

## Which Barley To Grow

By

T. E. Stoa, Agronomist

**B**ARLEY PRODUCTION in North Dakota during the 10-year period, 1932-1941, averaged about 25 million bushels. The acreage sowed to barley during this period, representing 11.4 percent of the land in crops, averaged about 2 million acres, ranging from 1.6 million in 1938 to 2.7 million acres in 1935. This is about the same acreage as the preceding 10-year period, when the acreage ranged from one million acres in 1922 to three million in 1929. Crop conditions, however, were more favorable in this earlier 10-year period and the annual production averaged higher, about 33 million bushels, ranging from 20 million bushels in 1923 to 56 million bushels in 1928.<sup>a</sup>

North Dakota ranks near the top among the states in the amount of barley produced, Minnesota alone having a higher production. Other states high in amount grown are California, South Dakota and Wisconsin. In normal years North Dakota accounts for about 15 percent of the total barley crop. About 75 percent of the U. S. barley crop is produced in the North Central states.

In North Dakota most of the barley is grown in the eastern one-third of the State. According to estimates by the Agricultural Marketing Service, the barley acreage in the three eastern cropping districts, or approximately the eastern third of the State, accounts for more than 50 percent of the barley acreage and more than 60 percent of the production (1932-1941). The seasonal rainfall in eastern North Dakota is usually more favorable for production. More livestock is fed in that area, so the demand for feed of this kind is greater, and surplus barley can often be sold advantageously on the market. The record of carlot ship-

ments of barley from North Dakota shipping points show that for the 10-year period, 1932-1941, about 7 million bushels or about 25 percent of the crop moved off the farm where grown.

Under the urge of war and maximum production the acreage sown to barley in North Dakota increased to 2.4 million in 1942 and 2.8 million in 1943. Generally favorable growing conditions which prevailed over the entire State these two years resulted in the highest production recorded for the State, 67 million bushels in 1942 and 64 million bushels in 1943. The high production in 1943 was in a large

<sup>a</sup>Acreage and production of figures from Agricultural Marketing Service. Harvested acre basis previous to 1929.

measure due to very favorable growing conditions in the western two-thirds of the State. In the usually best barley sections of the State the crop generally was disappointing. Barley there lodged badly, diseases were generally present, the yields not up to expectations, considering the amount of straw, and the grain usually light in weight and

sometimes blighted. What was true in eastern North Dakota was still more true in other barley growing sections of the North Central states. Wis. 38 grown most extensively in that area in recent years, usually yielding well and being the accepted and most extensively grown malting barley, was generally very disappointing.

### Varieties of Barley<sup>1</sup>

Varieties differ in their capacity to yield. However, the relative yield of any variety in any year will depend much upon the season and the environment under which it is grown. All varieties have some merit and usually some weaknesses — weaknesses that show up more in some seasons than in others. Early maturity is an advantage in some years. In other years later varieties, usually having a capacity for higher yield, will do better. Certain diseases are more prevalent in some years, and while all varieties lack much in desired resistance, they may differ in their reaction to some diseases.<sup>2</sup>

The performance of a variety over a period of years, with a

range of seasonal conditions, is a better criterion of a variety's suitability for a given area than its performance over a shorter period. While yield is a large factor in choosing a variety some growers may base their preference more on quality or market demand. In other instances, smooth awn, straw strength or some other character may be the basis for making a choice. One can not know the kind of season or environment to which the crop will be subject any year, but a knowledge of a variety's characteristics and behavior under known conditions in the past will make it easier to choose the variety having the characteristics and qualities most desired.

### Malting Barley and Feed Barley

Barley varieties may be grouped into two general classes, malting and feed barley. All varieties, when well developed, are generally regarded satisfactory for animal feed. For malting purposes, however, varieties having certain inherent characteristics and qualities have pref-

erence. Under the Federal grading system, barley to grade malting must weigh 43 pounds per bushel or over, must have 75 percent of mellow (not steely) kernels, must not contain over 5 percent of 2-row, Trebi or black barley, and not more than 4 percent of blighted kernels,

<sup>1</sup>Trials at Dickinson in cooperation with the Div. of Cereal Crops and Diseases, R. W. Smith in charge. Trials at Edgeley, Langdon and Williston under supervision of superintendents, J. P. Tiernan, V. Sturlaugson and W. H. Huber, respectively.

<sup>2</sup>Barley is subject to many diseases. Information on the reaction of varieties to many of these diseases not complete.

or more than 5 percent broken and skinned kernels. Barley of this class that has less than 75 percent mellow kernels is usually referred to by the trade as "hard malting barley," sometimes "hard barley. In grading practices blue or greenish blue kernels are associated with lack of mellowness.

