

# Which Variety of Oats To Sow<sup>1</sup>

By  
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**T**HE damage to the oat crop from rust, during the years 1941 to 1944, brought about much interest in varieties having more disease resistance. It resulted in the introduction and extensive use of such varieties as Marion, Boone, and Tama from Iowa; Vicland from Wisconsin and Vanguard and Ajax from Canada. Boone, Tama and Vicland are early ripening, yellow, short strawed varieties, resistant to many races of stem rust, also to leaf (crown) rust and smut. Marion and Ajax ripen slightly later and grow taller than Vicland or Gopher, and like Vicland are resistant to many races of stem rust but have white grain. Marion is moderately resistant to leaf rust, Ajax moderately susceptible. Both are excellent yielders when not injured by rust. Vanguard, too, is resistant to most of the common races of stem rust, but is moderately susceptible to leaf rust. This variety grows to good height, has fairly strong straw, white grain and yields well when leaf rust is not too serious. Vanguard matures later than the other varieties mentioned, is classed as early mid-season, and therefore best suited to the northern and western sections of the State. Rainbow, grown for a number of years on North Dakota farms, and having considerable resistance to stem rust and some resistance to leaf rust, has continued to yield well along with the newer and more resistant varieties.

These varieties have afforded considerable protection from rust and doing so have assured for North Dakota a larger production of oats than could otherwise have been obtained. Some measure of this protection, and the contribution afforded in larger yields, is seen in the accompanying tables, showing how the resistant varieties compared in yield with those very susceptible to rust, such as Gopher and Victory. As is to be expected, these differences in yield were most striking during the years 1941 to 1944, and especially in eastern North Dakota where the rust usually was

most severe. Rust did not occur in epidemic proportions in 1945 and 1946, so the advantage of rust resistance is not indicated by differences in yield during those years. However, it may not be unreasonable to assume that the extensive use of resistant varieties throughout the oats producing area, as well as in our State, was a considerable factor in checking the propagation and rapid spread of the rust organism. This was especially true in 1945 when the initial infection of leaf rust came early, but for some reason did not increase or spread rapidly, despite seemingly favorable conditions.

<sup>1</sup>Trials at Dickinson in cooperation with the Division of Cereal Crops and Diseases, U. S. Department of Agriculture, R. W. Smith in charge. Trials at Edgeley, Langdon, Williston, Minot and Williston (irrigation) under supervision of superintendents J. P. Biernan, Victor Sturlaugson, W. H. Huber, G. N. Geiszler and Arlon Hazen, respectively.

**TABLE 1—ANNUAL AND AVERAGE YIELDS OF SOME PROMISING NEW VARIETIES OF OATS WHEN GROWN AT FARGO, 1941 TO 1946.**

Variety	Bushels Per Acre						Average		
	1941	1942	1943	1944	1945	1946	1944 to 1946	1943 to 1946	1939 to 1946
	<b>Early:</b>								
Gopher	38.3	62.7	21.7	32.3	54.6	101.7	62.9	52.6	50.9
Marion	58.1	86.6	40.9	43.5	54.5	104.9	67.6	61.0	60.5
Vicland	60.2	87.9	51.0	53.1	53.5	99.6	68.7	64.3	61.7
Tama		89.2	50.6	50.6	51.5	101.0	67.7	63.4	
Ajax			51.4	48.4	58.2	97.2	67.9	63.8	
Clinton				42.6	54.0	98.0	64.9		
Forvic					58.0	92.4			
Bonda					49.5	86.7			
Mindo						100.9			
Benton						97.6			
<b>Early Midseason:</b>									
Rainbow	58.7	86.4	41.5	37.7	61.4	103.5	67.5	61.0	59.3
Vanguard	46.4	68.1	28.7	20.6	57.5	99.6	59.2	51.6	50.0
<b>Late Midseason:</b>									
Victory	30.8	69.3	12.1	18.0	51.5	88.9	52.8	42.6	43.3

### Varieties Not Immune to Rust

While the varieties mentioned have considerable resistance to rust they are not immune, and in rust years have shown some infection. This indicates that, while they are resistant to many of the common races of rust, there is a race (or races) present which can successfully attack them.<sup>1</sup> So far the amount of infection which they have carried has not been sufficient to noticeably injure their yield in our test plats. It has appeared, however, in those years when conditions for rust development

were favorable, as if the amount of infection were increasing, indicating that the race to which they lack resistance has been coming into wider and more general distribution. Reports from the central states indicate a more serious increase in the amount of stem rust occurring there on these oats than we have found. Leaf rust appears to have been on the increase here.

