

Barley

Introduction

Barley (*Hordeum vulgare*), a cereal grain in the grass family, is used as a livestock feed and in foods (e.g. cereals and soups) for human consumption. Barley is also converted into malt for brewing, distilling, and various other products (e.g. malted milk). Some growers use smooth-awn or awnless varieties in hay production.

While barley production has declined over the years, there has recently been a renewed interest in this crop. Because barley is harvested earlier than wheat, double-cropped soybeans can be planted earlier, resulting in higher soybean yields.

Hulless barley (*Hordeum vulgare* var. *nudum*) has also been generating considerable interest. Unlike traditional hulled barley, hulless barley sheds its fibrous hull during combining, thus eliminating the need to mechanically remove the hull during processing.

Marketing

Barley is produced commercially in Kentucky for livestock feed. Marketing barley straw may increase profitability for the crop. Some growers have sold small amounts of barley for local use in backyard poultry production.

Market Outlook

Barley production area has declined in the Eastern Corn Belt and Mid-South states due to increased profitability of corn, soybeans, and wheat. Barley prices are usually significantly lower than wheat prices. Nationally, the quantity of barley demanded by food and feed manufacturers is steady to slightly increasing. This increase is attributed to



1) increased interest in whole grain food ingredients in breakfast cereals and other foods; and 2) a search for lower-priced grains by the swine and poultry industries. However, the increase in the quantity of barley demanded has not been accompanied by a great enough increase in barley price to attract more production in Kentucky and nearby states. Additionally, higher-yielding barley varieties have more than compensated for any recent demand increase; fewer barley acres were harvested in the U.S. in 2011 than in any year since the 1930s Dust Bowl Era. This lack of a cash market has limited barley production in the Commonwealth.

Development of new hulless barley varieties with nutritional qualities attractive to today's consumer could create production opportunities if price premiums were available. Price premiums, if realized, could improve barley profitability and attract producers in areas like Kentucky to barley's earlier harvest, an advantage when doublecropping soybeans after small grains. As a lower priced grain, relative to corn, hulless barley is attractive in some applications in summer poultry rations and swine feeding. Hulless barley may be more appealing for human food manufacturers due to its relative ease of processing. Some biofuels research has also focused on hulless varieties.



Production Considerations

Site selection

Barley prefers well-drained, loamy soils and will not tolerate waterlogged conditions. Both yields and grain quality are reduced on poorly drained sites. Barley is less winter hardy than wheat and is very sensitive to acid soils; soil pH should be 6.0 or above.

Cultivar selection

Yield potential, disease resistance, and maturity are the critical considerations in cultivar selection. Growers need to be aware of the most commonly occurring diseases on or near their farm and then choose high yielding resistant varieties accordingly. Other varietal considerations include straw strength and grain plumpness. Use certified seed or seed of proven high quality from an established, reputable dealer. Seed should be fungicide-treated to protect against loose smut and seedling diseases.

The University of Kentucky Small Grain Variety Testing Program conducts research on hulless and traditional hulled barley. Important aspects of this research include evaluating experimental barley breeding lines and variety testing of commercially available barley varieties. Barley variety performance and evaluation of breeding lines are available at the UK Small Grain Variety Testing Web site. Select marketable cultivars that have performed well under diverse conditions over several years of testing.

Cropping systems and planting

Most barley grown in Kentucky replaces wheat in a rotation of three crops in 2 years. A spring-planted corn crop is followed by winter barley seeded in the fall; once barley is harvested in spring, it is followed by soybeans as a second crop (double cropping). A winter fallow then follows the soybean harvest. A few farms replace the winter fallow with canola.

Barley can be grown using conventional tillage, reduced tillage, or no-till systems. In a full or conventional tillage system, a smooth, level seed bed is prepared prior to planting. In contrast, seed is planted into the residue of the previous crop in reduced tillage and no-till systems. Conservation tillage systems have the advantage of reducing soil erosion, equipment requirements, labor costs, and fuel costs.

Regardless of tillage method, seed is usually planted with a grain drill. Because hulless varieties lack the protection of a hull, they are generally planted

at a higher seeding rate than hulled varieties. Seed placement is especially critical in no-till systems since the seed must be placed at the proper depth so it comes into direct contact with the soil below the plant residue. Variable planting depths will result in uneven stands. Winter barley for grain is planted between October 1 and October 15 in Kentucky. When grown for silage or hay, barley is planted between September 15 and September 30.