Conditions under which the crop is grown will contribute to the quality of the barley produced whether for feed or malting. The choicest feed barley is one high in protein, low in hull. A choice malting barley is mellow, uniform, insuring rapid and even germination in the malting process; plump kernels, indicating high starch content and high extract. Varieties differ in their content and activity of the diastase (enzyme capable of converting starch to sugar). For brewing purposes the malt may have a moderately low diastatic power, but high diastase is necessary in a good distillers' malt. Good rainfall distribution and moderate ripening temperatures favor the production of plump kernels and high yields. This condition, with a suitable variety also generally results in the production of barley that malts well. Drouth and high temperatures during the ripening period results in shriveled, steely barley, slow in germination and low in starch and malt extract.

**Manchuria** is the oldest of the varieties tested and for many years was the variety most commonly grown. Much of the rough awned common 6-row barley, not identified as to variety, is probably Manchuria or of the Manchurian type. Most of the Manchuria barley now grown has a mixture of white and blue ker-

nels, some strains more blue than others. Manchuria has rough awns, nodding heads, matures moderately late and yields moderately well. Like most varieties it lacks in resistance to most diseases of barley, though it appears to have some tolerance to leaf rust, spot blotch, and to head blight. When well filled, the Manchuria commonly grown usually will grade hard malting. The malt is valued for its high diastase.

**Wis. 38** is the most extensively grown malting variety. It has smooth awns, nodding heads, grows rather tall, has weak straw and a long weak neck that breaks readily in strong winds, matures late but has good capacity for yield and pearls white. Because it ripens late it is likely to be less satisfactory than earlier varieties in dry years. Wis. 38 has some tolerance to stem rust, also to leaf rust, and is less susceptible to the smuts than Manchuria. It is moderately resistant to barley stripe, but susceptible to mildew and moderately susceptible to scab. The Wis. 38 grain is more uniformly mellow and malts more evenly than other varieties. The malt is low in diastase.

During the years tested at Fargo, Wis. 38 has yielded as well or better than Manchuria 11 years out of 14, failing to yield up with Manchuria in 1931, 1933 and again in 1943. At Edgeley, Wis. 38 yielded as well or better than Manchuria in each of the 7 years tested and at Langdon in 8 out of 9 years tested. In the western part of the State favorable yields for Wis. 38 have been less dependable. At Dickinson for 9 years, ending 1940, Wis. 38 failed to yield up with Manchuria 6

times. However, at the Williston station where conditions were somewhat more favorable for barley production during the 4 years under test on the dry land station and 2 years later on the irrigation station, Wis. 38 yielded decidedly better in each of the years except 1943 on the irrigation station when next to Plush it had the lowest yield of the barleys tested. Observations

made and experience leads to the conclusion that Wis. 38, the most acceptable of the malting varieties now available, has capacity for higher yield than Manchuria and in years reasonably favorable for barley production will outyield Manchuria. However, in less favorable barley years, particularly with late drouth, high temperatures or a late serious disease condition, Manchuria may do as well or better.

**How Wis. 38 and other varieties have compared  
in yield over the longer period tested**

(Yield in bushels per acre)

Variety	Williston						
	Fargo (14 yrs.)	Edgeley (7 yrs.)	Langdon (9 yrs.)	Dickinson (9 yrs.)	D.Land (4 yrs.)	Irrig. (2 yrs.)	Mandan (4 yrs.)
Manchuria.....	34.3	29.5	32.5	16.5	21.3	34.8	....
Wis. 38.....	35.0	35.8	39.1	12.5	31.2	40.0	13.5
Odessa.....	40.6*	36.3	....	15.7	....	....	15.7
Trebi.....	42.5	38.8	41.4	19.3	36.4	66.9	15.7
Spartan.....	36.8	29.8	....	....	....	43.2	....

\*Manchuria yield substituted in 1943.

**Odessa** is one of the older varieties though never has come to be grown very extensively in the State. Odessa has rough awns, nodding head, matures earlier than Manchuria, grows about as tall, but has rather weak straw and lodges readily. This is a high diastase barley, which when pearled shows a mixture of white and blue kernels. Like most of the varieties Odessa is susceptible to stem rust and most of the other common barley diseases, although showing some tolerance to leaf rust, spot blotch and head blight.

Odessa appears to be less injured from high temperatures and drouth than many other varieties and generally is among the highest yielding varieties in

the tests. This has been particularly true in the Edgeley and Fargo trials. Its tendency to lodge readily would discourage its extensive use on the heavier soils in the eastern North Dakota.

