1973

Barley Production in South Dakota

Cooperative Extension South Dakota State University

Follow this and additional works at: https://openprairie.sdstate.edu/extension_fact

Recommended Citation
https://openprairie.sdstate.edu/extension_fact/1179

This Fact Sheet is brought to you for free and open access by the SDSU Extension at Open PRAIRIE: Open Public Research Access Institutional Repository and Information Exchange. It has been accepted for inclusion in SDSU Extension Fact Sheets by an authorized administrator of Open PRAIRIE: Open Public Research Access Institutional Repository and Information Exchange. For more information, please contact michael.biondo@sdstate.edu.
Barley Production in South Dakota
Barley can be grown in all areas of South Dakota. It is a crop that responds to good cultural and management practices. To be successful in producing barley, you should:

1. Select an adapted and recommended variety.
2. Use pure, high quality, high germinating seed.
3. Plant as early as possible.
5. Control weeds.
6. Thresh carefully.
7. Store grain at not more than 13 per cent moisture.

**CLASSES OF BARLEY**

Malting barley is grown mostly in the northeastern counties where growing conditions are more favorable for producing a mellow malting barley. Malt made from barley is used by many food processors and breweries. The price premium paid for malting barley over feed barley varies from one year to another but often is substantial. If you are in the recognized malting barley production area, consider raising barley for this premium market. The malting barley industry has expressed an increasing need for more malting barley. South Dakota barley has been in demand and the industry indicates that this demand will continue.

Malting varieties are those that have been tested and approved by the malting and brewing industry. These varieties possess characteristics deemed necessary for successful processing. However, an approved and recommended variety does not guarantee that malting quality will be obtained. Seasonal growing conditions and cultural practices can have a definite influence on the malting quality of the barley crop. Inheritable characteristics affecting malting quality and desired in a variety are: (1) bright, plump kernels with a firm, thin hull, (2) a mellow, starchy endosperm, (3) medium to high level of enzyme activity, (4) high malt extract, and (5) white aleurone layer (pearl white).

Barley must meet certain requirements, according to the U.S. Grain Standards in order to be classified as having malting quality:

1. 90 per cent or more of the kernels with white aleurone layers
2. not more than 5 per cent unsuitable malting types or varieties
3. not more than 4 per cent damaged kernels
4. not over 3 per cent foreign material
5. not more than 8 per cent skinned and broken kernels
6. not more than 15 per cent thin barley
7. not more than 2 per cent black barley
8. not more than 5 per cent other grains
9. a minimum test weight of 43 lbs. per bushel
10. a minimum of 90 per cent sound barley

In addition, malting barley should not be over 13.5 per cent protein and moisture content should not exceed 13 per cent. Germination should be better than 90 per cent with 95 per cent germination preferred.

Following are cultural practices suggested for malting barley growers:

1. Plant early—Research data have shown that barley planted two weeks later than the optimum planting date resulted in slightly over 2 per cent increase in the protein content of the grain. Yields were higher with lower percent of thin kernels for the early planting date.
2. Apply commercial fertilizer according to recommendations but avoid excessive use of nitrogen.
3. Thresh carefully. Adjustment of combine is very important in preventing skinned and broken kernels. Damaged kernels will not germinate normally and thus are not suitable for malting.
4. Harvest barley when mature.
5. Plant pure and high quality seed of the recommended malting varieties. Use certified seed to insure varietal purity.
6. Barley in storage should be less than 13.5 per cent in moisture. High moisture barley will heat, lower the germination and make it worthless for malting.

**FEED BARLEY**

Presently the “feed barley” class includes: (1) varieties whose grain does not possess the chemical characteristics required by the Malting and Brewing Industry for economic production of malt and beer, and (2) grain of malting varieties which fail to meet one or more of the ten requirements listed for malting classification. Feed barley has been downgraded because it wasn’t good enough for one particular industrial use. Only one-fourth of the barley produced annually in the United States is used for malting and brewing. The major part of production is available for...
Barley is excellent for fattening livestock, and is also a nutritious feed for other animals. All barley varieties, including those recommended for malting, are an excellent feed for all classes of livestock. Barley is a good feed for growing other uses. All barley varieties, including those respective on a par with malting barley.