Pest management

The potential for disease and insect outbreaks can be reduced by using multiple strategies, including crop rotation, delayed and/or staggered planting dates, resistant varieties, varying maturity types, proper fertility, seed treatment fungicides, and timely harvest. Field scouting for diseases, insect pests, and weedy plants is essential for an integrated pest management approach. Fungicide and insecticide spray decisions should be based on field scouting results, not on the calendar or wheat growth stages. The economic returns associated with pesticide use in barley are less than in wheat. Fungal diseases that can cause yield losses include loose smut, net blotch, scald, Fusarium head blight, and tan spot. Barley is generally more susceptible to barley yellow dwarf virus than wheat because of barley's earlier planting date. Common insect pests include Hessian fly and aphids. Armyworm and cereal leaf beetle are also common, but rarely result in economic losses.

Weeds compete with barley plants for growing space, water, and nutrients, resulting in reduced grain yield and quality. Cultural practices such as crop rotation, seeding rate, row spacing, and sanitation, as well as herbicides, are used to manage weedy plants. Avoid herbicides that persist in the soil for long periods when producing the rotational crops (soybeans and corn) since these chemicals can cause injury to the barley crop.

Harvest and storage

The timing of harvest is similar for both hulled and hulless varieties. However, additional care must be taken in harvesting hulless barley to minimize damage to the unprotected grain. Barley is typically harvested when the grain is at 13 to 15 percent moisture. When harvested at a higher moisture content, the grain must be quickly dried to prevent sprouting and spoilage. High moisture barley can be dried with both high speed and bin drying equipment.

Harvested grains are commonly held in on-farm storage for 12 months or more. The primary causes of grain spoilage in Kentucky are excess moisture and high temperature during the summer. Additionally, any grain improperly handled or stored longer than 6 months can be infested by insects. Sanitation and aeration are the keys to maintaining grain quality in storage. Grain should be inspected regularly for evidence of mold and insect infestations.

Labor requirements

Labor requirements for barley will vary according to the number of acres produced, size of equipment, and production system. For no-till production, labor needs per acre are usually about 1 hour for production and less than 1 hour for harvest and marketing. Tilled barley production may require more than 1 hour per acre for production. Harvesting straw will add more labor hours per acre.

Economic Considerations

Initial investments include land preparation and purchase of seed.

Production and harvest costs for no-tilled barley are estimated at about \$340 per acre. Total expenses per acre, including variable, fixed, and land rent, would come to approximately \$375. Presuming gross returns of \$340 per acre, a loss to management of \$35 per acre would result.

Since returns vary depending on actual yields and market prices, the following estimated per acre returns to management are based on three different scenarios for barley at current price levels. Conservative estimates represent the University of Kentucky's cost and return estimates for no-tilled barley in 2012.

<i>Pessimistic</i>	<i>Conservative</i>	<i>Optimistic</i>
\$(95)*	\$(35)	\$18

*Parentheses indicate a negative number, i.e. a net loss

Selected Resources

- Barley Research (University of Kentucky)
<http://www.uky.edu/Ag/wheatvarietytest/Barley.htm>
- Comprehensive Guide to Wheat Management in Kentucky, ID-125 (University of Kentucky, 2009)
<http://www.ca.uky.edu/agc/pubs/id/id125/id125.htm>
- Importance of Scouting Wheat for Plant Diseases, PPFS-AG-SG-12 (University of Kentucky, 2011)
http://www.ca.uky.edu/agcollege/plantpathology/ext_files/PPFShtml/ppfsagsg12.pdf
- Integrated Crop Management for Small Grains, IPM-4 (University of Kentucky, 2011)
<http://www.uky.edu/Ag/IPM/manuals/ipm4smgr.pdf>
- IPM in Kentucky Stored Grain (University of Kentucky)
<http://www.ca.uky.edu/entweb/storage/open.html>
- Kentucky Small Grain Growers Association
<http://www.kysmallgrains.org/>
- No-Till Small Grain Production in Kentucky (University of Kentucky, 2000)
<http://www.ca.uky.edu/agc/pubs/id/id136/id136.htm>
- Small Grain Variety Testing Program (University of Kentucky)
<http://www.uky.edu/Ag/wheatvarietytest/>
- Small Grains Web site (University of Kentucky)
http://www.uky.edu/Ag/GrainCrops/small_grains.htm
- Wheat and Wheat Double-crop Soybean Budget (University of Kentucky, 2012-2013)
<http://www.ca.uky.edu/agecon/index.php?p=29>
- Growing Hulled Barley in the Mid-Atlantic (Virginia Tech, 2009)
<http://pubs.ext.vt.edu/424/424-022/424-022.html>

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For additional information, contact your local **County Extension** agent