**Plush** is a new Canadian barley resulting from a cross made at the Brandon Experiment Station, between Lion and Bearer. Plush matures moderately late, about like Manchuria, has a moderately erect head, smooth awn, a relatively strong straw with satisfactory height and has white grain. While information on its malting qualities is rather incomplete, information which is available suggests that it should be satisfactory. Tests on comparable samples show that Plush

compares favorably with Manchuria in extract yield and diastatic power. Plush is less susceptible to stripe disease than most of the varieties, seems to have some tolerance to stem rust but is susceptible to most of the other barley diseases and especially to loose smut.

In Canada this variety has yielded satisfactorily, comparing favorably with the best varieties. Yield comparisons available in North Dakota are limited to 3 years at Fargo and a still shorter period at other stations. In these few tests, Plush has not yielded up to expectations.

**How the recently introduced Plush has compared with other varieties in yield during years tested**

(Yield in bushels per acre)

Variety	Fargo 1941 to 1943	Edgeley 1942- 1943	Langdon 1942- 1943	Williston			Weighted average 13 tests
				Dickinson 1942- 1943	D.Land 1942- 1943	Irrig. 1942- 1943	
Manchuria.....	37.8	41.2	48.2	34.4	55.9	34.8	41.7
Wis. 38.....	36.1	50.7	52.2	....	....	40.0	....
Olli.....	38.9	....	....	....	....	....	....
Plush.....	28.8	39.5	52.3	27.0	59.8	31.0	38.9
Trebi.....	47.0	50.0	58.0	36.7	71.3	66.9	54.4
Spartan.....	38.4	47.2	....	32.3	62.1	43.2	....

**Kindred**, also called "L" barley, is the increase of a selection made by S. T. Lykken, Kindred. This barley has rough awns, nodding heads, straw height about like Manchuria and matures about the same time but the straw is weak and lodges readily. Kindred generally pearls white and limited tests to date indicate that it should be an acceptable malting variety. This new barley is resistant to stem rust. Information with respect to its reaction to other diseases are too incomplete and conclusions not now warranted. Yield information too, is very limited. Observations to date suggests that this new variety may be expected to yield about like Manchuria in most years and better than Manchuria in rust years.

"**Norwegian**", a barley now grown to some extent in the

Hillsboro (Traill Co.) area, was originally brought to this country by one or more of our farmers when returning from visits to their former home land. This barley is a very early, rough awned, six-row variety, has nodding head, rather weak straw, is susceptible to rust, pearls white and the malt is high in diastase. In tests to date this barley has given evidence of not being able to withstand heat or dry weather at ripening time, and invariably has been disappointing in yield.

**Olli** is a six-row barley of Swedish origin. This variety matures earlier than most of the varieties, has weak straw, nodding head, rough awns and mostly white or straw colored kernels. Olli has not been extensively tested in this country but such tests as have been made and from tests in Canada, it ap-

pears that it lacks in capacity to yield, showing to best advantage in years when earliness is an aid in escaping late high temperatures or drouth. Olli appears to rust quite readily.

**Trebi** is a short strawed variety with long rough awns, erect head and matures mid-early. The kernels are long, fairly large, hard with a bluish color and steely appearance, germinates slowly and unevenly when malted, and the malt generally is not regarded with favor. Mixtures of Trebi in malting barley is regarded objectionable. Under the Federal grading system, malting barley may not contain more than a 5 percent admixture of Trebi, 2-row, or black barleys, considered unsuitable for malting. For animal feed, Trebi compares favorably with other varieties. Trebi kernels appear coarse and give the impression of having a high percentage of hull. Careful tests made covering six years, however, have shown that when Trebi and Manchuria were grown under comparable condi-

tions, the percentage of hull in Trebi was about the same as in Manchuria. Actual feeding tests too have shown that about the same gains will be obtained with either Trebi or Manchuria. Since Trebi does have a rather hard kernel, more attention may be needed in the grinding. Trebi is susceptible to most diseases but resistant to loose smut and has some resistance to barley stripe.

Trebi not only has a capacity for high yield but appears less sensitive to unfavorable conditions than most varieties, and so realizes a good yield more consistently. In the variety tests, covering a number of years and several stations, it has averaged a distinctly higher yield than any other variety. Short straw under drouth conditions, rough coarse awns that are objectionable, and hard kernels appear to be its main disadvantages.

