

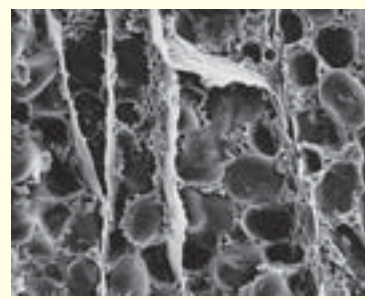
From Barley to Beer

MALTING BREWING



Malting Barley

Barley kernels of a recognized malting variety must be plump and contain a healthy viable embryo for strong, vigorous and even germination.



This is **malting barley** viewed under an electron microscope. The cell walls are intact.



Steep Tank

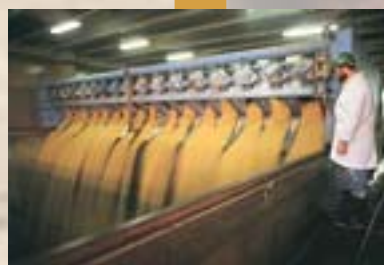
Water and barley are added to the tank. The barley soaks the water up, increasing its moisture content. The presence of water and oxygen triggers the growth of the embryo.



Germination Compartment



During germination, biochemical reactions occur within the kernels leading to the development of enzymes and breakdown of cell walls and proteins. The barley kernel 'grows' over a period of about four days. The grain is gently turned to sustain even growth and to prevent the kernels from matting together. By the end of the process, rootlets have formed on the kernels.



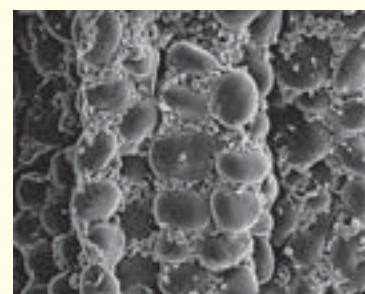
Kilning

The germinated barley, known as green malt, is sent to the kiln for drying. Kilning arrests the biochemical reactions taking place. After kilning, brittle rootlets break off and are easily removed.

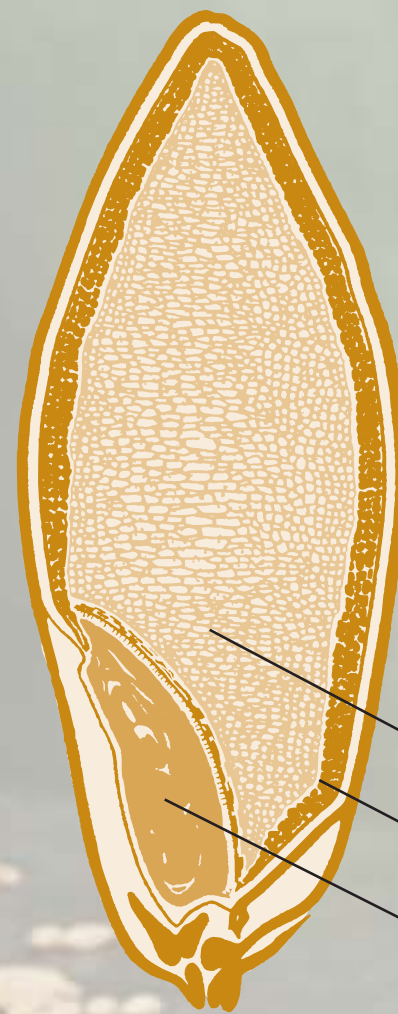


Malt

To the naked eye, malt looks similar to the original barley kernel. But inside the kernel, changes have taken place. The malt is now ready to be stored or sent to the brewery.



This is **malt** viewed under an electron microscope. Enzymes have destroyed the cell walls, exposing the starch granules.



Barley Kernel

In the malting process, the most important components of the barley kernel are the **endosperm**, the **embryo** and the **aleurone layer**.

Enzymes are activated in the aleurone layer once the embryo begins to germinate and are released into the endosperm. As you can see, the endosperm makes up most of the barley kernel. It is composed of starch granules protected by cell walls and protein. During malting, enzymes break down the cell walls and protein.

endosperm

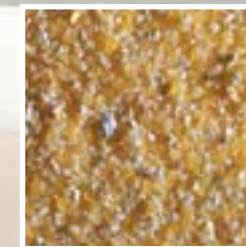
aleurone layer

embryo



Milled Malt

The brewer mills the malt to produce a grist.



Cereal Adjunct

Cereal adjuncts such as corn grits are sources of additional starch that can be converted into sugars.



Mash Tun

Ground malt is added to water in the **stainless steel mash tun**. The addition of **water reactivates** the enzymes to continue the process of starch breakdown into sugars.



Cooker

Cereal adjuncts are boiled and added to the malt mash.



Lauter Tun

Husks are separated from the dissolved sugars, called wort, in the lauter tun. At this stage, the wort is raked and filtered through the bed of husks. Then, the husks are sparged (rinsed) with hot water, causing foam.



Brew Kettle

The brew is boiled for at least an hour. During this time hops are added. Boiling inactivates all enzymes and extracts desirable aroma and flavour from the hops.



Hops

Hops are dried blossoms of the female hop plant. They add the slightly bitter taste to beer.



Fermentation

In sealed containers, yeast acts on the fermentable sugars in the wort to produce beer.



Yeast

Yeast is a micro-organism that can convert sugars to alcohol and carbon dioxide.



Storage & Filtration

From the fermenters, beer is transferred to large tanks to mature. It is then filtered to remove all haze.



End Product

This thirst-quenching beer is now ready to be enjoyed by consumers worldwide. The best beer in the world is produced from quality Canadian malt and malting barley.



Canadian Barley

THE MALTING & BREWING PROCESS

Canadian malting barley is the product of an integrated approach involving breeding, testing and varietal registration, careful management by farmers, followed by harvesting and selection to the strict quality standards required by maltsters and brewers.



Photo credits from top to bottom: Canadian International Grains Institute (From left to right: Latin American customers Jose Lara Rojas and Alejandro Quiodettis Batista with research scientist Manuel Cortez); Brandon Research Centre, Agriculture and Agri-Food Canada; Paul Pivert; and CWB collection. Cover photo by Robert Tinker.



The Canadian Wheat Board

Head Office: 423 Main Street, P.O. Box 816, Stn. Main

Winnipeg, Manitoba, Canada R3C 2P5

Phone: (204) 983-0239 Fax: (204) 983-3841

Visit our web site at <http://www.cwb.ca>