

BARLEY VARIETIES IN NORTH DAKOTA

By

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North Dakota leads all other states in barley production. During the 5-year period, 1942 to 1946, production has ranged from 47 to 67 million bushels, averaging about 58 million bushels. The acreage sown to barley during this period varied from about 2.2 to 2.7 million acres, an average of 2.4 million acres, or 12% of the total crop acres in the state in the five year period.

North Dakota's position as the top ranking barley producing state was brought about by several factors. In 1943 and 1944 heavy leaf disease infestations resulted in very poor yields in the warmer, more humid states of the North Central region and production dropped sharply in Minnesota, Wisconsin, Iowa, Illinois and Michigan. This drop in production, along with steadily increasing industrial demands resulted in a very favorable market for barley. This caused an increased production in North Dakota where the comparatively disease free condition and cooler growing season favored the production of good quality barley.

Barley has steadily increased in importance as a cash crop in the State. In 1942, 40 percent of the barley produced was marketed while in 1946 the amount marketed was 68 percent of the crop, even though total production in that year was 21 million bushels less than in 1942. In the coming years, if we wish to retain a large part of the market for malting barley, the grower should keep in mind the kind and quality of barley preferred. This means growing suitable malting varieties and delivering to the market a crop which is sound, free from damaged kernels, undesirable mixtures and otherwise of high quality.

Varieties of barley

Varieties differ in their yielding ability and other characters such as disease resistance, straw strength. Their reaction to different seasons and environment varies considerably. Early varieties will usually perform better than late ones in dry years, but in years of favorable moisture and temperature the later varieties are more productive.

Similarly, diseases are more prevalent in the more humid eastern part of the state and some consideration should be given to disease resistance when selecting a variety. Spot blotch, one of the humid high temperature leaf diseases, is caused by the fungus *Helminthosporium sativum* and appears as irregular brownish spots on the leaves. It may appear any time from shortly after emergence to maturity and cause damage ranging from complete killing to very slight reduction in yield. Smooth beards, straw stiffness or some other character may be considered when making a choice of variety. Seasonal conditions vary from year to year and in choosing a variety one should consider growing conditions in the past and select a variety which will most closely satisfy these growing conditions.

For marketing, barley is generally divided into two classes, malting and feed. Varieties differ in their chemical and physiologic action when malted, making certain ones more desirable for this use. All barleys make good feed if they are plump and free from disease and foreign material. A brief description of the more commonly available varieties is given here to enable growers to select the one which has the best chance to meet his requirements.

Manchuria, one of the older varieties is still grown to some extent. It yields moderately well, has rough awns, nodding heads, moderately stiff straw, mixed blue and white kernels, a tendency to shatter and is medium in maturity. It lacks resistance to most barley diseases but has some tolerance to root rot, spot blotch and head blight. Manchuria, while suitable for malting will often be graded as "hard" because it pearls mostly blue.

Wis. 38, until recently was the most extensively grown malting variety. After the 1943 and 1944 heavy epidemics of spot blotch to which Wis. 38 is susceptible, its popularity decreased. Wis. 38 has six rows, smooth awns, nodding heads, long weak necks which tend to break off, moderately weak straw and matures late. Under disease free conditions its yielding ability is high. Wis. 38 has some tolerance to stem rust and is less susceptible to smuts than Manchuria. It pearls white and usually produces mellow grain.

Trebi is a short, mid-early, rough awned barley which has given excellent yields over a long period of years and a wide range of conditions. The kernels are large, blue, fairly hard and germinate unevenly so is considered unsuitable for malting and mixtures of it in other varieties is regarded as objectionable for malting. Trebi is susceptible to most diseases but is resistant to loose smut and stripe. Trebi should be regarded as a feed barley.

**How the older varieties have compared in yield
over a long period of years
(Bushels per acre)**

Variety	Williston						
	Fargo 18 yrs.	Edgeley 11 yrs.	Langdon 13 yrs.	Dickinson 17 yrs.	D. Land 9 yrs.	Irrig 3 yrs.	Minot 3 yrs.
Manchuria	35.5	30.9	38.5	23.4	35.6	43.3	30.1
Wis. 38	35.7	35.9	45.3	.....	.....	54.4	39.2
Trebi	44.1	39.9	47.8	25.4	47.9	65.3	43.4
Spartan	36.5	32.3	.....	.....	40.4	48.1	35.5

Spartan, a stiff strawed, smooth awned two-row variety is very early maturing and this sometimes enables it to "escape" heat and drought. Its yield is only moderate under favorable conditions. It shows some resistance to spot blotch and scab but is susceptible to rusts and smuts. Two-row barleys are excluded from the malting grades under present standards, but Spartan has proven good for pearled barley, which is used in soups, puddings and breakfast foods.

