Resistant Oats Varieties Insure Against Rust Loss[1]

By

T. E. Stoa, Agronomist

INSURING THE NORTH DAKOTA OAT CROP against serious loss from rust, thru the larger use of rust resistant varieties now available, is the object of a more aggressive educational program being sponsored this fall and winter by several agricultural agencies, including the North Dakota Agricultural Experiment Station and the Extension Division. Much leaf (crown) rust damage has occurred the last three years in much of eastern North Dakota. Leaf rust has come early, developed rapidly and reached epidemic proportions before the oat crop could ripen. Early varieties which usually have been sufficiently early to "escape" injury have been seriously damaged, though to a less extent than later ripening oats. The oat crop may also be injured by stem rust, but this rust has been less common the last few years than leaf rust.

The recent development and introduction of varieties that resist both stem and leaf rust, and the increasing availability of this seed, now makes it possible for farmers who wish to acquire seed to do so and thus protect their oat crop against such losses. Since rust and rust losses occur most frequently in eastern North Dakota, where summer rainfall and humidity is usually higher, the need for rust resistant varieties is more urgent in that section than elsewhere in the State. Then too, the more resistant varieties now available are early ripening and have short straw. Because rust losses are a lesser hazard in the western counties, and because varieties with taller straw are generally preferred there, it is felt that the seed stocks now available should first be used in eastern North Dakota. Further tests and observations will soon determine how desirable these varieties may prove in other parts of the State.

[1]For a more complete discussion of oats varieties see Bimonthly Bulletin Vol. 5, No. 3. Reprints of this will be sent on request to the Information Department, State College Station, Fargo, N. Dak. See also Farmers' Bulletin No. 1941, U. S. Department of Agriculture.

The varieties that are most rust resistant are Vicland, Boone and Tama. These are all early, short strawed, yellow oats, resistant not only to the rusts but to smut. Fair acreages of Vicland and Boone were sown in North Dakota in 1943 and considerable seed is available for further sowing next year, provided it is saved for that purpose and made available to other growers. There are several other early yellow selections[1] from the same cross which resulted in the above varieties. These are in less extensive production. However, they are rust resistant and where certified, or otherwise recognized pure seed is available, they can be used.

Marion, a white oat, has satisfactory resistance to stem rust and is resistant to many races of leaf rust, but susceptible to some races which are present. In our 1941 trials, Marion was relatively free from leaf rust, but carried considerable infection in both 1942 and 1943. Marion grows taller than most of the other early varieties, and may, therefore, be preferred on the lighter soils where the longer straw is desired and in sections where the rust hazard is not so great.

Rainbow, already grown quite extensively, having been introduced several years ago, also has good resistance to stem rust and like Marion is resistant to a number of races of leaf rust but susceptible to other races which appear to have become increasingly prevalent in this area the last two years. Rainbow is slightly later in ripening than the varieties referred to above, usually yields well and grows taller. It has a yellowish white kernel.

Familiar varieties like Gopher and others are very satisfactory and excellent yielders when rust is not severe. **The newer varieties should not be expected to show superior yields when rust is not present, but their introduction and use will make production much more sure in those years when rust is damaging.**

In the accompanying tables are the yearly yield comparisons since 1939 for Fargo and Edgeley, representing the eastern sections of North Dakota where these early rust resistant varieties have shown to the best relative advantage, and are likely to do so in future years. Trials at Langdon have not generally included early ripening varieties since observations in earlier years have indicated that somewhat later ripening varieties have generally yielded better in that section. However, when grown at Langdon in 1943 these comparable yields were obtained: Vicland 89.7; Rusota 88.5; Rainbow 88.2; Vanguard 77.5; Anthony 68.1; Victory 59.4 bushels per acre, indicating the advantage of rust resistance and earliness in that section this year.

Differences favoring the resistant varieties have been particularly outstanding in the Fargo trials, representing a section where rust injury has been most severe (Table 1). These differences can be noted especially for the years 1941 to 1943. Rust was also present these years at Edgeley, but was most damaging in 1942. In the usually drier sections of the State, as repre-

[1]Control, Cedar and Vikota are other named selections.

