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**Fact Sheet FS-01-47**

## **Malting Barley in Nevada**

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Worldwide, barley is the most important grain used in producing high quality beer. The barley is used to make malt, which determines the beer's color, body and alcohol content.

Malt is barley that has been soaked or "steeped" in water for at least 40 hours, and allowed to germinate, until the root and shoot are roughly the length of the kernel. At this point the starch in the grain has been converted to sugar that is used in the fermentation process and the germination is stopped. The germinated kernels are then dried and heated or cured to produce the desired color and flavor needed for producing beer.

### **Characteristics of Malting Barley**

Malting barley is high quality barley that has the special characteristics necessary to produce malt. Certain varieties are recommended for malting as they meet stringent quality requirements better than non-malting varieties. Worldwide only about ten percent of all barley is used to produce malt, the rest is used as feed. In the United States about 25% of all barley is grown for malt. Because the quality standards are much higher for malting barley than feed barley, malting barley commands a higher price. The price differences between malting and feed barley can reach upwards of 50 percent.

Malting barley is often grown under contract with the price and quality standards set prior to planting. If the quality standards are not met the barley grower's only option may be to sell the grain as feed and receive a lower price.

Malting barleys are normally divided into two types. The most popular varieties in the United States are classified as six-row plants known as *Hordeum vulgare* L. They make up approximately fifty percent of all varieties planted in the United States. The standard malting varieties worldwide are from two-row types with the scientific name *Hordeum distichon* L. Six row plants have three kernels at each node in the seed head, while two row types have only 1 kernel at each node. Almost all malting barleys are spring types, which produce seed heads without the chilling requirement necessary for winter type barley.

### **Malting Barley Standards**

Regardless of the type or variety grown malting barleys must meet strict quality standards to qualify for the increased price. The quality requirements extend to the growing and harvesting phases of the production cycle. The following characteristics are generally accepted as the standards that must be met to produce a high quality malting barley:

- Weed free seed, pure lot of a malting variety
- Greater than 95% germination (3 day test) plus vigorous growth
- Over 70% plump, mature, kernels
- Less than 6% skinned or broken kernels
- Protein content between 10.5-13.5 % on a 100% dry basis
- Maximum moisture content of 13.5%
- Kernels free from disease, insect, frost, weather or heat damage
- Kernels without damage or evidence of smut, ergot, odor, or chemical treatment
- Barley free from contamination by rodents, birds and other stored grain pests

Additional quality standards may be required by the buyer when grown under contract. A grower must know and understand the quality requirements prior to producing the barley or it may not meet malting barley standards. In all likelihood the crop will be valued at a lower price. Producing higher quality malting barley may increase the cost associated with management. A producer must consider the additional management costs when deciding to grow this crop.

### **Production Considerations**

One of the most critical items to control is the protein content of the harvested grain. The protein content is determined primarily by the growing conditions, especially soil moisture. Excess nutrients especially nitrogen applied too late in the growing period can result in an unacceptably high protein content. Inadequate nutrients, however will reduce the yields and quality of the harvested grain. In addition to nutrients soil moisture content at planting and during plant growth is as at least as important. To avoid the problem of excessive protein content a grower is recommended to complete a comprehensive soil test to determine nitrogen levels, and to plant into a relatively moist soil. That normally means planting early (mid-April), or irrigating before seeding if the crop is planted late or winter precipitation was inadequate to moisten the soil. Water stress when the seed heads are filling will result in

high protein and reduced plumpness in the kernels. Early planting, adequate water and production practices that result in high yields generally will reduce protein levels. Seeding rates are normally around 110-120 pounds/acre with the seed placed at 1.5-2 inches deep. Seed should be treated with an approved fungicide prior to planting to avoid seedling diseases and spike type diseases such as loose smut and covered smut.

As with any barley crop the plants must be irrigated regularly until the seed heads fill and mature. Once the seed heads mature irrigation is stopped and the grain is allowed to dry.

Some important factors to consider in field selection are interactions between soil type, the delivery rate of irrigation water, and the size and shape of the field. Deep, sandy soils have rapid, high infiltration rates. If the fields are too long, or flat and irrigation rates are low, insufficient water may reach the lower end, sharply reducing yields. Long narrow fields may be less productive than wide, short fields despite a similar total size.

The crop must be kept free of weeds, disease and damaging insects. Regular field scouting to identify potential problems before they cause significant damage will reduce costs associated with controlling pest or disease organisms.

Proper harvesting is critical to producing acceptable malting barley. Kernel moisture at harvest is very important and a grower has a narrow window to harvest the grain properly. The barley kernels should be no more than 13.5% moisture before combining begins. If moisture content drops below 11% before combining excess peeling can occur. Excessive breakage or skinning of the kernels prevents malting standards from being met. Skinned kernels have over one-third of the outer husk removed. Problems normally can be avoided by slowing the cylinder speed, increasing the clearance in the concave and restricting volume of the returns to the cylinder. Grain augers should be run slow and full

enough to avoid damaging the kernels when they are handled. Properly threshed barley kernels will retain a portion of the awn (1/8-1/4 inch) after threshing.

### **Current Production Efforts**

Nevada has a history of growing malting barley, but it has been several years since any has been produced. Most of northern Nevada is suitable for barley production and during 2001 malting barley was planted at several locations in Pershing and Humboldt Counties. Over 500 acres of malting barley was produced in Nevada in 2001. Test plots were established at one location in Pershing County. Several hundred acres were grown in Humboldt County where production data was closely measured and recorded.

In Pershing County the varieties **Harrington**, **Merit**, **B1202**, **B2482** and **Legacy** were tested. All the varieties were treated with the fungicide Vitavax 200, before seeding. The seeding rates were approximately 120 pounds per acre. The yields in Pershing County were exceptionally high for all of the varieties. Yields ranged from 138 bushels/acre (bu./ac.) for B2482 and Harrington to 147 bu/ac. with Legacy and Merit. Variety B1202 fell in the middle with approximately 140 bu/ac.

In Humboldt County the same varieties were tested with the exception of B2482, which was not planted. The soil was much more sandy than at Pershing County and a severe mid-May frost (low 20's) at bloom caused significant seed damage. These environmental conditions resulted in lower yields. Legacy produced 72 bu/ac., B1202, 66 bu./ac., Merit 60 bu/ac. and Harrington, 49 bu/ac.

This information represents only one trial and a decision to plant or not plant should not be made solely from this information. If a grower is interested in planting malting he/she is advised to contact a potential buyer of the grain to discuss minimum quality standards, and the expected price for malting quality barely. Potential buyers include large brewers that are currently contracting barley growers in

surrounding states such as Anheuser-Busch, and Coors Brewing Company. Without a contract the production of malting barley is probably not a viable option at this time.

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