Kindred, also called "L" barley is now grown extensively in North Dakota and adjoining states to the east and south. Kindred has rough awns, nodding heads, medium length of straw and is medium in maturity. Its straw is weak and lodges readily, especially on rich soil with abundant moisture. Kindred, however, is resistant to stem rust, shows considerable tolerance to spot blotch, but is moderately susceptible to smut. Tests to date have shown that this variety in disease free years, may be expected to yield somewhat higher than Manchuria but not as high as Wis. 38. In stem rust years it may yield considerably better than Manchuria and better than Wis. 38 in spot blotch years. In 1943 and 1944 trials at Fargo, when spot blotch was prevalent, Kindred outyielded Wis. 38. Kindred pearls white and is acceptable for malting.

How Kindred ("L") has compared with other varieties in yield

(Bushels per acre)

Variety	Fargo 1942- 1947	Edgeley 1943- 1947	Langdon 1944- 1947	Williston		Minot 1945- 1947
				Dickinson (D. Land) 1945- 1947	D. Land) 1944- 1947	
Manchuria	40.3	34.5	52.0	32.9	39.8	30.1
Wis. 38	37.6	37.4	59.3	.....	.....	39.2
Kindred ("L")	43.3	39.4	53.3	28.3	41.5	36.8
Trebi	49.5	42.9	62.1	36.4	49.3	43.4
Tregal	45.8	42.9	62.5	31.6	47.0	38.1
Spartan	36.1	35.9	.....	26.9	41.4	35.5

Tregal has smooth awns, relatively short stiff straw, erect heads and matures about the same time as Trebi, making it medium early. Tregal is moderately susceptible to stem rust, susceptible to spot blotch but resistant to loose smut. In tests Tregal has shown very good yielding ability. It has generally outyielded Manchuria, Kindred and Wis. 38 and has very closely approached Trebi. Tregal, when malted, has some undesirable characteristics so must be considered as a feed barley and is equal to other barleys for this purpose.

How Tregal has compared with older standard varieties in yield

(Bushels per acre)

Variety	Fargo 1937- 1947	Edgeley 1941- 1947	Langdon 1941- 1947	Williston		Minot 1945- 1947
				Dickinson 1938- ¹ 1947	D. Land Irrig. 1942- 1947	
Manchuria	36.8	37.4	50.5	29.0	45.1	31.0
Wis. 38	38.1	42.3	56.8	.....	.....	39.2
Trebi	45.8	45.9	61.6	33.8	56.6	43.4
Tregal	44.9	47.3	61.1	30.8	55.6	38.1
Spartan	37.5	39.2	.....	26.8 ²	48.3	35.5

¹1941 omitted because of hail damage. ²Yield of Steigum used for 1938.

Montcalm, the new Canadian barley released by MacDonald College, Quebec, has blue kernels, six rows, smooth awns, nodding heads, medium length of straw which is moderately weak being slightly weaker than Manchuria and is medium late maturing. It pearls blue and as such may be, when graded, unfairly classified as non-mellow thus eliminating it from the malting grades. Color of pearled barley, however, is not a true indication of mellow-ness.

Montcalm is susceptible to stem rust and moderately susceptible to loose smut, spot blotch and root rot. It has a stronger neck than Wis. 38 but in the Fargo and Edgeley trials in 1947, showed a tendency to shatter. This may have been due to the very dry conditions at harvest. In yield trials the past few years Montcalm has given promise of yielding satisfactorily especially in eastern North Dakota. At Fargo, it outyielded both Wis. 38 and Kindred. In the northeastern and north central sections it has outyielded Kindred and yielded slightly less than Wis. 38. In the drier sections of the State, Montcalm has yielded well but has not shown the same advantage over other varieties as it has in the more humid eastern area. This may be due to a lack of resistance to drought and high temperatures. This variety is accepted in Canada for malting purposes. Adequate large scale tests have not yet been made in this country but it has given promising results in small scale tests made at the Malting Laboratory, Madison, Wisconsin.

How the recently introduced Montcalm has compared with other varieties in yield during years tested
(Bushels per acre)

Variety	Fargo 1945- 1947	Edgeley 1945- 1947	Langdon 1946- 1947	Dickinson 1946- 1947	Williston		Minot 1946- 1947
					D. Land 1947	Irrig. 1946- 1947	
Manchuria	43.0	33.2	56.6	29.1	33.4	52.6	27.8
Wis. 38	46.2	35.5	63.9	.....	.....	53.0	38.1
Kindred ("L")	44.5	37.3	58.0	26.7	37.7	.....	34.9
Montcalm	52.8	33.3	62.5	30.0	44.5	63.8	36.3
Trebi	52.7	42.0	66.9	46.5	51.5	69.6	39.4
Tregal	51.0	41.2	69.9	33.0	58.2	61.0	36.2
Spartan	38.8	33.2	.....	26.1	52.2	50.6	32.4