Iowa has also reported a threat to the oats crop in that State from another disease, a root-rot and blight, called *Helminthosporium victoriae*. (See B-

<sup>1</sup>Lacking in resistance to races 8 and 10 of stem rust, Vicland and Tama susceptible to race 41, leaf rust.

monthly Bul. Vol. 9 No. 2 1946). While this may not be a new disease it was not recognized until after the varieties Control, Boone, Tama and Vicland came into general use. These varieties are all selections from the Victoria-Richland cross, and all have been found to lack in resistance to this blight disease. On the other hand they have found that older varieties, once common in that State like Gopher and Richland (Iowa 105) are resistant. This may in part explain why this disease has not been observed or previously recognized as a problem. Also of special interest is the knowledge that Marion and the newer varieties, Clinton, Benton, Bonda and Mindo, bred especially for greater resistance to rust, have been found to carry resistance also to this blight organism. While this blight has not been

reported as a problem in this State, and perhaps our usually drier conditions and cooler temperatures are less conducive to its development and spread than are these conditions in the central states, it is well to consider the possibility that in time it may also be a factor to contend with here.

**Present Varieties Still Have Merit**

One should not conclude from this that continuing to sow Vicland, Tama, or Boone in North Dakota in 1947 is certain to invite serious losses from rust or blight. Nor should one conclude that the easy solution to his oats problem is to grow one of the newer varieties, if he could obtain some seed. The evidence now at hand does not warrant such a conclusion. Vicland and Tama still have

**TABLE 2—HOW THE VARIETIES COMPARED IN YIELD AT EDGELEY**

Variety	Bushels Per Acre									
	Average									
	1941	1942	1943	1944	1945	1946	1944 to 1946	1943 to 1946	1941 to 1946	1939 to 1946
<b>Early:</b>										
Gopher	63.7	41.5	71.8	48.4	62.3	50.3	53.7	58.2	56.3	47.0
Marion	69.0	62.2	71.0	52.1	49.5	52.0	51.2	56.2	59.3	50.4
Vicland	61.9	83.9	76.7	65.3	51.2	48.2	54.9	60.4	64.5	
Tama		89.1	79.0	65.6	51.6	49.9	55.7	61.5		
Ajax			83.4	58.6	61.9	53.4	58.0	64.3		
Clinton				66.1	63.5	49.1	59.6			
Bonda					54.4	48.3				
Mindo						47.4				
Benton						45.8				
<b>Early Midseason:</b>										
Rainbow	69.9	60.3	71.5	52.1	58.6	54.0	54.9	59.1	61.1	51.0
Vanguard		39.6	63.3	36.0	53.0					

considerable merit and these varieties together with Marion, Ajax, Rainbow and Vanguard can be expected to occupy a large share of our oat acreage for yet a while. It is well, however, to know and appraise the advantages and limitations of each of several varieties for his conditions, in so far as such information is available, then choosing the variety which yields best and which it appears meets best the hazards with which the crop is likely to have to contend.

conclusions. However, they are presented here (Tables 1 to 6) because of the large interest in them and because they suggest that **when the rusts or blight are not present, the advantages in yield may not be with the varieties that are most resistant,** and at least not to the extent one may have been led to expect.

Clinton has been in the field plot tests at Fargo only 3 years, some of the other varieties for a lesser period and under conditions where rust was not a prob-

**TABLE 3—HOW THE VARIETIES HAVE COMPARED IN YIELD AT DICKINSON**

Variety	Bushels Per Acre					Average		
	1942	1943	1944	1945	1946	1944	1943	1940
						to	to	to
<b>Early:</b>								
Gopher	69.3	48.3	64.8	61.9	45.6	57.4	55.2	52.6
Marion	64.9	43.0	55.2	59.9	47.7	54.3	51.5	50.2
Vicland	59.0	42.3	60.1	52.4	46.0	52.8	50.2	48.4
Tama		40.8	57.3	53.2	46.0 <sup>a</sup>	52.2	49.3	
Ajax		45.9	56.4	56.6	55.5	56.2	53.6	
Clinton			52.5	52.7	42.9	49.4		
Bonda				56.0	35.4			
Benton					33.8			
<b>Early Midseason:</b>								
Rainbow	80.0	45.0	60.0	52.1	54.9	55.7	53.0	53.3
Vanguard	80.2	49.2	69.1	56.5	52.4	49.3	56.8	55.5
<b>Late Midseason:</b>								
Victory	81.6	45.8	68.6	62.4	57.6	62.9	58.6	56.9

<sup>a</sup> Not grown, using yield from Vicland.

