

WHICH

Hard Red Spring Wheat

TO GROW IN 1954

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Following the recent rust experience, many farmers are concerned with what wheat to grow this coming year. Questions being asked are: What is the likelihood of another serious rust situation in 1954? Which variety offers most resistance to Race 15B? Which has the best chance of escaping injury should a rust epidemic occur? Which variety would be best in those years or areas where rust is not a factor?

Since 1950, when Race 15B came into wide distribution - and independent of its alternate host the barberry plant - stem rust must again be recognized as a perennial threat, until such time as we can have varieties which have adequate resistance. This does not mean that we will have rust in epidemic proportions each year. For rust to develop to such an extent there needs to occur a sequence of events favorable for the rust. Should some one or more of these events prove not favorable, the build-up of the rust could be greatly slowed and to the extent that the wheat crop would mature with little or no injury. Some of the favorable conditions or events which would need to occur are:

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1. Fall infection of susceptible wheats or grasses in the southern states and Mexico, where the rust can overwinter in the summer or red spore stage.

2. Successful over-wintering of the rust infected plants.

3. Favorable growing conditions in the spring for crop plants in that area and for the rust, allowing new infections to take place and thus to result in an early and rapid increase of additional summer spores.

4. Favorable wind and air currents to carry these spores north into the fields of susceptible winter wheats for a further build-up, or even directly into northern spring wheat fields.

5. Favorable conditions for spore germination and infection to take place in these fields, such as high moisture and humidity, a lush growth and susceptible wheats.

6. The state of our crop when spore showers settle on our wheat plants, followed by a race between the rust increase and crop maturity.

The first four of these are almost certain to occur every year, although to a greater or lesser extent. Even when the rust buildup in the south may be light or only moderate, an early but light spore shower settling in our fields, can result in a rapid buildup if conditions in our fields are favorable. This actually happened in 1953. On the other hand, a relatively dry period in June or early July, unfavorable for the spores to germinate and new infections to take place, could slow the rust increase to the extent that the crop would mature with relatively little or no serious rust injury. So while rust is certain to be a threat each year, it does not follow with the same certainty that serious rust damage will occur.

NO VARIETY NOW AVAILABLE IS RESISTANT

No variety now in distribution has adequate resistance to Race 15B of stem rust. What then is our choice as we give thought to what to sow next year? Are there differences in the degree of susceptibility to this stem rust? To leaf rust? Perhaps, in some areas, late summer drouths should be regarded as an equally or more important factor than rust in influencing the variety choice. Are there differences in time of maturity which may give some variety an advantage over others?

Not knowing what the seasonal environment will be, you must base your choice on the important characteristics of the varieties.

available, selecting the one which you feel is likely to be the best suited to the usual conditions in your area.

In Table 1 are variety comparisons set up to show how the important varieties differed in yield in years when stem rust was not an important factor. In table 2 are the comparisons for the same varieties in the years when rust did influence the yields. These comparisons are from the field plot trials at the several experiment stations in the state. Five years are represented in the "non-rust" period and two years, 1950 and 1953, when considerable stem rust injury did occur.

TABLE 1 HOW VARIETIES COMPARED IN YIELD IN YEARS WHEN THERE WAS LITTLE OR NO STEM RUST INJURY, 1947-52 (a)

	Average yield per acre, bushels						Weighted average 26 sta. years
	Fargo 1947-52	Edgeley 1947-52	Langdon 1947-52	Minot 1948-52	Dickinson 1948-52	Williston 1948-52	
Common Wheat:							
Mida	26.5	20.2	33.9	34.0	21.7	19.9	25.8
Rival	25.9	20.1	35.6	31.1	21.4	19.8	25.6
Thatcher	26.6	18.1	23.2	33.6	20.0	21.1	24.4
Rescue	-	-	-	28.8	18.8	20.7	-
Lee	27.9	20.1	33.9	32.4	18.7	19.0	25.3
Rushmore	26.1	18.1	-	30.5 ^(b)	17.8	-	-

(a) omit 1950

(b) Yield for Redman 1949

You may note from this that over a period of years with stem rust not a factor, that average yield differences among the better varieties are not large. Mida, Rival and Thatcher have been grown for a long period, are well known, and may be taken as standards for comparison. Each has certain advantages, also certain limitations.

Lee released in 1951, because of better resistance to leaf rust, has shown relatively satisfactory yields in the tests at the western stations. The advantage for Lee in eastern North Dakota is in part due to its greater resistance to leaf rust, a factor not so important in the normally drier sections of the state. Such varieties as Mida and Rival probably have a capacity for higher yield than Lee, but with leaf rust and other unfavorable conditions prevailing, will often not yield up to their capacity. Lee is bearded, matures slightly earlier than Mida, and does not grow as tall. Lee is susceptible to loose smut, like Mida, but is moderately resistant to covered smut.

Rushmore, a relatively new variety, has shown a more satisfactory yield in the trials at the central station, Fargo, than at the other stations. Rushmore, a beardless variety, has about the same resistance to the common races of stem and leaf rust as Mida or Rival. Rushmore has good resistance to both smuts, strong and shorter straw than Mida or Rival. Being earlier to ripen, Rushmore does not appear to have the yielding capacity of Mida or Rival, but can equal or excel those in yield when conditions for these later varieties are less favorable.

