New Varieties of Wheat Their Advantages and Limitations[1]

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Just as progressive farmers are interested in the possibilities of new farm practices so are they alert to the possibilities of new varieties which might prove better than those they are now growing. This year the North Dakota Agricultural Experiment Station is offering to farmers two varieties—one hard red spring wheat and one durum These are special purpose varieties which offer some advantages not available in varieties now grown. It should not be inferred that they excel in all important respects, but rather they are intended to help meet some special disease or cultural problems where these exist. They are not expected to take over any large proportion of the wheat acreage. The origin and distribution of these varieties and how they have compared with others are shown below. Tables I, II, III and IV report average annual yields per acre obtained in official variety trials at the Agricultural Experiment station and at the several branch stations in the state.

LEE (MINN. 2776)

Lee is an early, bearded hard red spring wheat selected from a cross of Hope x Timstein, made at the Minnesota Agricultural Experiment Station in cooperation with the U. S. Department of Agriculture. Lee is resistant to the common races of stem rust (not to 15B which was prevalent for the first time in 1950), and is resistant to most of the races of leaf rust now common in this area.[3] In this respect Lee is superior to other varieties of hard red spring wheat now grown here. This variety is moderately resistant to covered smut (bunt) but shows about the same degree of susceptibility to loose smut as Mida. In yield comparisons to date Lee has performed satisfactorily, averaging favorably with the better yielding varieties.

Table I. HOW LEE (Minn. 2776) COMPARED WITH OTHER VARIETIES IN THE FIELD PLOT TRIALS AT THE SEVERAL EXPERIMENT STATIONS IN NORTH DAKOTA.

Average Annual Yields (Bushels per acre)

Variety	Fargo 1947-50	Edgeley 1947-50	Langdon 1947-50	Minot 1948-50	Dickinson 1948-50	Williston 1948-50	Weighted average 20 sta. yrs.
Mida	27.9	20.0	37.8	27.8	22.8	23.6	26.9
Rival	26.7	19.0	39.6	23.0	22.2	24.1	26.3
Thatcher	27.6	17.2	31.9	28.4	20.7	25.7	25.1
Redman	26.9	16.9	33.2	26.1	20.0	22.8	24.4
Cadet	25.4	17.1	33.5	23.0	24.0	24.4	24.8
Lee	**30.4**	**20.0**	**40.0**	**27.1**	**20.2**	**23.8**	**27.4**

[1]The writer is indebted to the following men for supervising the trials at branch stations: Edgeley, J. P. Tiernan; Langdon, Victor Sturlaugson and Reuben Heermann; Minot, G. N. Geiszler; Dickinson, T. J. Conlon; Williston, Arlon Hazen, also to R. H. Harris and L. D. Sibbitt, Department of Cereal Technology for appraisal of the varieties for their respective milling, baking or macaroni qualities.

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[3]Present seed stocks not completely uniform for leaf rust reaction.

As might be expected, the average for Lee has been greatest in the eastern part of the state, the area where leaf rust injury usually is most severe. In the Fargo trials Lee equalled or outyielded Mida in each of the four years tested; at Langdon it outyielded Mida in three out of the four years; at Edgeley in two years out of four and at Minot it was equal to Mida in each of the two years tested. In the areas of less rust, as at Dickinson, Lee failed to equal Mida in each of the three years grown and at Williston the two varieties yielded about the same, but below Thatcher which usually yields best there and is the variety most commonly grown in that section of the state.

Lee appeared to better advantage than usual in 1950, especially in the trials at Fargo and Langdon. While Lee appeared to have been injured less by stem rust than some other varieties, the advantage which it has is principally in more satisfactory resistance to leaf rust. This variety averages relatively high in protein and while the gluten strength, as measured by the loaf volume, is not proportionately high, its baking qualities are considered acceptable.

Lee is being released in both Minnesota and North Dakota. The amount of seed available is still small and so is released only on contract to farmers who will cooperate in its further increase in 1951. Lee should help to fill a need until varieties with more rust resistance, more loose smut resistance and superiority in other characteristics can be made available.

NUGGET DURUM (LD 303)

Nugget was released for farm increase in 1950 and will be given general distribution in 1951. This is an early ripening amber durum developed cooperatively by the U. S. Department of Agriculture and the North Dakota Agricultural Experiment Station. Nugget is from a double cross (Mindum x Carleton) x (Heiti x Stewart). This selection was for a durum with the rust resistance of Stewart but earlier ripening and with shorter straw.

Compared with Stewart, Nugget will head and ripen from six to seven days earlier, is five to eight inches shorter and has slightly weaker straw. It equals Stewart in resistance to leaf rust and the common races of stem rust but, like Stewart, is susceptible to race 15B. Nugget threshes easier, and has excellent macaroni qualities, being superior to Stewart in the latter respect.

Since it ripens distinctly earlier Nugget does not have the capacity for yield that a longer season variety like Stewart has. This is somewhat apparent in the tabulation of comparative yields recorded in Table II. Nugget showed to the best advantage at Fargo and Langdon in 1950, when rust caused the heaviest injury to the later ripening varieties. For the four years at Fargo, Nugget outyielded Stewart in two years out of four; at Edgeley one year out of four, and was equal to Stewart in yield in one other year. At Langdon, Nugget failed to yield as high as Stewart in each of the years except 1950, and also did not equal Stewart in yield in the Minot trial during the two years grown.

