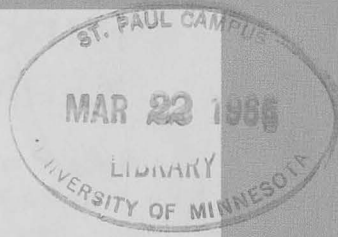


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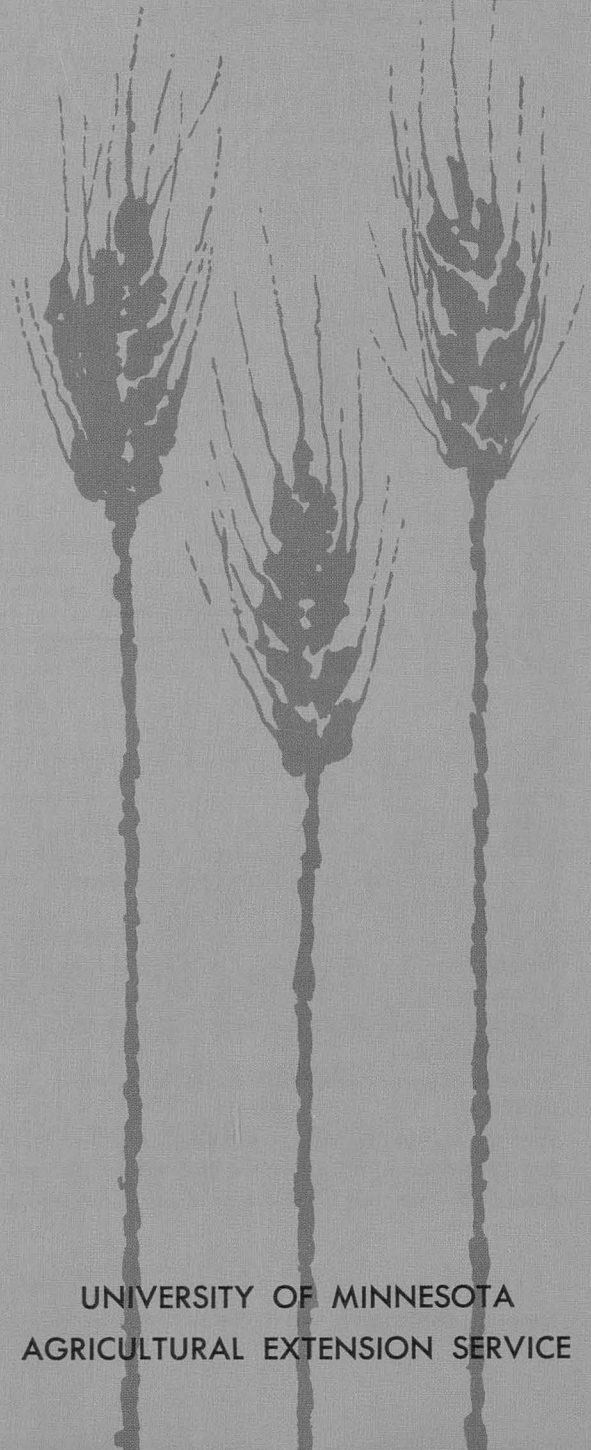
# MALTING BARLEY GRADE FACTORS

FEBRUARY 1965  
EXTENSION FOLDER 230

## IMPORTANCE OF KERNEL DAMAGE

The malting qualities of approved barley varieties grown in the Upper Midwest attract buyers from all over the nation. Keeping kernel damage to a minimum will help maintain market preference for malting barley now and in the future, and may mean increased income for those who produce, store, or market barley.

High-quality malt requires sound barley. In making malt, kernels that will germinate uniformly are necessary. Improper harvesting and poor storage can reduce proper germination.



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# TYPES OF KERNEL DAMAGE

The types of kernel damage in malting barley either illustrated and described, or commented on, in this folder are:

- Those that occur before or during harvest (including barley in the swath) such as (a) blight or scab, and (b) weathered, sprouted, skinned, broken, and frosted kernels.
- Those that occur in storage and merchandising, such as (a) heat damage, heat injury, mold, and weevil damage; and (b) barley that fails to meet accepted standards of cleanliness.

# IMPORTANCE OF KERNEL DAMAGE

Barley containing small amounts of damaged kernels makes inferior malt and thus commands a lower price than sound grain, or may even be unsalable as malting barley. Malting barley must also meet special standards for variety, varietal purity, vigor of germination, plumpness and uniformity in size of kernels, and protein content.

## Malting Barley and Blue Malting Barley

Grades and grade requirements for the subclasses malting barley and blue malting barley of the class barley

Grade	Minimum limits of:		Maximum percentage limits of:					
	Test weight per bushel	Percent sound barley	Damaged kernels	Foreign material	Skinned and broken kernels	Thin barley	Black barley	Other grains
1	47	97	2.0	1.0	4.0	7.0	0.5	2.0
2	45	94	3.0	2.0	6.0	10.0	1.0	3.0
3	43	90	4.0	3.0	8.0	15.0	2.0	5.0

Note: barley of the class barley which does not meet the requirements of any of the grades 1 to 3 inclusive for the subclasses malting barley and blue malting barley shall be classified and graded according to the grade requirements for the subclass barley.