**Velvon** was developed by the Utah Experiment Station and is from a cross (Coast x Lion) x Trebi. Velvon has smooth awns,

**How the newer varieties have compared in yield  
with older established varieties**  
(Yield in bushels per acre)

Variety	Williston						Weighted average 23 compar- able tests
	Fargo	Edgeley	Langdon	Dickinson	D.Land	Irrig.	
	1939 to 1943	1939 to 1943	1940 to 1943	1938 to 1943 <sup>a</sup>	1940 to 1943	1941 to 1943	
Manchuria.....	32.7	30.4	42.0	25.8	37.5	....	33.2
Wis. 38.....	34.3	37.6	49.3	....	....	....	....
"Norwegian"....	22.2	....	....	....	....	....	....
Trebi.....	40.8	39.3	54.3	31.0	51.4	67.5	42.5
Spartan.....	35.5	31.5	....	26.6 <sup>e</sup>	46.8	52.8	....
Tregal.....	38.4	39.4	52.7	29.2	53.2	54.0	41.7
Velvon.....	39.0	41.7 <sup>b</sup>	52.6	....	....	62.8	....
Ezond.....	36.9 <sup>a</sup>	40.4 <sup>c</sup>	50.9	27.8	55.5 <sup>a</sup>	....	41.4

<sup>a</sup>Yield from Velvon in 1943. <sup>b</sup>Not grown in 1939, Ezond substituted.

<sup>c</sup>Not grown in 1943, Velvon substituted. <sup>d</sup>Omitting 1941, when hail damaged crop.

<sup>e</sup>Steigum one year.

relatively short straw like Trebi and erect head, straw is strong and resists lodging quite well, grain is white, but is not considered a satisfactory malting barley. Velvon is moderately resistant to leaf rust, also to covered smut and stripe, but is susceptible to loose smut and kernel blight. A good capacity for yield and strong straw appear to be its advantages.

**Tregal** is from a cross between Regal, a smooth awn variety and Trebi made at the North Dakota Agricultural Experiment Station, and was released to growers in 1943. Tregal has smooth awn, relatively short straw, erect head, and matures about the same time as Trebi. Tregal appears to have some tolerance for stem rust, and a capacity for good yield. Its grain pearls white and the grading mellow is not considered wholly a satisfactory malting barley. It should, therefore, be considered primarily as a feed barley, a replacement for Trebi and other rough awn feed barleys. Tregal malt is low in diastase like Wis. 38. In the brewing process the wort lacks the clearness desired in a brewers' malt. In tests to date Tregal has averaged better yields than Wis. 38 and Man-

churia and in many of the tests has compared favorably with Trebi in yield.

**Spartan** is the only 2-row variety in these tests and the only 2-row now grown to any extent in the State. Spartan matures earlier than most varieties, has smooth awn, white grain and relatively short, strong straw. Spartan shows some resistance to barley stripe, spot blotch and scab, but is susceptible to the rusts and the common smuts. Under present malting standards 2-row barleys are excluded and Spartan is considered less satisfactory than other 2-row varieties. However, the uniformly large white kernels makes Spartan preferred over other varieties for use in soups, puddings, and breakfast foods.

In yield trials Spartan has shown to best relative advantage in years when later ripening varieties were injured more from late drouth or excess temperatures. Earliness too, has been an advantage in years when grasshopper damage was severe. The strong straw in Spartan appeals to some farmers who find that under their soil and growing conditions, other barleys lodge badly.

### Summary

**T**WO TYPES of barley are generally grown in North Dakota, malting barley for sale as a cash crop and feed barley to be fed on the farm.

For malting purposes Wis. 38, despite a disappointing yield in 1943 in many places, appears to offer the most promise for sowing in 1944, in that area of the State where conditions most often permit the production of mellow barley. Other varieties offering some advantages are Manchuria and Odessa for hard malting, Plush and Kindred.

Trebi is the highest yielding barley. Other feed barleys of promise are Spartan, Tregal and Velvon. Any of the malting varieties may also be grown for feed.

Select a soil that retains moisture well; a soil that is fertile so that the plants are well nourished, and practice early sowing, so that the crop is permitted to develop and approach maturity under more moderate summer temperatures. These are factors which together with the use of a good variety will assure the most satisfactory yield.

Reprints of this article available.

---

**Farm practices** may often be altered to benefit wildlife, yet not to interfere with agricultural production. In fact, the farmer may receive both esthetic and tangible economic values by promoting desirable wildlife habitats. When a given area is entirely taken over for the growing of crops and the extensive grazing of cattle, agriculture may become intensified to its own disadvantage. With no shrubs, wooded areas, swamps or other suitable wildlife environments, insect feeding birds and fur bearing animals are deprived of food and shelter and are unable to survive. The authors set forth practical recommendations for improving cover and food conditions, controlling game destroyers, protecting wildlife by decreasing mortality due to farming operations, and related factors of game preservation. (Review by H. S. Telford).  
Beal, F. E. L. Some Common Birds Useful to the Farmer. U. S. Dept. of Interior. Fish and Wild Life Service. Conservation Bulletin No. 18 28 pages (1942).