BARLEY IN THE ROTATION

Before general use of commercial fertilizers, the type of rotation system or crop sequence employed was an important factor in assuring maximum barley yields. The highest yields were obtained on those rotations which included a cultivated crop and a legume crop. Soil tests and fertilizer uses provide growers with a way—other than legumes—to supply optimum soil nitrogen levels for high barley yields.

In recent years, soil moisture and barley diseases have been important in influencing barley yields. The presence of scab organisms in corn stubble that can attack barley in both the seedling and mature stages of growth and the use of herbicides on corn have altered the previous common practice of growing barley on corn land.

Barley will perform well in several types of rotations if the needs of the plants are met with regard to disease control, soil fertility, and soil moisture. It does well on summer fallow land but the strongest strawed variety should be selected so as to minimize the problem of lodging. Barley is often used as a comparison crop for underseeding of legumes and grasses.

SOIL FERTILITY IS IMPORTANT

Barley responds well to the application of commercial fertilizers, especially nitrogen and phosphorus. This response is realized, not only by marked increases in yield and bushel weight, but by improved standing ability and by more uniform ripening. Many farmers would find barley to be a profitable crop if they grew it on land with adequate fertility.

Soil temperatures in early spring are often too low for the release of sufficient plant nutrients from organic sources to permit optimum plant growth. Therefore, the application of readily available nutrients is essential to promote maximum growth and development of the barley plant.

Soil testing is the recommended way to evaluate existing soil fertility and a guide in selecting the proper fertilizer program. The results of the soil tests, along with information supplied on previous cropping practices, soil type, and area of the state, will permit fairly precise fertilizer recommendations. When the fertilizer is applied by an attachment on the grain drill, the usual recommendations range from 20 to 30 pounds of actual nitrogen and 20 to 30 pounds of phosphorus (P₂O₅) per acre. This would be on land that has not been fallowed the previous year or where a legume crop has not been grown during the past three years nor manure applied the past 1 to 2 years.

Little or no nitrogen is recommended where fallow, legumes, or a heavy application of manure precedes the barley crop the previous year. Phosphorus and perhaps potash (potassium) may be required, however, depending on soil test levels.

Most South Dakota soils have fairly adequate levels of potassium so it is recommended less frequently than nitrogen or phosphorus. However, some soils in the eastern counties of the state may give yield responses with additional potassium. A soil test should reveal the possible need of this very essential plant nutrient. An adequate supply of readily available potassium will help to assure strength of straw in the barley plant.

The drill attachment, which places the fertilizer with the seed, is the most efficient method of phosphorus and potash fertilizer application for barley. Nitrogen can also be applied with the drill attachment but care should be taken to not apply more than 40 pounds of total actual nitrogen and potassium per acre with the seed. Seed germination may be delayed or plant roots injured by the high salt content of the soil surrounding the seed of rates greater than 40 pounds.

Nitrogen results are equally effective if applied by the drill attachment or broadcast. This is usually not true for phosphorus. If phosphorus is broadcast on, then increase the rate of application by one-third suggested previously for the drill attachment. See fact sheet entitled “Fertilizing Small Grains” for additional information.

SEEDBED PREPARATION

A desirable seedbed is mellow yet compact enough so that the soil is in close contact with the seed. Double disk and harrowing row cropland is a common method of seedbed preparation. It is relatively cheap and fast and it leaves 3 to 4 inches of loose, friable soil on the surface with firm soil beneath.

The pony-press drill behind a plow with a packer attachment is an excellent once-over seedbed preparation and planting method. It plants the seed at a uniform depth in moist soil for rapid germination. Another “once-over” seedbed preparation and planting method is the rototiller type of tillage machine with
a press-drill attached. The plant residues are mixed with the soil but some residue is left on the surface to help control possible wind erosion. Some satisfactory research information is available on this special rototiller type tillage machine, but it does not appear to be adaptable where stones are a problem.

