoth Red is classified as Silver Sheaf. The particular strain of Mammoth Red reported in this experiment was a pure-line selection of Mammoth Red made in 1912 at the Maryland Station. Ohio 13384 and Portage are both pure-line selections made from the Poole

variety at the Ohio Station. Kentucky Selection and Currell's Prolific are pure lines selected at the Kentucky Station and the Maryland Station, respectively, while Reliable 80 and Leap's Prolific represent selections of Gypsy and Mediterranean varieties, respectively.

In general those varieties having close genetic relationships show similar yields. For example, Ohio 13,384 and Portage, both selections from Poole, rank ninth and tenth with yields of 23.7 and 23.6 bushels, respectively. Fulcaster derivatives, consisting of Fulcaster, Penn. 44, Mammoth Red and Bearded Purple Straw rank second, third, fourth, and thirteenth with average yields of 26.4, 25.1, 25.1, and 21.0 respectively. Currell's Prolific and Kentucky Selection, both coming from Currell's Prolific variety, rank eleventh and twelfth with yields of 22.8 and 21.7. Reliable 80, a selection from Gypsy variety, ranked sixth with a yield of 24.7 bushels, while Leap's Prolific, the only selection from the Mediterranean variety, was lowest in yield with an average of 20.8 bushels for the eight-year period.

Gladden, a pure-line selection from Gypsy made at the Ohio Station in 1906, was grown for seven years during the experiment and gave an average yield of slightly less than Kentucky Selection.

V. P. I. No. 131, a pure-line selection made from Fulcaster at the Virginia Station, has been grown in the varietal experiment for six years and during this time has given an average yield of 23.5 bushels, while Fulcaster for the same period gave an average yield of 25.7 bushels. V. P. I. No. 131 closely resembles Bearded Purple Straw in performance, the records indicating that V. P. I. is headed two days ahead of Bearded Purple Straw but has a fruiting period only one day longer. Bearded Purple Straw has an average height of 8 inches more than V. P. I., whereas the spring survival and percentage of corneousness are almost identical in the two varieties.

Forward, a variety produced by the plant breeding department at Cornell University, has been grown in the variety tests for three years. During this time it has proved to be one of the best-yielding varieties in the test, ranking second to Fulhio for the three-year period. Although three years is hardly sufficient time to test a variety, present indications show Forward to be a wheat well able to yield with the best sorts. This performance of Forward is particularly noteworthy since one of these winters, that of 1927, was very severe and many of the varieties winter killed to the extent of 75 to 80 percent or more.

Purkoff, a variety introduced from the Purdue Station, has been grown for two years. These years have not been marked by any adverse conditions; thus it is felt that the time is entirely too short either to commend or to condemn the variety. Yield and appearance thus far indicate that this variety is well adapted to conditions in West Virginia.

Percentage of spring survival is a measure of the ability of the varieties to withstand winter killing. The relative yielding ability of a variety over a period of years is no doubt determined very largely by its winter hardiness. As stated previously, the winter of 1927 was

particularly severe; many plots were entirely winter killed. Purkoff was by far the most hardy, showing a survival of 65 percent, whereas Fulhio, Fultz, Gladden, Ashland, and Fulcaster followed in the order named, with survivals of 46.5, 46.2, 30, 28.7, and 25 percent, respectively. When the average spring survival during normal years is close to 90 percent, it is seen that a winter like that of 1927 serves as a rigorous selective agency in determining hardiness.

The varieties tested did not show striking differences in regard to date of heading, fruiting period, and height. Although some differences were evident in regard to fruiting period, it was found that those varieties with relatively short fruiting periods were the best-yielding varieties. During the course of the experiment several varieties were dropped because of low yield. As a general rule, late maturity and low yield were found to be associated.