Nugget, therefore, is expected to have its largest use in the southern sections of the durum growing area, or other sections where earliness to escape late drought, heat or rust injury is especially desired.

Table II. HOW NUGGET (Ld 303) COMPARED WITH OTHER DURUMS AT FOUR STATIONS IN OR NEAR THE DURUM AREA IN 1950 AND FOR THE LONGER PERIOD TESTED.

Variety	Average Annual Yield (Bushels per acre)								
	Fargo		Edgeley		Langdon		Minot		Weighted average
	1950	1947-50	1950	1947-50	1950	1947-50	1950	1948-50	14 sta. yrs.
Mindum	21.7	29.8	23.9	18.9	35.7	38.4	24.7	29.9	29.2
Stewart	20.6	27.9	20.9	17.9	37.5	40.7	27.3	31.5	29.2
Carleton	17.1	25.6	19.8		35.7	38.4	24.5	26.3	
Vernum	29.8	31.1	19.3	17.5			24.3	27.8	
Nugget	**27.5**	**30.8**	**19.8**	**17.4**	**39.2**	**36.2**	**18.9**	**21.6**	**27.2**

OTHER VARIETIES

In addition to these new releases there is increasing interest now in two other varieties released two and four years ago, but which never came into extensive production. These showed to relatively good advantage in 1950, and therefore may be expected to come into larger use in 1951.

Rushmore. This is an early beardless hard red spring variety selected from a cross between Rival and Thatcher, made at the South Dakota Agricultural Experiment Station. This variety has shown that it has about the same amount of resistance to the common races of leaf and stem rust as varieties now in general production, and satisfactory resistance to both covered and loose smuts. Rushmore has strong, fairly short straw; yields fairly satisfactory but is not considered a high yielder. Under the unusual conditions experienced in 1950 it appeared to better advantage than usual, especially in the Fargo trials. It has good milling and baking qualities. Rushmore was released to South Dakota farmers in 1949 and the same year made available to North Dakota farmers for increase and distribution. Thus there is considerable seed now available for those who wish to try it.

Table III. HOW RUSHMORE COMPARED WITH OTHER VARIETIES IN 1950 AND FOR THE LONGER PERIOD TESTED.

Variety	Average Annual Yield (Bushels per acre)							
	Fargo		Edgeley		Minot	Dickinson		Weighted average
	1950	1945-50	1950	1946-50	1950	1950	1948-50	15 sta. yrs.
Mida	32.2	27.3	24.5	20.5	24.6	20.5	22.8	24.0
Rival	28.9	27.1	21.6	19.9	24.5	19.5	22.2	23.5
Thatcher	32.5	27.3	19.3	18.2	24.2	18.2	20.7	22.7
Redman	32.2	25.9a	21.5	18.0	21.6	19.6	20.0	21.8
Cadet	28.5	24.8	20.2	18.5	20.1	21.2	24.0	22.2
Rushmore	**34.9**	**27.6**	**20.9**	**18.4**	**23.3**	**18.9**	**18.9**	**22.5**

a—Yield for Regent in 1945.

In field plot trials at Fargo since 1945, Rushmore yielded more than Mida three years and less than Mida the other three years. Results were less satisfactory in the Edgeley trials where since 1946 it averaged below Mida four years, was about equal to or above Mida the other year. In each of the three years grown at Dickinson it failed to equal Mida. In 15 comparisons in North Dakota Rushmore averaged 22.5 bushels compared with 24.0 bushels for Mida; 23.5 bushels for Rival and 21.8 bushels for Redman.

Based on observations to date, Rushmore is not expected to take over any large acreage in North Dakota. However, for farmers in the southeastern and eastern sections of the state who desire an early, strong strawed, beardless, smut resistant wheat, it would appear to be a good choice.

Vernum is another relatively early amber durum that may come into larger use in 1951. This variety has about the same resistance to the common races of stem rust as Stewart but generally yielded more satisfactorily than Stewart under the rust conditions in 1950. This is not to imply that it has much resistance to Race 15B, because less infection and less injury may have been due to its earliness or conditions of growth.

Vernum is not as early as Nugget, yet two to four days earlier than Stewart and slightly earlier than Mindum. This variety was developed cooperatively by the U. S. Department of Agriculture and the North Dakota Agricultural Experiment Station and is from a Mindum x Vernal (emmer) cross, backcrossed to Mindum four times, to recover the desirable macaroni qualities of Mindum. Vernum was released to North Dakota farmers in 1947, and has since come into fairly good distribution in the southern sections of the state. Vernum has moderately weak and fairly long straw.

Vernum is a fair but not a high yielding variety (See Table IV). Over a period of years, however, it has averaged satisfactorily in comparison with other varieties.

Table IV. HOW VERNUM HAS COMPARED WITH OTHER DURUM VARIETIES DURING THE YEARS TESTED.