When barley follows any small grain or flax crop, the land will need to be plowed. Do not plow too deeply. Pack all plowed land either before or after seeding the barley, to prevent excessive moisture evaporation.

If barley follows corn, turn cornstalks under thoroughly to reduce chances of scab infection. A more complete job of covering the cornstalks can be done if they are disked or chopped before the land is plowed. Barley probably should not follow corn in areas where scab is likely to reduce yield and grain quality.

**TIME OF SEEDING**

When the soil can be properly worked with usual farming equipment, it is time to seed. “Mudding in” before the surface soil has had a chance to dry out is not a good practice.

Stating a specific optimum seeding date is not practical because the optimum time varies from one year to another. Experiment Station trials and farmer experience show that barley planted early will usually out-yield late plantings. Early planted barley also will have a better chance to meet malting quality.

**METHOD AND RATE OF SEEDING**

Seed with a grain drill. Drilling distributes the seed uniformly and places it at a uniform depth in moist soil where conditions are favorable for germination. This method is especially recommended for drier areas. The deep-furrow drill, the press drill, and the pony-press drill are satisfactory. Broadcasting and disking in is a cheaper seeding method and can be justified only on small acreages.

The seeding rate for barley should range between 1 to 1½ bushels per acre when drilled. The rate will depend upon several factors, namely soil type, soil fertility, annual rainfall, and whether grown under dryland or irrigated conditions. Because of these factors, a precise recommendation for rate of seeding is not feasible. However, a lower seeding rate is recommended for the lower rainfall areas of the state and the upper range for the higher rainfall areas. The rate of 1½ to a maximum of 1¼ bushels per acre should be used when the seed is broadcast.

**USE GOOD SEED**

Good quality seed is essential to successful crop production. Plant only seed that is plump, free of disease, free of weed seeds, true to variety, and of high germination. Certified seed must meet certain standards of quality and purity, and therefore, assures the producer of getting high quality seed and seed of a known variety.

A grower need not buy or plant certified seed every year. Many follow the plan of getting certified seed about every third year and this seems to be an economical and feasible practice.

**WEED CONTROL**

Weeds compete with crops for moisture and plant nutrients. Weeds frequently reduce small grain yields 30 to 50 percent. Weeds may also lower the market value of the grain.

A good weed control program includes using good cultural practices and chemicals throughout the rotation. Cultural control includes (1) using weed-free seed, (2) clean cultivation of row crops, (3) summer tillage of grain stubble, and any other practices which may prevent weed seed production. Using high quality seed and providing proper soil fertility, a good seedbed and early planting will give barley a competitive advantage over many grassy weeds.

Use 2,4-D or MCPA to control numerous broad-leaved weeds. Both chemicals are available in amine or ester formulations. Apply when the crop is between the 5-leaf and early boot stage. Use only the amount needed to control the weeds. Rates of 1½ pound of 2,4-D ester or ¾ pound acid equivalent per acre of 2,4-D amine or MCPA ester or amine seldom cause appreciable crop damage.

Use bromoxynil (tradename Brominal or Buctril) to control wild buckwheat. Apply 1¼ to ½ pound active ingredient (1 to 1½ pt. product) per acre when grain has reached the 2-leaf stage and before the boot stage. To improve control of broad-leaved annual weeds other than wild buckwheat, mix 1½ pound acid equivalent of MCPA or 2,4-D ester per acre with bromoxynil (Brominal only). The mixture of MCPA ester and bromoxynil (tradename Brominal Plus or Bronate) is sold as a commercial premix. Use 1 to 1½ pints of premix per acre. Mixtures of 2,4-D or MCPA with bromoxynil should be applied when the grain has reached the 5-leaf stage and before the boot stage.