TABLE 2.—*Yield of winter wheat at Lakin, 1923-1929*

Variety	W. Va. accession number	Average yield in bushels per acre
Gladden	29	25.3
Reliable 80	22	23.9
Trumbull (check)	27	23.6
Fulhio	28	23.0
Mammoth Red	43	23.0
Currell's Prolific	40	22.7
Fulcaster	15	22.6
Fultz 7	13	22.5
Portage	30	22.3
Ashland	32	22.2
Penn. 44	46	22.0

Of the five high-yielding varieties for the eight-year period, three are awnless and two are awned. All five have white smooth glumes. Some wheat growers prefer awnless varieties because they are less disagreeable to handle than the awned varieties. So far as yield alone is concerned there seems to be no particular advantage of one form over the other.

Percentage of hardness or corneousness in bread wheats is usually associated with milling quality. Percentage of hardness in the varieties was found to fluctuate widely from year to year; however, within any year a variety would tend to be rather consistently high or low. Fulhio, the highest-yielding variety, shows an average percentage of hardness of 60.7, while Fulcaster, which was second in yield, shows a percentage of hardness of 46.9. Bearded Purple Straw has the highest percentage of hardness but the yield is next to the lowest. These figures show that there is a tendency to show a negative relation between yield and percentage of hardness. This relationship, however, is not sufficiently close to be considered causative.

From the data presented in Table 1 one may safely conclude that any one of the five or six best-yielding varieties over the eight-year period will give satisfactory performance under conditions similar to those existing at Morgantown. Personal preference should guide one in the further elimination of varieties and such characteristics as awned vs. awnless, height of plant, color, and texture of grain should be considered in making the final selection of a variety.

WHEAT EXPERIMENTS AT LAKIN

The variety experiments at Lakin were conducted at the substation in Mason County. This farm is located on second bottom and represents two soil types. Huntington is a silt loam of high productivity while Wheeling is fine sandy loam of relatively low productivity.

Table 2 contains data of wheat variety yields obtained at the Lakin substation for a period of six years. These varieties were grown in rod-row plots and were treated in a manner similar to the plots on the Agronomy farm at Morgantown. The center row of each plot was harvested and sent to Morgantown, where it was threshed and yields recorded. Since seed for the Lakin test and that of the Morgantown varieties came from the same source, any significant differences in yield may be attributed to soil and climatic factors.

Data are available for the years 1923-1929, with the exception of 1928, when the wheat varieties winterkilled to such an extent that it was felt the yield from the surviving plots would be of no value.

Gladden, Reliable 80, Trumbull, Fulhio, and Mammoth Red rank in the order named with yields of 25.3, 23.9, 23.6, and 23.0 bushels, respectively. A comparison of Tables 1 and 2 shows three varieties, Fulhio, Trumbull, and Reliable 80, to be within the five best varieties at Lakin as well as at Morgantown. Gladden, which gave the highest yield at Lakin, was one of the least desirable at Morgantown, with an average yield slightly less than Kentucky Selection. On the other hand, Fulcaster, which ranked second at Morgantown, was seventh in the yield trials at Lakin. These results indicate that no single variety was outstanding under conditions that vary as widely as those at Morgantown and Lakin, but it is shown that three of the five highest-yielding varieties gave satisfactory performance at both places.

OAT VARIETIES

According to the United States Department of Agriculture Year Book for 1928, the acreage of oats in West Virginia is something over 200,000. This represents approximately 0.4 percent of the oat acreage of the United States. In wheat there has been a marked decrease in acreage during the past decade, whereas in oats there has been a trend toward larger acreage. An average yield of 28 bushels is reported for 1928.

The yield of 23 varieties which were grown on the Agronomy farm at Morgantown are reported in Table 3. Albion, Gopher, Richland, and Common 60 Day were introduced from the Minnesota Station; Victory, Iowar, White Russian, Kherson, Fulghum, Swedish Select, and Early Mountain from the United States Department of Agriculture; Silvermine, Miami, Ohio 7009, Golden Rain, and Ohio 6222 from the Ohio Station; Japan Selection and New Zealand from the Pennsylvania Station; V. P. I. No. 1 from the Virginia Station; Markton from the Washington Station; Kanota from the Kansas Station; and Iogold from the Iowa Station.

