OHIO STATE UNIVERSITY EXTENSION

Management of Ohio Winter Malting Barley

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THE OHIO STATE UNIVERSITY
COLLEGE OF FOOD, AGRICULTURAL, AND ENVIRONMENTAL SCIENCES

Fall Management of Ohio Malting Barley

Winter malting barley is a new crop to Ohio. Malting barley requires careful management to maximize grain yield and to maintain high quality grain for malting purposes. Here, we offer practical fall management recommendations. Malting barley management trials are currently being conducted to further fine-tune management guidelines. A spring management guide will be available during winter 2018.

In 2009, Dr. Eric Stockinger (Department of Horticulture and Crop Science), initiated a winter malting barley breeding program by testing different varieties obtained from outside sources for their suitability in Ohio. As winter-hardiness is the most critical parameter for successful barley cultivation in the Midwest, emphasis on winter-hardiness and developing winter-hardy barley varieties is a key breeding program goal.

Ohio farmers need to carefully consider growing winter malting barley as it may not be suitable for all operations. Malt quality barley must meet several criteria to avoid being rejected by the malt facility- this risk may be too high for certain farmers since there are no markets in Ohio for rejected barley. Malting barley is not sold through traditional grain elevators like corn, soybean, and wheat, so contracts or agreements should be in place before planting. Special considerations for post-harvest handling include drying capability, grain cleaning, and delivering in totes (versus hopper trucks). Each farmer must understand the unique challenges of growing malt quality barley before contracting and purchasing seed.

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Field Selection

Proper field selection is necessary for maximizing grain yield and quality. When selecting fields for winter malting barley production, consider the following:

- **Drainage-** Select a well-drained field with a low chance of ponding.
- **Crop rotation-** Do not plant malting barley after corn or wheat. Be mindful of herbicides used on previous crops and follow label instructions.
- **Soil fertility-** Select a field with adequate fertility (see soil fertility section for more details).
- **Tillage-** Barley may be produced with or without tillage. No-till can help prevent erosion, reduce spring heaving, and lower production costs. However, tillage may be useful to control weeds and diseases caused by residue-borne pathogens.

Seed Sources

Each year, the Ohio Seed Improvement Association publishes a directory listing Ohio seed dealers that supply Certified Seed. The 2017 directory can be found here: https://ohseed1.org/publications/

Planting Date

Do not plant barley prior to the county Hessian fly-safe date (Figure 1). The fly-safe date coincides with reduced numbers of adult aphids, which transmit Barley Yellow Dwarf Virus to seedlings in the fall. The best time for seeding is the 10-date period starting the day after the fly-safe date. If freezing weather is delayed until late November or early December, planting three to four weeks after the fly-free date can be successful.

Figure 1. Hessian fly-safe dates for planting winter barley or wheat in Ohio counties.

Seeding Rate

We recommend planting barley based on number of seeds/acre. Planting by pounds/acre or bushels/acre is inaccurate due to variability in seed size from one year to another and from one variety to another. Low seeding rates result in inadequate stands and winter injury, while excessively high rates increase lodging. Calibrate the drill each year for each variety and seed lot planted. Use Table 1 to calibrate grain drills.

The optimum seeding rate for barley is 1.2 to 1.6 million seeds/acre (18 to 24 seeds per foot of row in 7.5-inch row width) when planting during the two weeks following the fly-safe date (Figure 1). During the third and fourth week after the fly-safe date, plant 1.7 to 2.0 million seeds/acre (24 to 30 seeds/foot of row).

Table 1. Pounds of seed needed to plant from 1.2 to 2.0 million seeds/acre with seed of varying size.