Use triallate (tradename Far-go) or barban (tradename Carbyne) to control wild oats. Apply triallate preplant or preemergence at the rate of 1¼ pound active ingredient (1½ qt. product) per acre. Apply to smooth soil and incorporate to a depth of ½ to 1½ inches. Apply 1¼ to ½ pound active ingredient (1¼ to 3 gal. product) of barban per acre when wild oats are in the 2-leaf stage. The crop should not be sprayed later than 14 days after emergence or after the crop reaches the 4-leaf stage.

Use of a tradename does not imply product endorsement or that it is recommended over those of similar nature not listed.
Use 2,4-DB or MCPA to control broadleaved weeds in grain underseeded with a legume. Apply 1 pound acid equivalent of 2,4-DB per acre when the grain is tilled and the legume seedlings have 2 to 4 true leaves. Use ¼ pound acid equivalent of MCPA amine per acre after the small grain has tilled until boot stage and legume seedlings are 2 to 3 inches tall. Do not harvest hay or graze areas treated with 2,4-DB within 30 days after spraying.

See fact sheets entitled, “Weed Control in Small Grains,” “Chemical Weed Control in Crops,” and “Control and Elimination of Wild Oats” for additional information.

HARVESTING AND STORING

Harvesting and storing procedures probably have more influence on the grain quality and market value of barley than on any other cereal grain. Most of the barley acreage is harvested with a combine from the winrow because weeds, uneven ripening, shattering or excess grain moisture usually prevent direct combining.

Several factors must be kept in mind if good quality malting barley is to be obtained. The barley should be fully ripe when harvested. Grain with more than 13 per cent moisture cannot be stored safely. The forward speed of the combine should be adjusted so the volume of the barley entering the cylinder is kept at or near capacity load for the most efficient job of threshing.

Skinned and broken kernels are common downgrading factors in malting barley and are caused largely by excessive cylinder speed or too narrow concave clearance. Damaged kernels are not too serious in feed barley but still have an adverse effect on germination.

Proper adjustment of the wind volume and sieve setting are important to get good separation of grain, chaff and straw and prevent any loss of grain. The amount of grain coming back through the return should be held to a minimum. Frequent minor adjustments of the combine may be necessary during the day to compensate for change in the moisture content of the grain and straw. All combines have an operators manual. It will give the specific adjustments for barley. Attention to details is important in producing high quality grain with a minimum of skinned and broken kernels.

DISEASES

Barley diseases are not as serious in South Dakota as they are in the Red River Valley of Minnesota and North Dakota. Cool nights with heavy dew formation provide the best conditions for the spread and development of most leaf diseases. The most common barley diseases in north-central United States are loose smut, spot blotch, net blotch, Septoria and leaf rust. Two other diseases, scab and bacterial leaf stripe also appear in fields. The level of infection for any of these diseases varies from year to year and from one area to another. None of our present barley varieties is resistant to all of these diseases.

Very seldom does one disease become serious enough to cause serious crop loss. It’s possible that a particular barley disease might cause a noticeable reduction in yield and grain quality. The grower should then select a variety that has resistance to the disease. The group of recommended varieties listed in this fact sheet are the best adapted varieties available. Varietal disease reaction is given on a few important barley diseases.

Good cultural and management practices are important factors in reducing losses to disease. One example of a good management practice is to fall plow corn stubble and reduce scab infection in a following barley crop. Practices which promote good plant growth are maintenance of adequate soil fertility, proper preparation of the seedbed, use of high quality seed, early seeding (by 15 April) and weed control. Neglect of any of these practices will reduce production.

SELECTING THE BEST VARIETY

Selecting the best barley variety for a farm or for a certain field is an important decision. Growing an adapted variety or varieties helps to insure more stable production. Ignoring this principle often invites disappointments and causes fluctuations in farm income. The suggestions, recommendations, and variety descriptions given in this fact sheet should help farmers to choose their varieties.

VARIETY RECOMMENDATIONS

The list of recommended varieties for South Dakota shown in the table is based on Experiment tests conducted throughout the state. These recommendations are based, not only on yields, but also on such factors as earliness, disease and insect resistance, straw strength, grain quality, and market needs. Variety recommendations according to “crop adaptation areas” are given in each current year’s Extension fact sheet on Crop Variety Recommendations.