On the basis of the nine-year average yield test, Albion leads with an average yield of 63.9 bushels. Iowar, Gopher, Japan Selection, and Silvermine rank in the order named with 60.9, 60.5, 60.4, and 59.5 bushels, respectively.

It is of interest to note that the relatively early, medium-tall varieties are those giving the most satisfactory performance over a period of years. Ability to resist lodging is desirable in oats. Data on percentage and degree of lodging are recorded in columns 5 and 6 of Table 3. Of the 18 varieties listed only two, Victory and Ohio 6222, show no lodging. Silvermine shows but slight lodging. Gopher has the least lodging of the early varieties with 1.4 percent and 2.8 degrees. This lodging of Gopher is significant due to the fact that Gopher was used as the check variety and occurred every fifth plot throughout the nursery. It thus had ample opportunity to occupy unfavorable plots more frequently than the other sorts that were grown in only four systematically distributed plots each year.

TABLE 3.—Average yield and other characteristics of oat varieties grown on the Agronomy farm at Morgantown (1921-1929)

Name of variety	W. Va. accession number	Average date headed	Fruiting period	Height	Lodging		Average yield (1921-1929)
					Percent	Degree	
Albion (Iowa 103)	27	6-17	30	33.3	13.2	17.5	63.9
Iowar C. I. 847	15	6-22	27	33.9	6.6	16.0	60.9
Check (Gopher)	25	6-20	29	32.7	1.4	2.8	60.5
Japan Select.	21	6-25	26	40.2	1.1	12.0	60.4
Silvermine	4	6-24	28	36.3	0.2	1.0	59.5
Early Mountain	11	6-28	26	39.8	6.9	13.4	58.5
Iowa 105 (Richland)	26	6-17	31	30.7	6.2	10.5	58.0
Com. 60 Day	24	6-17	30	32.9	13.2	17.7	57.7
New Zealand	19	6-29	27	39.1	2.7	3.5	57.6
Ohio 6203 (Miami)	1	6-26	29	37.6	0.4	6.0	57.5
Victory C. I. 560	8	6-29	27	39.2	0.0	0.0	57.3
Fulghum	12	6-18	32	33.4	8.1	11.6	57.1
Ohio 7009	3	6-15	29	31.8	3.0	18.0	56.9
Swedish Select.							
C. I. 134	9	6-27	28	38.6	2.9	4.9	56.8
Kherson C. I. 459	16	6-17	30	31.7	9.0	20.8	56.3
Golden Rain	5	6-28	27	39.8	2.8	5.1	55.8
Ohio 6222	2	6-29	26	36.7	0.0	0.0	55.6
White Russian	10	7-2	27	41.2	0.8	10.0	48.2

Albion, although ranking highest in yield, showed lodging in five out of nine years. During certain of these years Albion was the most severely lodged variety in the nursery. This tendency to lodge makes it of doubtful value for general culture. Gopher during this same period of years showed but 1.4 percent and 2.8 degrees on all of the plots on which it was grown. No lodging whatever was recorded for Gopher in seven out of nine years. The heavy lodging of 1928 is largely the result of a severe wind storm just preceding harvest.

Iowar C. I. 847, like Albion, showed severe lodging in four of the nine years. Thus, of the five highest-yielding varieties, the first two should be discriminated against on the basis of their weak straw. Japan Selection and Silvermine show a fairly desirable record as to lodging, but because of their mid-season maturity they often are adversely affected by weather conditions at the time of ripening.

White Russian was the only variety included in the test that was

of the side or horse-mane type. The low average yield of this variety indicates that it is not adapted to the conditions under which this experiment was carried out.

Gopher is easily the first choice since it combines the desirable qualities of satisfactory yield with earliness and stiff straw.