COMPARISONS WHEN 15B WAS A FACTOR

While none of the above varieties has adequate resistance to Race 15B, the variety comparisons for 1950 and 1953, when there was considerable stem rust, show there was less injury to some varieties than to others. Some of this difference is in part due to earlier maturity, but it also shows that some varieties are less susceptible, or have a degree of tolerance to Race 15B, not possessed by some of the others.

Lee, for instance, followed by Rushmore, appear to have some tolerance and yielded distinctly better than the other common wheats at all of the stations and particularly in the eastern sections of the state. It would seem from this that Lee and Rushmore will deserve a wider use in 1954, as farmers search for a measure of insurance against the rust hazard. In the northwestern counties, where Thatcher is most extensively grown, there is less reason for any particular change. Rust is less a hazard in that area, and Thatcher, although not resistant, apparently has some tolerance to Race 15B.

TABLE 2 HOW THE SAME VARIETIES COMPARED IN YIELD IN TWO YEARS
WHEN THERE WAS SERIOUS STEM RUST INJURY, 1950 and 1953.

	Average yields per acre - bushels						Weighted average 12 sta. years
	Fargo	Edgeley	Langdon	Minot	Dickinson	Williston	
Mida	24.8	18.5	32.4	16.7	17.8	28.1	23.1
Rival	22.3	15.7	33.5	17.4	18.2	29.0	22.7
Thatcher	27.0	15.7	30.9	17.2	17.4	29.7	23.0
Rescue	-	-	-	15.1	18.7	27.5	-
Lee	32.5	20.4	41.0	18.7	20.8	31.6	27.5
Rushmore	29.1	19.7	-	17.8	21.0	-	-
Mindum	17.6	14.4	28.0	15.3	13.1	-	-
Stewart	15.6	11.8	27.9	17.0	-	-	-
Vernum	24.7	14.4	35.2 ^a	17.3	-	-	-
Nugget	21.6	12.5	31.6	11.3	13.2	-	-

^a Calculated yield, 1950

Rescue, grown to some extent for its resistance to sawfly, has usually not yielded as well in our sawfly infested area, as other varieties, when these could be harvested without serious crop loss. Chinook, a more recently developed sawfly resistant variety, has not shown any superior yielding ability over Rescue in our trials, but does produce wheat better in milling and baking qualities.

ARE VARIETIES WITH MORE RESISTANCE ON THE WAY?

Promising a fair degree of resistance to 15B stem rust and the most advanced in experimental tests and under increase today, is CT 185, a new Canadian variety recently named Selkirk. This is a beardless, early maturing variety, with moderately strong straw, of medium height.

Selkirk is moderately resistant to the common races of stem rust, including 15B, moderately resistant to leaf rust and resistant to both smuts. The yielding ability of this new variety in comparison with other varieties we grow, is not yet well known when considered over a wide range of conditions. However, the fact that it promises a greater measure of protection against 15B justifies the large interest there is in it. The North Dakota Experiment Station expects to have about 3,000 acres of this wheat under increase in 1954, looking forward to a general distribution in 1955.

Other lines promising some rust protection and under increase at present, looking forward to a possible release in 1955, include one other hard red spring wheat and one durum. Neither of these can be said to have a high degree of resistance to 15B but have shown more resistance than varieties now in use.

EARLIER RIPENING TO "ESCAPE" INJURY

The degree of rust injury is directly associated with the length of time the crop is exposed to severe infection. Thus, the matter of early sowing, for the sake of having the crop further along before the rust can become serious, takes on special importance.

Application of a phosphorus fertilizer, to fields which have shown such fertilizer response, can further hasten the development of the crop, thereby increasing the chances for "escaping" injury.

The use of earlier ripening varieties is another means of "escaping" injury, and is recommended when the sacrifice in yield for the earlier ripening variety is not too great.

SUMMARY

Stem rust Race 15B is certain to be a threat each year until varieties with adequate resistance can be developed and come into extensive use. This does not mean that rust in epidemic proportions will occur every year. That will depend on conditions, whether favorable or unfavorable for rust.

Rust will develop most rapidly in areas where rainfall is the most favorable with high humidity and heavy morning dews, hence the threat from rust is normally higher in eastern than in western North Dakota. In choosing the variety to grow, one should take into account the crop hazard most common to a given area, and the advantages and limitations of each variety under those conditions.

For eastern North Dakota and other areas, where a larger measure of rust protection is desired, Lee is recommended, followed by Rushmore. In western or southwestern areas where rust is normally less a hazard, Mida, pilot and Thatcher may continue to have preference. With Lee a larger place, especially on summerfallow, where its shorter straw would be less objectionable, and where rust protection would be most needed. For northwestern counties, Thatcher still appears to be a good choice, followed by Lee and Mida.

This circular which is a companion to circular A-204, entitled, "Which Durum To Grow In 1954", presents information which we hope will be of some help in deciding which crop and variety to grow.

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