An acceptable list of barley varieties is given in the variety table. These varieties have potential but in some cases lack some desirable characteristics such as straw strength, heat tolerance, yield, etc., and are considered slightly inferior to the recommended list. Also, some are recent releases from cooperating Experiment Stations and have not been adequately tested in South Dakota.

The table gives the important characteristics of the more commonly grown barley varieties in South
Dakota. The recommended group represents a list of good varieties adapted in one or more areas of the state, realizing that other varieties in the acceptable list may have local interest with satisfactory performance. In some cases, varieties not recommended may not be inferior to those recommended but merely may represent duplication of qualities already available.

SERVICES AVAILABLE

Some factors in barley growing, such as weather and grain prices, are not controllable. The barley grower can control the fertility of his soil and the quality and purity of his seed. Maximum production may well depend on the use you make of the services available at your Experiment Station. We encourage you to use them.

(1) Soil testing. Representative soil samples can be sent to: State Soil Testing Laboratory, Plant Science Department, SDSU, Brookings, South Dakota, 57006. County Extension Agents have forms and instructions for taking soil samples.

(2) Seed testing. Representative seed samples for purity and germination test can be sent to: State Seed Testing Laboratory, Plant Science Department, SDSU, Brookings, South Dakota, 57006. Planting high quality seed of good germination is the first pre-requisite to a successful barley crop.

(3) Loose smut test. A one-pound sample of your barley for a loose smut test can be sent to: Plant Disease Clinic, Plant Science Bldg., SDSU, Brookings, South Dakota, 57006. Barley producers should know if your barley seed is infected with the loose smut organism. The amount of infection is closely correlated with reduction in yield. If your barley seed contains 3-5 percent or more loose smut, it should not be used for seed. The amount of infection can vary considerably from one year to another.

NOTE: The above testing services do have a reasonable charge.

(4) Certified seed directory. Write to the Seed Certification Service, Plant Science Department, SDSU, Brookings, South Dakota, 57006, for a free copy of the directory of certified seed growers in South Dakota. The directory contains names and addresses of growers of several standard barley varieties. If you do not see a variety listed that you want, the Seed Certification Service will help you locate a seed source. Planting certified seed assures a producer that he is using seed of a known variety and the seed has met certain minimum standards of genetic purity, mechanical purity and germination. Good seed does not cost, it pays.

Always check up-to-date variety recommendations. See Fact Sheet 524.