Special Grades to be Added When Applicable (nonmalting):

**Tough** — for the class barley when moisture is over 14½ percent but not over 16 percent.

**Blighted** — more than 4 percent damaged or materially discolored by blight and/or mold.

**Smutty** — covered with smut spores or containing smut masses in excess of 0.2 percent.

**Weevily** — infested with live weevils or other injurious insects.

**Ergoty** — containing ergot in excess of 0.3 percent.

**Bleached** — treated in whole or in part with any bleaching agent.

## TYPES OF PEARLED SOUND MALTING BARLEY KERNELS



An illustration of pearled malting barley kernels, with colorless or white aleurone layer on the left and colored or blue pearl aleurone layer kernels on the right. Samples of barley normally are pearled to determine the texture, heat damage, and injury by heat.

Note: For detailed information on all grain grades refer to the official Grain Standards of the United States, Grain Division, Agricultural Marketing Service, U. S. Department of Agriculture.

# PRINCIPAL KERNEL DAMAGES

Sound Barley Kernel (Left) Compared with Varying Degrees of Diseased or Damaged Kernels



## HEAT DAMAGED (pearled)

Entire kernel definitely discolored brown or black. In extreme cases the kernel may be charred and shrunken. The kernels are damaged as a result of external heat caused by fire or excessive heating in storage.



## INJURY BY HEAT (pearled)

Germs appear dark brown or black. Slight discoloration may extend into the entire kernel. Such kernels have deteriorated in storage due to high moisture content, molds, and respiration.



## MOLDY KERNELS (Infected by Fungi)

Kernels with visible evidence of fungi. High-moisture barley infected by fungi and stored at high temperatures can become musty very quickly.



## BLIGHT AND SCAB

Kernels are light to dark brown in color on germ end or over entire kernel. Scabby kernels often have pink areas. Scab is difficult to distinguish from blight when this pink color does not develop.



## WEATHERED

Kernels vary from moderately discolored to a grayish, dull, lifeless appearance.



## SKINNED AND BROKEN

1. Kernels have one-third or more of hull removed.
2. Kernels have hull loosened or removed over the germ.

Broken kernels are pieces of barley kernels. Any exposure of the germ reduces the possibility of barley making malting grade.



## SKINNED AND BROKEN (Sprouted)

Sprouting occurs when inadequate protection is given by the hull and moisture is present. Kernels improperly threshed or handled result in the hull being partially loosened or removed over the germ. Skinned kernels are susceptible to mold damage in malting.



## WEEVIL DAMAGE OR INSECT BORED

Kernels with distinct holes from which insects have emerged.



## FROSTED KERNELS

Such kernels are usually immature, shrunken, and discolored green. They often have an abnormal depression on the back. Severely frosted kernels appear brown or black and are badly shrunken.



# REDUCE STORED GRAIN LOSSES

## MAJOR CAUSES OF KERNEL DAMAGE DURING STORAGE

### STORAGE FUNGI

High moisture content is the chief factor that results in the germ damage, heat damage, and mold damage caused by storage fungi. Usually when such damage occurs the average moisture content of the grain is above 13.0 percent. The chief reasons for this are:

- The moisture meter may be inaccurate; accuracy cannot be assumed. Submit check samples to a state or federal inspection office.
- The average moisture content of a given lot of grain does not indicate the range in moisture content of that lot. A truckload of barley that averages 14.0 percent moisture is likely to include some grain with 15.0 percent moisture. For safe storage it is essential to know the *highest* moisture content of any lot.
- Moisture may shift with time in a bin of stored grain, sometimes rapidly. When lots of high and low moisture content are mixed to achieve an average presumed to be safe for storage, the moisture content may never equalize. Many such mixtures have a high storage risk; avoid them.
- Activities of grain-infesting insects may increase the moisture content of the grain by as much as 1.0 percent per week.

### INSECTS AND MITES

The best insurance against damaging attack by grain-infesting insects and mites is to store grain free of dirt, debris, chaff, and broken kernels at a moisture content below 13 percent and at a temperature below 50° F.

If insecticidal sprays, dusts, or fumigants are used, consult current state or federal recommendations and follow directions carefully to avoid harmful or illegal pesticide residues.

### MEASURES TO PREVENT DAMAGE BY STORAGE FUNGI

After grain has been binned, and periodically during its storage life, take samples from different portions, determine the moisture content of each sample, and examine it for damage by insects and storage fungi. No germ damage or heat damage will develop in grain with moisture content below 13.0 percent.

Measure and keep a record of temperatures in different parts of the grain. Even a slight rise in temperature means that damage is underway, because only vigorously feeding insects or rapidly growing storage fungi cause heating in stored grain. If a rise in temperature is detected, remove samples and examine them so that you know the size and location of the hotspot and the condition of the grain in and near it.

In barley with a moisture content of 13.5 to 14.5 percent, slow invasion by storage fungi can cause germ damage and heat damage without any rise in temperature. In the absence of insects, heating in stored barley means that the moisture content of the grain is above 15.0 percent.

- If the facilities are available, aerate the high-moisture grain as soon as possible to provide a temperature of 40° to 50° F. throughout the bulk.

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