OAT VARIETY EXPERIMENTS AT LAKIN

Seven varieties were grown in the oat variety test at Lakin. The seed for these varieties was produced at Morgantown with the exception of the check, which was a variety of good yield grown in the vicinity of the substation.

Albion was high with a yield of 54.5 bushels. The local variety ranked second and Gopher third with average yields of 52.6 and 52.4 bushels per acre, respectively. Richland, Fulghum, New Zealand, and Victory averaged 51.8, 49.7, 47.5, and 46.2 bushels per acre, respectively.

It is significant to note that the high-yielding varieties at Lakin as well as at Morgantown were early-maturing varieties. The fact that Albion has undesirable straw should be considered when a choice of variety is made for general culture.

TABLE 4.—Average yield and other characteristics of winter rye grown (1922-1929) on the Agronomy farm at Morgantown and at Lakin

Name of variety	West Va. accession number	Average date heading	Fruiting period	Average height in inches	Morgantown av. yield in bu. per A.	Lakin av. yield in bu. per A.
Rosen	1	5-19.5	50	52.6	31.1	38.6
Abruzzes C. I. 40	2	5-15.6	56	54.6	29.2	36.6
Minnesota 2	13	5-17.1	54	54.8	28.8	38.3

RYE VARIETIES

The acreage of winter rye in West Virginia never has been very great. The agricultural census for 1920 gives an acreage of 9000 with an average yield of 13 bushels. Hampshire, Morgan, Pendleton, Hardy, and Berkeley Counties produce most of the rye that is grown for grain in this state. This comparatively low acreage of rye is not surprising since the chief use of rye is as a cover crop.

Three varieties of winter rye were included in the tests made at Morgantown. These were grown in the fall-seeded nursery and were handled in every respect like the wheat varieties.

Table 4 gives the average yield and other characteristics of winter rye grown at Morgantown and at Lakin. Rosen has given the best yield for the six-year period during which this experiment has been conducted. Abruzzes C. I. 40 and Minnesota No. 2 ranked second and third in yield. The same three rye varieties were grown at the Lakin substation and here Rosen again gave the best yield, while Minnesota No. 2 was second and Abruzzes C. I. 40 was third. There was no great difference in yield between the varieties as shown in the accompanying table. Quality of grain as measured by size, color, and plumpness was decidedly in favor of Rosen in both tests.

BARLEY VARIETIES

Table 5 gives the average yield and other characteristics of spring barley grown on the Agronomy farm at Morgantown for the years 1922-1929, inclusive. All varieties are bearded, six-rowed types with covered seeds, with the exception of Chevalier, a two-rowed type. Wisconsin Pedigree was obtained from the Wisconsin Station; all other varieties, from the U. S. Department of Agriculture.

It will be noted from Table 5 that Alpha has the highest average yield for the duration of the experiment. This variety is of hybrid origin and is the result of a cross of Manchuria x Champion of Vermont, the latter being the pollen parent. Wisconsin Pedigree has been grown for five years. The last column gives the average yield of all varieties for this five-year period. The order of yield is not changed from that of the eight-year period except for the Wisconsin Pedigree and Chevalier varieties. Chevalier is a two-row sort and is distinctly lower in yield than any of the other varieties. The poor yield is due in part to the late maturity of this variety.

TABLE 5.—*Spring barley varieties on the Agronomy farm, 1922-1929*

Variety name	West Va. accession number	Date headed	Fruiting period	Average height	Yield in bu. per A. 1922-29	Yield in bu. per A. 1925-29
Alpha C. I. 959	7	6-19	31	32.1	35.5	38.0
Manchuria C. I. 643	6	6-18	31	28.9	31.3	34.0
Oderbrucker C. I. 1174	9	6-18	30	28.7	30.4	32.6
Featherstone C. I. 1120	8	6-17	31	30.1	29.2	32.1
Chevalier C. I. 278	4	6-23	29.4	27.0	26.1	22.6
Wisconsin Pedigree C. I. 835	10	6-20	31	30.1		31.5