Variety	Average Annual Yield (Bushels per acre)								
	Fargo		Edgeley		Langdon[a]		Minot		Weighted average
	1950	1941-50	1950	1942-50	1950[b]	1941-48	1950	1946-50	31 sta.yrs.
Mindum	21.7	30.7	23.9	23.5	21.2	41.0	24.7	32.4	31.5
Stewart	20.6	29.8	20.9	22.8[d]	24.7	43.1	27.3	32.4	31.5
Carleton	17.1	26.3			20.8	39.8	24.5	28.0	
Red durum (D-5)	27.6	30.5				35.0[c]			
Vernum	**29.8**	**30.7**	**19.3**	**22.6**	**21.5**	**39.2**	**24.3**	**31.1**	**30.5**

[a]Not grown at Langdon since 1948. [b]Comparisons from nursery.
[c]Yield for Monad. [d]Using yield for Mindum in 1942.

In yield comparisons, Vernum did better than Stewart in four of the years tested at Fargo, yielded less in five other years and was about equal one year. Under the rust conditions of 1950 at Fargo it showed to good advantage as can be seen in Table IV, averaging about nine bushels higher than Stewart, and with a more nearly normal test weight, 62.8 pounds compared with 58.1 pounds for Stewart. At Edgeley during the nine years it was grown, Vernum yielded as well or better than Stewart six years and less than Stewart in three years. Under conditions at Langdon, usually more favorable for later ripening varieties, Vernum did not outyield Stewart in any of the years tested although it yielded about the same as Stewart in two of the years. Vernum was not grown in the Langdon field plots after 1948. In 1950 nursery comparisons at Langdon, Vernum did not yield as well as Stewart but the quality of the grain, as indicated by test weights, was distinctly better. At Minot too the yields for Stewart have generally been better than for Vernum.

It would seem from this that Vernum should for the present be regarded as best suited to the more southern sections of the durum growing area and elsewhere only if more earliness is desired.

VARIETIES NOT RECOMMENDED

"Wahpeton"—A variety grown to some extent in some communities and identified by the name "Wahpeton" because it first came into use in that area, (also referred to as "Larson wheat"), has been grown in our trials two years. Its origin and history is not known. The few comparisons available up to this time have shown that the variety matures later than Mida, or about the same time as Rival, resists rust and loose smut to about the same extent and shatters readily. In our trials this variety has not shown any advantage in yield over Rival or Mida. Results of comparable milling and baking tests indicate that this wheat does not measure up to the standards desired in flour quality, and extensive production therefore would not be desirable. From its record in our trials so far there would appear to be little purpose in growing this variety in preference to established and proven varieties.

Others—Salesmen traveling through farm communities, taking orders for seed, have brought on many inquiries from farmers seeking information about new varieties which are being offered to them. In some instances the varieties, identified by numbers, are experimental selections which have been tested and failed to gain approval by the experiment stations in this area or by the U. S. Department of Agriculture. Usually these varieties offer no important advantages over varieties now in use, or they lack seriously in some important respects and thus could not be approved. In some other instances the tests are less complete and do not permit of either approval or disapproval.

It is understandable how the new rust threat would create an interest in and desire for trying a new and highly praised variety.

Extravagant claims and high seed prices, however, cannot add to or improve a variety's performance. **We would again point out that no variety now known has adequate resistance to Race 15B of stem rust. Varieties now being promoted in farm-to-farm sales offer no more protection against leaf rust than is available in the varieties now grown. There would seem to be no worth-while gain to come from the purchase of such seed, unless it is experience.**

SUMMARY

There appears to be no substantial basis for any large changes in variety recommendations for 1951. Mida and Rival seemingly should continue to have preference among the hard red spring wheats in the eastern and central parts of the state, with some increase for Rushmore, particularly in the southeastern and eastern counties. Thatcher should still have preference in northwestern North Dakota, with Pilot and Mida having a larger use in the central western counties.

Because the later ripening durums were injured more seriously by stem rust in 1950 than the common wheats, a shift from durum to common wheat is likely. On the basis of another rust threat, and the desire for an earlier ripening crop to "escape" injury from stem rust, this would appear to be somewhat justified in the marginal durum areas, where the advantage for durum in the normal years is not appreciable.

Would any large shift in acreage to common wheat in the better durum growing area be wise? The answer to that presumes knowing the conditions which will prevail in 1951. For instance, will a serious stem rust situation develop in 1951? If it does, will the injury to the two wheat classes differ as widely as it did in 1950? If rust does not occur, will the usually lower yield of the common wheat, or possible price differences, have justified the change? Is a heavy leaf rust infestation in 1951, with serious injury to common wheat, a smaller or greater possibility than a recurrence of stem rust?

Because so many questions are involved for which there is no answer now, the individual grower must determine for himself if any shift is advisable for him. If he continues to grow durum then Stewart should continue to have the largest preference in the northern durum area, followed by Mindum and Carleton. If an earlier ripening variety is desired a portion of the acreage could be sown to Vernum or Nugget. Early sowing is also recommended, thus increasing the opportunity for a crop to "escape" damage from rust.

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