Table 1. **How Resistant Varieties have Compared in Yield with Gopher and others at Fargo and Edgeley for the years grown**

Variety	Yield, bushels per acre					Average		
	1939	1940	1941	1942	1943	1941 to 1943	1940 to 1943	1939 to 1943
FARGO								
Gopher	58.2	37.8	38.3	62.7	21.7	40.9	40.1	43.7
Rainbow	63.0	26.3	58.7	86.4	41.5	62.2	53.2	55.2
Marion	62.9	32.3	58.1	86.6	40.9	61.9	54.5	56.2
Boone	56.4	32.0	57.0	91.1	45.9	64.7	56.5	56.5
Vicland	....	....	60.2	87.9	51.0	66.4	....	....
Tama	....	....	....	89.2	50.6	....	....	....
Vanguard	58.1	21.3	46.4	68.1	28.7	47.7	41.1	44.5
Victory	60.1	15.4	30.8	69.3	12.1	37.4	31.9	37.5
EDGELEY								
Gopher	27.5	10.4	63.7	41.5	71.8	59.0	46.9	43.0
Rainbow	33.7	7.7	69.9	60.3	71.5	67.2	52.4	48.6
Marion	....	14.2	69.0	62.2	71.0	67.4	54.1	....
Boone	....	....	76.4	82.6	72.4	77.1	....	....
Vicland	....	....	61.9	83.9	76.7	74.2	....	....
Tama	....	....	....	89.1	79.0	....	....	....
Vanguard	....	....	....	39.6	63.3	....	....	....

sented by the Dickinson and Williston stations (Table 2), rust has been less a factor in influencing yields and the advantage of rust resistance in that section has generally not been so apparent. Gopher, an early, and Victory a mid-late variety, both susceptible to stem and leaf rust, are included in these tabulations for the sake of comparison, as is also Vanguard, a mid-early variety resistant to stem rust but not to leaf rust.

Early sowing of oats, to permit the crop to develop and approach maturity before the higher temperatures of late July and early August, will usually result in more satisfactory oat yields. Earliness too is a factor often helpful in enabling a field of oats to "escape" disease damage, including damage from the

Table 2. **Showing Comparative Yields obtained when Grown at the Dickinson and Williston substations**

	Dickinson		Williston	
	1940 to 1943	1939 to 1943	Dry land 1942-1943	Irrigation 1941-1943
Gopher	47.8	54.6	84.0	73.7
Rainbow	50.8	54.2	84.0	74.1
Marion	46.0	....	85.2	b
Boone	42.3	47.1		b
Vicland	43.9	....	a	b
Vanguard	51.7	....	87.4	75.5
Victory	50.9	49.8		

a Vicland grown in 1943 yielded very satisfactory. Boone not grown.
bMarion grown only two years. Vicland and Tama one year, 1943.

rusts which usually is most severe on the later ripening susceptible varieties. Good cultural practices and a wise selection of the variety to grow will go a long way towards insuring a satisfactory crop.

Seed of New Rust Resistant Durums Available

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TWO DURUM WHEATS, CARLETON AND STEWART, were released by the North Dakota Agricultural Experiment Station in the spring of 1943. These new durums are products of the durum wheat improvement program carried on cooperatively with the Division of Cereal Crops and Diseases, Agricultural Research Administration U. S. Department of Agriculture.[1] Both varieties are from Mindum x Emmer ("speltz") crosses, made to obtain the high rust resistance of the emmer parent and backcrossed twice with Mindum to recover the more desirable characteristics of Mindum, particularly kernel type, color and semolina quality. Carleton and Stewart are highly resistant to the durum "races" of stem rust commonly found in this area on Mindum and Kubanka, and in tests to date have appeared to be very satisfactory in semolina quality.

About 395 bushels of Carleton were released in lots up to 10 bushels each to 40 farmers who cooperated in its increase in 1943. From this initial distribution about 6000 bushels are now available for sowing in 1944. Farmers report an average yield of about 20 bushels per acre. Carleton is slightly later in ripening than Mindum, has a stronger, coarser straw and carries its head more erect. The kernel is shorter and more plump than Mindum and like Mindum is without brush. Its outstanding merits over Mindum are higher rust resistance and stronger straw.

A total of 1160 bushels of Stewart was available for distribution last spring. This was released in lots up to 20 bushels each to 61 cooperating farmers. Reports on hand indicate that from this distribution about 18,000 bushels will be available for sowing in 1944. The average farm yield reported for 1943, including several fields partially hailed or drowned out, was about 20 bushels per acre. Stewart is slightly later in ripening than Mindum, is less subject to

[1]Bimonthly Bulletin, March 1943.