Barley has never been an important grain crop in West Virginia. This is due largely to the fact that barley must compete with oats if seeded in the spring. Yields of barley do not compare favorably with our better oat varieties. Winter barleys have been grown at both Morgantown and Lakin but yields are very low. This is attributed to winter killing in most cases. Growers and feeders of barley would prefer awnless or smooth-awned types. Yield tests conducted thus far have shown bearded sorts to give much better results than any awnless varieties known at the present time.

BUCKWHEAT VARIETIES

According to the statistics compiled in the 1928 Year Book of the United States Department of Agriculture, West Virginia has an annual acreage of 40,000 acres which are devoted to the raising of buckwheat. This acreage has remained fairly constant during the last ten years. Preston County with 10,000 acres ranks first in acreage and production. Hampshire, Barbour, Morgan, and Tucker rank in the order given. The average yield for the state for the past twenty years is approximately 20.0 bushels as compared to an average for the United States during this same period of 18.5 bushels.

Table 6 gives the name, West Virginia accession number, and yield of eight strains of buckwheat that were included in the variety tests during the years 1921-1927, inclusive. Two types of buckwheat are represented. C. I. 91 Mountain belongs to the Fagopyrum

TABLE 6.—*Buckwheat varieties on the Agronomy farm, Morgantown*

Name	West Virginia accession no.	Average yield 1921-27
U. S. Japanese Sel.	7	23.8
Check Japanese	8	23.3
Scarlett's Japanese	1	22.3
Wood's Japanese	3	21.9
U. S. Japanese	2	20.4
Wood's Silverhull	5	19.8
C. I. 91	6	19.4
U. S. Silverhull	4	17.4

tataricum while the seven remaining varieties belong to *Fagopyrum esculentum* species. West Virginia accession numbers 4 and 5 represent strains of Silverhull, while accession numbers 1-2-3-7-8 are strains of Japanese.

Silverhull and Japanese varieties are the two most widely grown in West Virginia. As a result of these variety tests, the Japanese strains are shown to be superior to the Silverhull. Millers seem to favor the Silverhull variety because the flour is better in color and, it is claimed, gives a higher milling percentage. Japanese is objected to because the dark, coarse hulls give a flour of inferior grade. Since differences in yield are very much in favor of Japanese it is felt that the increase in yield is sufficient to more than offset the difference in milling quality. Mountain buckwheat matures between ten days and two weeks later than the *esculentum* types. This difference in maturity is thought to be one of the chief causes for its poor yield.

SUMMARY

Varietal experiments were carried on with wheat, oats, rye, barley, and buckwheat at Morgantown for nine years; and with wheat, oats, and rye at Lakin for seven years.

Fulhio, Reliable 80, and Trumbull were among the five highest-yielding varieties of winter wheat both at Morgantown and Lakin. These three varieties have given consistent results and can be relied upon to give a satisfactory performance under average West Virginia farm conditions. Fulhio and Trumbull are awnless varieties while Reliable 80 is a bearded variety.

Albion, Iowar, and Gopher have given the most satisfactory yields among the varieties of oats that were tested. Gopher is the most satisfactory variety since it combines the good qualities of earliness, yield, and stiffness of straw. Albion is of questionable value for general culture because it has a weak straw that permits lodging during most seasons.

Three varieties of winter rye were grown both at Morgantown and Lakin. Rosen gave the highest average yield but differences between the varieties tested were not great.

Alpha barley gave an average yield of four bushels more than any other spring barley tested. This barley is of hybrid origin and seems to show considerable promise for those sections of the state where barley is grown in preference to oats. Winter barleys were grown both at Morgantown and Lakin but were found to give unsatisfactory yields at both places.

Japanese buckwheat produced an average yield of four bushels more than Silverhull for the period of the test.