	Millions of Seeds/Acre				
Seeds/lb	**1.2**	**1.4**	**1.6**	**1.8**	**2.0**
10,000	120	140	160	180	200
11,000	109	127	145	164	182
12,000	100	116	133	150	167
13,000	92	108	123	138	154
14,000	85	100	114	129	143
15,000	80	93	107	120	133
16,000	75	88	100	113	125
17,000	71	82	94	106	118
18,000	66	77	89	100	111

Row Width

Planting barley in 7.5-inch row width is ideal. However, wide-row barley production is also feasible. Winter wheat grown in 15-inch row width yields 1-11% lower than wheat grown in 7.5-inch rows. We recommend planting 25-29 seeds/foot of row (0.85 to 1.0 million seeds/acre) if growing barley in 15-inch row width. When planting barley in wide-rows consider the following:

- Plant barley as soon as possible after the Hessian fly-safe date.
- Spring herbicide application is very important to maximize yield in wide-rows.
- Changing row spacing will change the microclimate within the barley canopy, and this could affect disease development. Scout fields for foliar diseases to determine whether disease risk is high enough to warrant a fungicide application.

Soil Fertility

Recent soil test results should be used to guide lime and fertilizer applications. See the Tri-State Fertilizer Recommendations for Corn, Soybeans, Wheat, and Alfalfa (Extension Bulletin E-2567) for soil sampling guidelines.

pH- Soil pH should be between 6.3 and 6.8. When proper soil pH is maintained, micronutrients should be available at adequate levels. The lime test index or buffer pH on the soil test report should be used for lime recommendations. These recommendations are for mineral soils with adequate drainage containing 1 to 5% organic matter.

Nitrogen (N)- 20 to 30 lb N/acre of fall-applied nitrogen is recommended for early fall and spring growth. The remainder of the N is topdressed in the spring with careful consideration to rate.

Phosphorus (P)- Phosphorus is important for early tiller development and should be applied prior to planting when the soil test level is below 50 ppm (100 lb/acre) Bray P. At soil test levels of 50 ppm (100 lb/acre) or greater, additional P fertilizer is not recommended. Table 2 shows P recommendations for barley.

Potassium (K)- Potassium recommendations vary by soil cation exchange capacity (CEC). Soils with larger CEC values are more likely to inhibit K availability than soils having lower CEC values. Soils having a larger CEC require more potassium than soils with low CEC. See Table 3 for potassium guidelines.

Table 2. Phosphorus (expressed as lb P_2O_5/acre) recommended for barley. Soil test values reported as Bray P.

Soil test value		Annual recommendation
lb/acre	ppm	(lb P_2O_5/acre)
30	15	115
40	20	90
50-80	25-40	65
90	45	35
100	50	0

Table 3. Potassium (expressed as lb K_2O/acre) recommended for barley by soil cation exchange capacity (CEC).

Soil test value		CEC (meq/100 g soil)		
lb/acre	ppm	10	20	30
50	25	165	255	300
150	75	90	155	240
250	125	50	55	115
350	175	0	0	0

Sulfur (S)- Barley grown in sandy soils and/or soils low in organic matter (<2%) is most likely to respond to S fertilizer. If applied in the fall, elemental S is recommended to minimize loss. In the spring, suitable S fertilizers include ammonium sulfate, ammonium thiosulfate, and gypsum.

Weed Management

Effective weed control is important to maintain barley yield and quality, and to ensure control in any following crop of double crop soybeans. A healthy barley crop competes well with weeds, especially when production techniques result in an initial uniform stand and when loss of stand due to winter injury is minimal. Effective weed control and prevention of weed seed production in prior crops will reduce the severity of weed problems in barley. Barley should be planted into a weed-free seedbed through use of tillage or burndown herbicides. Some barley fields can benefit greatly from herbicide application in late fall or spring, and failure to scout and take the appropriate measures can result in loss of yield or quality, and harvesting problems. The weeds that appear above the barley canopy late in the season, such as giant ragweed and Canada thistle, can often be easily controlled or suppressed with a spring herbicide treatment. The most common weed problems in fall-planted barley include:

Winter annual weeds, such as common chickweed, marestail, purple deadnettle, shepherd's-purse, and field pennycress. These weeds become established in late summer and fall along with the barley, and can interfere with the early development of barley in spring. Gramoxone, glyphosate, and Sharpen are labeled for burndown application any time prior to barley emergence. Low rates of dicamba can be applied at least 15 days before planting, but 2,4-D is not labeled for preplant burndown in small grains. Sharpen can control emerged marestail and provide residual control following planting, but should be mixed with glyphosate or Gramoxone for control of most other emerged weeds. Sharpen rates of 1.5 to 2 oz/A also provide residual control of broadleaf weeds for several weeks following application. No-till fields not treated with burndown herbicides at time of planting can be treated with postemergence herbicides later in the fall to control winter annual weeds, marestail, and dandelion as necessary. Options include Huskie, and mixtures of dicamba (2 to 4 oz of 4L) with products that contain tribenuron or tribenuron+thifensulfuron. Late fall-applied herbicides can be more effective for control of these weeds and safer to the crop than spring-applied herbicides. Where spring applications are necessary to control winter annual weeds, Huskie or mixtures of 2,4-D or MCPA with products that contain tribenuron + thifensulfuron are among the effective treatments.

Wild garlic, due to the contamination of harvested grain with its bulblets. Herbicides containing thifensulfuron are effective when applied in the spring after garlic has several inches of new growth.

Canada thistle, which can greatly suppress barley growth due to its tendency to occur in dense patches. Many spring-applied barley herbicides have at least some activity on thistle, and can suppress it adequately through harvest if not applied too early in spring.

Dandelion, which can interfere with barley establishment in the fall and

barley growth in the spring. Emerged dandelion should be controlled prior to barley planting with tillage or glyphosate, or at least by late fall with the postemergence herbicides. The combination of dicamba (4 oz of 4L) and tribenuron (Express etc) applied in early November has been effective in OSU research.

Summer annual broadleaf weeds, such as common and giant ragweed, which can begin to emerge in late March. A healthy barley crop can adequately suppress these weeds, but a spring herbicide application is occasionally warranted.

Herbicides must be registered for use on barley, and label guidelines followed to minimize the risk of crop injury, including application at the appropriate stages of barley growth. When barley has not yet reached the jointing stage, any approved herbicide can be safely applied. As barley growth stage advances past jointing and approaches the boot stage, herbicide choices become much more limited. Most herbicides can be applied in UAN when the barley is top-dressed. This may increase crop injury somewhat, and some labels recommend adjusting surfactant rates to minimize injury. Information on herbicides and specific weed problems can be found in the current edition of the *Weed Control Guide for Ohio, Indiana, and Illinois*, Extension Bulletin 789, available at all County Extension offices and online at CFAES publications at: http://estore.osu-extension.org/ and also as a pdf for download at http://u.osu.edu/osuweeds.

Fall Disease Management

Barley is affected by several leaf, spike, and root diseases that have the potential to negatively impact grain yield and quality by reducing stand and grain-fill, and contaminating grain with mycotoxins. Disease management is critical for the production of high malting quality barley, and this should begin in the fall in order to prevent early disease establishment and reduce risk.

1. Avoid planting highly susceptible varieties.
2. Avoid planting barley after corn or wheat, as both crops are hosts for *Fusarium graminearum*, the fungus that causes head scab and contaminates grain with vomitoxin.
3. Avoid planting barley no-till after barley or other related grass species. Till and/or rotate with soybean. Several of the leaf and root diseases of barley are caused by pathogens that overwinter in stubble left in the field after harvest.
4. Avoid planting barley too early. Rusts, viruses, and leaf blotching disease may become established in early-planted barley, getting a head-start in the spring.
5. Plant treated seeds. This will reduce stand loss due to seed and seedling diseases; help to control smuts; and prevent early establishment of leaf diseases.
6. Control weeds in and around barley fields, as some weed species are hosts for viruses that affect barley and the insect vectors that transmit them.
7. Avoid excessive N fertilization and high planting density.

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