Bay, released in 1945 from the Michigan Experiment Station at East Lansing, Michigan, is a six-row, stiff strawed, fairly tall variety with smooth beards, white kernels, erect heads and matures later than Manchuria but 2 to 3 days earlier than Wis. 38. It is susceptible to stem rust, moderately susceptible to loose smut but is more resistant to root rot and spot blotch than Wis. 38. Under conditions which prevailed in much of the State in 1947, Bay appears to shatter easily. This was especially true at Dickinson where it shattered badly resulting in disappointing yields. Bay is acceptable for malting. Yield comparisons on Bay in North Dakota are too limited for definite conclusions. At Fargo in 1946

Bay yielded slightly less than Manchuria and about 2 bushels less than Wis. 38. In the 1947 trials at Fargo, Edgeley, Langdon and Minot, it yielded about the same or slightly higher than Manchuria and was outyielded consistently by Wis. 38 except at Edgeley. No serious disease conditions were present to influence comparisons in these trials. Indications are that it will be a fair but not a high yielder in North Dakota.

Other Varieties

There are several other varieties which are of minor importance in the State. Mars, a stem rust resistant, stiff strawed, smooth-awned early variety has not given outstanding yields and is considered as a feed barley. Plush, the Canadian feed barley, is very susceptible to loose and black smut, root rot and spot blotch. Its yields have been relatively low. O.A.C. 21 also called "Arctic" is very similar to Manchuria both in yield appearance and other agronomic characters. It pearls blue but like Manchuria has certain desirable malt properties. Galore, a Canadian feed barley has smooth awns, white kernels, medium straw strength and matures about the same time as Manchuria. On the basis of yield tests for one year, which are not conclusive, its yield was satisfactory. Malting quality tests on Galore have been few but indicate that it is low in diastase, being considerably lower than Kindred and somewhat lower than Wis. 38. Information on its handling and chemical properties is lacking for plant scale malting and brewing trials. Feebar, a South Dakota Experiment Station release, is a short, erect, smooth bearded stem rust resistant feed barley. In limited trials its average yielding ability in North Dakota and short straw do not give it any advantage over other varieties. It does, however, have higher protein than most other varieties.

Summary

North Dakota leads in barley production and over half of the crop is marketed. To hold this market we should produce high quality barley. For malting purposes, Kindred ("L"), and Wis. 38 produce good yields of mellow barley in suitable areas of the State. Manchuria and Bay are other varieties which may offer some advantages. Trebi is the highest yielding barley followed closely by Tregal. Spartan, while not as high yielding as Trebi and Tregal, may be useful under certain conditions for the production of feed. Other varieties which have not been tested sufficiently for conclusive results are Montcalm, Galore and Feebar.

To obtain most satisfactory yields, sow early on well prepared soil which is fertile and retains moisture. This enables the crop to make full and rapid growth in the cooler more favorable growing period.

GROWING FLAX IN NORTH DAKOTA

By

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Successful flax production is usually the result of several factors operating together: favorable weather, a good soil and good farm practices.

Man can not influence the weather or change his soil basically, but he can through good soil management and farm practices lessen the unfavorable effects of poor soil structure and low rainfall. Through his field operations he has considerable control over the condition of his soil, the seed bed which he provides, its tilth, moisture reserve and the amount of weed competition which the crop may have to face. These and other practices, such as time of seeding and choice of varieties, can have a large influence on the stand and yield of a crop.

A cropping program which includes a legume, or mixture of a legume and grass, insures a soil richer in available fertility, in root fiber and organic matter and as a result is in better tilth, better physical condition. Such a seed bed is less subject to crusting and will have a larger capacity for absorbing and holding moisture.

Cultural Practices

Competition from weeds is one of the most serious problems to successful flax production. Weeds compete with flax for available moisture and fertility. In periods of low rainfall this extra plant growth, and the moisture which it takes from the flax, can mean the difference between a poor or a good crop. In the same way weed competition can aggravate a deficiency in soil nutrients.

Plan Ahead For the Flax Field

Cultural and soil management practices for the control of weeds must usually begin a year or more before the flax is to be sown. The most successful flax farmer is one who manages his fields so that weed competition is always at a minimum and then, in his cropping program, he sows flax following the crop where weed competition would be the least. Usually this is after corn or some other intertilled crop, provided the cultivations kept the weeds in check. It may also be grassland, if this has been down to grass long enough to permit rotting of the buried weed seeds. A firm seed bed and early sowing to permit the crop to develop under relatively moderate temperatures is generally preferable.

Spring plowing is a common practice on the lighter soils and insures relatively clean flax. When sown in this manner the soil should be plowed, well packed and the flax sown the same day. Some growers when sowing on summer fallow prefer to plow the fallow in the spring, pack and seed immediately.