

# HAZEN

## A NEW BARLEY VARIETY FOR NORTH DAKOTA

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The Director of the North Dakota Agricultural Experiment Station in cooperation with the Agricultural Research Service, U.S. Department of Agriculture, announced the release of a new barley variety on January 10, 1984. Seed increase of 'Hazen' (P.I. 483238) was made by County Crop Improvement Associations in all counties in North Dakota in 1984 under contract with the North Dakota Agricultural Experiment Station. Seed allocations of Hazen also were made to interested states and to the North Dakota seed trade.

Hybridization, selection, and development of Hazen was done at North Dakota State University through cooperation of the departments of Agronomy, Cereal Chemistry and Technology, and Plant Pathology. Also, Branch Experiment Stations in North Dakota, cooperating states in the region, the USDA Barley and Malt Laboratory at Madison, WI, and industry laboratories under auspices of the American Malting Barley Association collaborated in testing Hazen barley.

### HISTORY OF HAZEN BARLEY

Hazen is a selection from the cross Glenn/4/Nordic//Dickson/Trophy/3/Azure made in the 1976 spring greenhouse. Early generations of Hazen were grown at Fargo in greenhouses or field and at Cd. Obregon, Sonora, Mexico. A single F<sub>3</sub> plant was selected in 1978 and the F<sub>4</sub> row was bulked to provide seed for yield tests starting in 1979 in North Dakota. Hazen was tested under the number ND5569 and was entered in regional tests in 1982. Hazen is named in honor of the late Arlon G. Hazen, former Director of the Agricultural Experiment Station and Dean of the College of Agriculture.

### AGRONOMIC CHARACTERISTICS OF HAZEN

Hazen is a six-rowed, semismooth-awned spring barley with white aleurone and long hairs on the rachilla. Comparisons of Hazen with other varieties for several agronomic characteristics are presented in Table 1.

**Table 1. Agronomic performance of Hazen compared with Glenn, Morex, Robust, and Azure, averaged over five locations<sup>1</sup> in North Dakota, 1982-84.**

Characteristic	HAZEN	Azure	Robust	Glenn	Morex
Yield, bu/A	80.7	80.3	77.8	71.5	74.4
Days to heading (after 5/31)	29.5	28.6	29.0	27.0	28.1
Height, inches	30.7	30.5	30.4	29.9	31.4
Lodging, percent	14.0	22.0	21.0	24.0	24.0
Test weight, lbs/bu	46.8	46.6	47.5	45.4	45.6

<sup>1</sup> Locations were Fargo, Langdon, Carrington, Minot, and Williston.

Average grain yield of Hazen has exceeded that of Glenn, Morex, or Robust in North Dakota trials. Yields of Hazen and Azure are nearly equal. Hazen has very good kernel plumpness and test weight. Maturity is one to two days later than Morex and Glenn but equal to Robust. Hazen has better resistance to lodging than other varieties.

### DISEASE REACTION OF HAZEN

Hazen is superior to Glenn and Morex for spot blotch resistance but is about equal to these varieties for net blotch reaction (Table 2). It is susceptible to loose and covered smuts; however, growers can prevent losses from these diseases by use of the seed treatment Vitavax. Covered smut is controlled by use of any currently recommended seed treatment. These varieties all are resistant to prevalent races of stem rust but are susceptible to leaf rust. Leaf rust normally is a problem only on late planted barley in the northern and eastern areas of North Dakota.

### MALTING QUALITY OF HAZEN

Small scale laboratory quality tests were performed on Hazen barley beginning in 1979, and results have been generally favorable. Tests on barley from branch station variety plots were conducted during 1982 and 1983. The results of these latter laboratory malting tests are summarized in Table 3. The data shown are the average for the two years and six locations, thus representing 12 station years for each variety.

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**Table 2. Reaction of Hazen, Glenn, and Morex to prevalent diseases in North Dakota.**

	No. of station years	Hazen	Glenn	Morex
Leaf spot 1-10*, **	4	4.7	5.0	6.0
Spot blotch 1-10**	6	3.4	4.2	4.8
Net blotch 1-10**	4	6.2	5.9	5.8
Loose smut		sus.	sus.	sus.
Covered smut		sus.	sus.	sus.
Leaf rust		sus.	sus.	sus.
Stem rust		res.	res.	res.

Disease notes were taken at selected locations where good differential readings could be obtained.

\* Includes foliar diseases (primarily spot blotch and net blotch).

\*\* 1 = no symptoms, 10 = severe symptoms.

From data shown in Table 3, percentage of plump kernels of Hazen is exceeded only by Azure, and percentage of thin kernels is very low. Maltsters desire large uniform kernels since they malt (germinate) more evenly.

Hazen is lower in protein percentage than other varieties tested except Azure. It averages 0.2 percentage points lower than Morex, the present standard of malting barley quality. It is important to note that variety plot tests usually are higher in protein than commercial fields and that a comparison with an acceptable malting barley such as those shown in Table 3 is needed. Low protein is desirable for a good malting barley. High protein types do not malt well, produce less beer in the brewery, and may have stability problems. The amount of soluble (wort) protein in Hazen is sufficient to maintain yeast growth and is not likely to cause haziness in

finished beer. Hazen's level of wort/total protein (W/T) is exceeded only by the 32.9% for Morex but it is judged to be in an acceptable range.

Hazen exceeds other barleys tested in laboratory fine-grind extract at 76.2 percent. This high value is a very desirable malt property as it indicates how much beer can be made from a given quantity of malt. However, this property can be verified only by a commercial brewing test.

Diastatic power (DP) and alpha-amylase activities are measures of the total amylolytic activity of a malt. Acceptable, high levels of each enzyme must be present to convert the malt and adjunct starch in a brewer's mash to fermentable sugars for yeast metabolism and alcohol production. The average diastatic power of 236°L and 43.5 dextrinizing units for alpha-amylase activity of Hazen appear to be adequate for a brewers, six-rowed malting barley.

### COMMERCIAL MALTING AND BREWING TESTS

Two years of pilot scale malting and brewing tests conducted by the American Malting Barley Association collaborating laboratories confirmed the observations made from NDSU's laboratory tests. The data from the 1981 and 1982 pilot tests showed that Hazen was plumper than Morex, had lower protein and alpha-amylase activity and higher extract. It was recommended that Hazen be advanced to carlot plant scale evaluation. Plant scale data on the 1983 crop appeared to be favorable. The second plant scale test is now being conducted on the 1984 crop. If the results show that Hazen malts and brews satisfactorily, it may be recommended as an acceptable malting barley.

**Table 3. Analysis of laboratory malts made from Hazen and other barleys grown at six North Dakota Branch Stations in 1982-1983<sup>1</sup>.**

Variety	Kernel Assortment <sup>2</sup>		Total %	Protein		Extract Fine %	Alpha Amylase 20° D.U.
	Plump %	Thin %		Wort %	W/T %		
Hazen	73.9	2.6	14.8	4.51	30.9	76.2	236
Morex	61.7	4.3	15.0	4.87	32.9	75.3	241
Glenn	62.6	5.4	15.3	4.71	30.9	74.4	238
Azure	74.8	2.6	14.8	4.54	30.9	75.7	231
Larker	71.0	3.6	15.7	4.62	29.7	74.0	241

<sup>1</sup> Grown at Carrington, Langdon, Fargo, Dickinson, Minot, and Williston.

<sup>2</sup> Plump = Percentage of kernels staying on top of a slotted sieve with 6/64 x 3/4" openings. Thin = Percentage of kernels going through a slotted sieve with 5/64 x 3/4" openings.