<table>
<thead>
<tr>
<th>Variety</th>
<th>Yield</th>
<th>Plant Height</th>
<th>Maturity</th>
<th>Lodging Resistant</th>
<th>Bushel Weight</th>
<th>Seed Size</th>
<th>Malting</th>
<th>Aleurone Color</th>
<th>Stem Rust</th>
<th>Spot Blotch</th>
<th>Loose Smut</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conquest</td>
<td>High</td>
<td>Tall</td>
<td>Medium</td>
<td>V. Good</td>
<td>Medium</td>
<td>Medium</td>
<td>Yes</td>
<td>Blue</td>
<td>R</td>
<td>MR</td>
<td>R</td>
</tr>
<tr>
<td>Larker</td>
<td>High</td>
<td>Medium</td>
<td>Medium</td>
<td>Good</td>
<td>Medium</td>
<td>Medium</td>
<td>Yes</td>
<td>White</td>
<td>R</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td>Prilar</td>
<td>High</td>
<td>Medium</td>
<td>Medium</td>
<td>Good</td>
<td>Medium</td>
<td>Medium</td>
<td>Yes</td>
<td>White</td>
<td>R</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td>Primus II</td>
<td>High</td>
<td>Med, Short</td>
<td>Early</td>
<td>V. Good</td>
<td>High</td>
<td>Medium</td>
<td>No</td>
<td>White</td>
<td>R</td>
<td>MR</td>
<td>S</td>
</tr>
<tr>
<td>Beacon</td>
<td>High</td>
<td>Medium</td>
<td>Medium</td>
<td>V. Good</td>
<td>Medium</td>
<td>Medium</td>
<td>Yes</td>
<td>White</td>
<td>R</td>
<td>MR</td>
<td>R</td>
</tr>
<tr>
<td>Cree</td>
<td>High</td>
<td>Medium</td>
<td>Good</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
<td>No</td>
<td>White</td>
<td>R</td>
<td>S</td>
<td>R</td>
</tr>
<tr>
<td>Dickson</td>
<td>High</td>
<td>Medium</td>
<td>Good</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
<td>Yes</td>
<td>White</td>
<td>R</td>
<td>MR</td>
<td>S</td>
</tr>
<tr>
<td>Firlbecks III</td>
<td>High</td>
<td>Medium</td>
<td>Late</td>
<td>Good</td>
<td>High</td>
<td>Large</td>
<td>Yes</td>
<td>White</td>
<td>S</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td>Nordic</td>
<td>High</td>
<td>Medium</td>
<td>Medium</td>
<td>Fair</td>
<td>Medium</td>
<td>Medium</td>
<td>No</td>
<td>White</td>
<td>R</td>
<td>MR</td>
<td>S</td>
</tr>
<tr>
<td>Betzes</td>
<td>Medium</td>
<td>Short</td>
<td>Late</td>
<td>Fair</td>
<td>High</td>
<td>Large</td>
<td>No</td>
<td>White</td>
<td>S</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td>Burk</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
<td>Good</td>
<td>Medium</td>
<td>Medium</td>
<td>No</td>
<td>White</td>
<td>R</td>
<td>MS</td>
<td>S</td>
</tr>
<tr>
<td>Bonanza</td>
<td>Medium</td>
<td>Tall</td>
<td>Medium</td>
<td>Good</td>
<td>Medium</td>
<td>Medium</td>
<td>Yes</td>
<td>Blue</td>
<td>R</td>
<td>MS</td>
<td>R</td>
</tr>
<tr>
<td>Compana</td>
<td>Medium</td>
<td>Short</td>
<td>Early</td>
<td>Poor</td>
<td>High</td>
<td>Large</td>
<td>No</td>
<td>White</td>
<td>S</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td>Liberty</td>
<td>High</td>
<td>Medium</td>
<td>Medium</td>
<td>Good</td>
<td>Medium</td>
<td>Medium</td>
<td>No</td>
<td>White</td>
<td>R</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td>Otis 2</td>
<td>Medium</td>
<td>Short</td>
<td>Medium</td>
<td>Good</td>
<td>Medium</td>
<td>Large</td>
<td>No</td>
<td>White</td>
<td>S</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td>Paragon</td>
<td>Medium</td>
<td>Tall</td>
<td>Late</td>
<td>Good</td>
<td>Medium</td>
<td>Medium</td>
<td>No</td>
<td>Blue</td>
<td>R</td>
<td>MS</td>
<td>R</td>
</tr>
<tr>
<td>Plains</td>
<td>Medium</td>
<td>Short</td>
<td>Early</td>
<td>Good</td>
<td>Medium</td>
<td>Medium</td>
<td>No</td>
<td>White</td>
<td>R</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td>Spartan</td>
<td>Medium</td>
<td>Medium</td>
<td>Early</td>
<td>Fair</td>
<td>High</td>
<td>Large</td>
<td>No</td>
<td>White</td>
<td>S</td>
<td>S</td>
<td>S</td>
</tr>
</tbody>
</table>

1All varieties are susceptible to leaf rust but leaf rust readings have been relatively light. All varieties appear to be susceptible to virus diseases, yellow dwarf and false strips, R = resistant; MR = moderately resistant; MS = moderately susceptible; S = susceptible.
2Two-row variety
3Prilar is not yet approved for malting. Firlbecks III approved for malting only when grown under irrigation.
4Firlbecks III recommended only for irrigation west of the Missouri river. Primus II for both irrigation and dryland.