#### Newer Varieties

The observations on some of the newer varieties such as Clinton and others, with respect to their relative abilities to yield under our conditions, are not sufficient to base definite

lem. For the 3 years at Fargo, Clinton yielded about the same as Vicland 2 years and less than Vicland the other year. At Edgeley during the same 3 years Clinton yielded as well or slightly better than Vicland in

**TABLE 4—HOW THE VARIETIES HAVE COMPARED IN TRIALS AT WILLISTON AND MINOT**

Variety	Bushels Per Acre					
	1946	Williston Average			1946	Minot Average
		1944 to 1946	1943 to 1946	1942 to 1946		1945 to 1946
<b>Early:</b>						
Gopher	52.8	73.0	77.7	77.4	57.5	70.2
Marion	48.4	68.8	75.0	75.2	64.0	76.4
Vicland	54.1	72.7	79.8		52.3	71.9
Ajax	54.1	73.5			57.7	76.4
Clinton	42.6				48.1	
Bonda	43.6				48.1	
Mindo					45.4	
<b>Early Midseason:</b>						
Rainbow	52.4	69.1	75.1	75.0	54.3	68.3
Vanguard	46.9	66.3	72.7		61.7	76.5
<b>Late Midseason:</b>						
Exeter		65.5 <sup>1</sup>	75.0 <sup>1</sup>		70.2	79.8

Grown 1943 to 1945—using yield for Vanguard in 1946.

each of the years. At Dickinson Vicland outyielded Clinton in two out of the three years tested. Grown only one year in the trials at Williston, Minot and Langdon, Clinton yielded less than Vicland, Marion, Ajax or Rainbow. Only at Fargo and Edgeley in 1944 was rust a factor and it was mostly leaf rust.

The Experiment Station recommends Clinton for the south-eastern and eastern sections of North Dakota, and is encouraging its introduction into that area. However, the likely advantages of this variety over Vicland or Tama, under our conditions, appear to be mainly in more protection from stem rust in case of a serious rust

epidemic, resistance to blight, and a stronger and slightly longer straw. These are all desirable characters and justify the introduction and use of the variety, even though under our conditions it may not always excel or yield up with those that are less resistant. Clinton is resistant to most, but not all races of leaf rust,<sup>1</sup> matures only slightly later than Vicland and has plump, yellowish-white grain of high test weight.

Clinton is from a cross, D69 x Bond, made at the Iowa Experiment Station, in cooperation with the U. S. Department of Agriculture, and was first released to farmers in 1946. The parent, D-69 was from a cross using the stem rust resistant

<sup>1</sup>Not resistant to race 45.

**TABLE 5—HOW THE VARIETIES HAVE COMPARED IN YIELD AT THE WILLISTON IRRIGATION STATION**

Variety	Bushels Per Acre						Average		
	1941	1942	1943	1944	1945	1946	1945	1943	1942
							to	to	to
							1946	1946	1946
<b>Early:</b>									
Gopher	78.5	68.0	74.7	65.3	74.4	95.7	85.1	77.5	75.3
Marion		49.0	59.1	53.2	67.1	87.1	77.1	66.6	63.1
Vicland			92.1	68.9	81.7	97.2	89.5	85.0	
Tama			88.4	69.0	77.1	97.2 <sup>a</sup>	87.2	82.9	
Ajax					77.3	87.9	82.6		
Clinton						81.2			
Bonda						73.8			
<b>Early Midseason:</b>									
Rainbow	69.9	69.0	83.5	68.0	78.3	92.1	85.2	80.5	78.2
Vanguard	71.7	71.0	83.9	59.3	83.5	93.6	88.6	80.1	78.3

<sup>a</sup> Using yield for Vicland.

Richland (Iowa 105) x Green Russian. Bond, the other parent, is a stiff strawed midseason Australian variety highly resistant to crown rust, also to loose and covered smut. There should be an abundant supply of Clinton seed available for sowing in 1948.

Benton, developed from a cross similar to that producing Clinton was selected, increased and released in Indiana where it appears to have done well. Benton compares with Clinton in resistance to stem and leaf rust, smut and blight. Benton is more uniform in plant type than Clinton, grows taller but does not have quite as strong straw. If Benton should be found to yield satisfactorily under our conditions, this greater height should be an advantage in a considerable portion of our State where early ripening oats are grown on the lighter soils and especially in dry seasons. As yet too few

tests are available in North Dakota to determine how well it will yield here in comparison with other varieties. Based on observations from other states its yields have compared favorably with those of Clinton.

Bonda was developed by the Minnesota Experiment Station and first released in 1946. Bonda is from a cross, Bond x Anthony, and is considered as having about the same resistance to the smuts, blight, stem and leaf rust as Clinton. While this variety has not yielded as well as some of the others, during the two years grown in our trials, it grows up tall and produces a well developed, plump, yellowish-white kernel, with high test weight. Bonda requires from 2 to 3 days longer to ripen than Vicland.

Mindo, another variety developed by the Minnesota Experiment Station, also has Bond as one of the parents. Like Bonda

**TABLE 6—HOW THE VARIETIES HAVE COMPARED IN YIELD  
AT LANGDON**

Variety	Bushels Per Acre						Average	
	1941	1942	1943	1944	1945	1946	1943	1940
							to	to
							1946	1946
<b>Early:</b>								
Vicland			89.7	69.4	89.0	59.4	76.9	
Ajax			101.0	87.8	90.0	73.8	88.2	
Clinton						56.9		
Bonda						49.4		
<b>Early Midseason:</b>								
Rainbow	75.6	90.3	88.2	85.6	89.4	78.8	85.5	80.2
Vanguard	64.4	92.8	77.5	82.2	82.8	74.4	79.2	75.0
<b>Late Midseason:</b>								
Victory	61.9	86.3	59.4	74.4	58.8	73.2	66.5	67.4
Rusota	66.6	95.3	88.5	87.2	90.7	80.6	86.8	80.7
Exeter			88.2	87.5	85.9	77.8	84.9	

This variety is resistant to most of the common races of stem rust, also to leaf rust, smut and the new blight disease. Mindo grows to about the same height and will head and ripen about the same time as Vicland or slightly earlier. This variety has not been tested long enough to indicate how well it may yield in comparison with other varieties in North Dakota. It was released to Minnesota growers in 1946.

#### Early Versus Later Varieties

The oat crop is not only susceptible to injury from rust, but is sensitive to unfavorable climatic conditions. High temperatures during the ripening season, or a late drought may seriously injure an otherwise promising crop. When it occurs, late ripening varieties usually are injured more than those that

head and ripen earlier. The early varieties are injured too, but being more advanced when the high temperatures usually occur the injury is proportionately less. High ripening temperatures will occur with greater frequency and usually with more serious results in the southern and western parts of the State than in the northern sections.

Varieties classed as early ripening require about 80 days to mature. This is from 5 to 10 days less than is required by those varieties classed as mid-season. In spite of a short growing season good early ripening varieties yield surprisingly well. Most early varieties, however, have rather short straw, a disadvantage in dry years or when grown on the lighter more sandy soils. In North Dakota early ripening varieties are

suited best and generally grown in the eastern and southeastern sections of the State. They usually also yield satisfactorily in relation to other varieties, in the more western parts of the State, but are not in such general favor because of the short straw. In the northern counties, where ripening temperatures are more moderate, the later varieties rather consistently have the advantage in yield over those ripening early. Since the newer more rust resistant varieties, now coming

into early distribution, are early ripening sorts, it is expected that they may find their largest use in the eastern and southeastern sections of the State. It is there that earliness is most desirable and also where most rust protection may be needed.

Plant pathologists recommend treating all seed before sowing, using Ceresan. This is a good practice every year. It seems especially important this year in view of the importation of much seed from blight infested areas.

### THE GEOLOGIC HISTORY OF THE BISON IN THE GREAT PLAINS

The bison we know today is known to science as "Bison bison". Messrs. C. B. Schultz, Director of the University of Nebraska State Museum, and W. D. Frankforter, the Assistant Curator of Paleontology in that museum have recently furnished us much information about more ancient forms of the bison which once inhabited the plains area. (The Geologic History of the Bison in the Great Plains—A Preliminary Report—C. Bertrand Schultz and W. D. Frankforter—Bulletin of the University of Nebraska—December, 1946). Here we find drawings of the skulls of *Bison bison*, of *Bison antiquus*, of *Bison antiquus barbouri* and of the two huge super-bison, *Bison alleni*, and *Bison latifrons*.

The authors state, "Bison first appeared in the Great Plains before the middle of the Pleistocene (Glacial Period) x x x. The first bison to reach the Plains region were truly giants and were the size of *Bison* (superbison) *latifrons* (Harlan) from Big Bone Lick, Kentucky". They note that *Bison antiquus*, "has been found associated with the cultural remains of early man in many parts of the Great Plains".

In their conclusion the authors state, "that evidence at hand indicates that there has been a gradual diminution in the size of the bison since the first migrants arrived in the Great Plains during Kansan time (the Kansan was a very early glacial period—H.L.W.) The giant forms apparently had attained this maximum size before reaching the plains region, probably in Asia".

(Review by H.L.W.)