

For Geeks Only

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Cold Water Extraction of Dark Grains

By Mary Anne Gruber

The use of dark roasted grains has become common in homebrewing and craft brewing, yet the desired results are not always achieved. Even when the same proportion of similarly named grains (roasted barley, for instance) is used, the color contribution and flavor character can vary. One objection that is sometimes raised is the presence of overly harsh or astringent flavors in the finished beer. In the past, some have suggested adding dark grains at the end of the mash rather than including them from the beginning. This may address the harshness issue, but it still does not help control the color obtained from the grains. More recently, there has been some discussion about cold steeping of grains to address these issues.

At Briess Malting Company, we have recently conducted some tests to compare various methods of dark grain extraction by looking at the flavor and color of the resulting worts. This article presents our findings.

Materials and Methods

Experiments were conducted with both black malt and roasted barley. The black malt used contained 6.1 percent moisture and had a color rating of 475 Lovibond. The roasted barley had a moisture content of 4.4 percent with a color rating of 325 Lovibond. In both cases, the grains were prepared by milling to a coarse texture as would normally be done for mashing. Both the hot and

cold water procedures were undertaken using 12 gallons of water and 10 pounds of the grain being studied.

For the cold water procedure, two kettles were filled with the water at 64° F (18° C). The two grains were placed into separate steep baskets, one for roasted barley one for black malt, and the baskets were then dipped into their respective kettles. The steep baskets were dipped several times to ensure that all particles were wetted and then left submerged in the kettles for 20 hours to allow for extraction. At the end of the extraction period, the baskets were raised above the liquid and the grain squeezed gently to remove as much liquid as possible.

For the hot water procedure, two steeping periods were examined: five minutes and 30 minutes. This was done for each of the two grains resulting in a total of four batches. As with the cold water procedure, 12 gallons of prepared water was filled into each kettle. The water was then heated to 180° F (82° C) and the steep baskets full of grains dipped into the water several times to ensure wetting. One set of baskets was steeped for five minutes; the second set for 30 minutes. The temperature during steeping was approximately 165-167° F (74-75° C). When the baskets were removed, the grain was squeezed gently to remove as much water as possible.

In the case of the roasted barley, a fifth

option was evaluated. In this fifth case, pre-ground grain was added directly to the boil kettle and subjected to a 10-minute boil. This method was chosen to emulate a technique sometimes recommended by older homebrewing texts.

Following the preparation of these worts, samples were submitted to the Briess in-house tasting panel. This eight-member panel routinely tastes wort samples to assess their quality and consistency for the company.

Results

Quantitative and qualitative analyses of the worts are shown in Table 1 (for black malt) and Table 2 (for roasted barley). With regard to the black malt preparations, the taste panel preferred the cold water extraction (with no boil). Their second preference was the five minute hot water extraction. One striking difference between the two was the fact that the aroma of the malt was far less evident in the hot water sample,



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Table 1: Black Malt Extraction Results

	pH	Color	Flavor
20 hour cold water steep	6.03	386 L	Bland, no astringencies, some dryness
10 minute boil	5.22	455 L	Some bitterness, a little cooked flavor
5 minute hot water steep	5.63	458 L	Smooth, full flavor, slight harshness
30 minute hot water steep	5.34	513 L	Some bitterness, harshness, astringent

Table 2: Roasted Barley Extraction Results

	pH	Color	Flavor
20 hour cold water steep	5.95	271 L	Cold coffee, mild
Cold Water Steeping with a 10 minute boil	5.30	290 L	Good coffee flavor and aroma
5 minute hot water steep	5.58	347 L	Full flavored coffee
30 minute hot water steep	5.08	446 L	Harsh, astringent, no coffee aroma
Preground in the kettle	4.89	408 L	Harshest, most bitter 10 minute boil

indicating dissipation of the volatile aroma products during production.

In the roasted barley preparations, we found that cold water steeping and the short hot water steeping produced similar flavors. As a result of this, the taste panel showed no significant preference between these two methods.

From a practical perspective, brewers can precisely control finished beer color by adding cold-water extract to the kettle near the end of the boil. This prevents some of the guesswork involved in color determination. Second, the cold-water extract solution has been saved following the procedure described below and used in the brewing of a variety of beers for nearly six months now. During this period the extract has remained stable. It has developed no off aromas or flavors, no sediment or growths and the flavor impact remains consistent.

In general then, we feel that the cold water steeping procedure provides some significant advantages to the brewer, as follows:

1. Cleaner flavor, less harshness/bitterness
2. More accurate color addition to the wort.
3. Left over extract solution can be saved for the next brew.

Recommendations for Homebrewers

Based upon these findings, we have

developed a procedure that homebrewers can use to replicate these results in their own brewing. Here is the procedure for cold water extraction at the five gallon scale.

This procedure works well using black malt, chocolate malt, roasted barley or black barley. As with a normal full-mash extraction, the typical yield is 50 percent for black malt and chocolate malt, and 45 percent for roasted barley and black barley.

Materials

2 quarts water (1.89 L)
1 lb crushed grain, the finer the better (0.45 kg)
Glass coffee pot
Strainer

Procedure

The day before brewing, crush the grain, add cold tap water to the coffee pot, mix in the grain and let set on the counter until you are ready to use. If you think of it, swirl the pot a couple times during the steeping period. When you are ready to use, decant. If you want to recover the maximum amount of extract, pour into a coffee filter and squeeze. Add to kettle near the end of boil. Start by adding a small amount, check the color. Continue adding a small amount until the desired color is reached.

Storage

To keep the remaining liquid heat to about 150° F (66° C). Transfer to a mason jar. Seal and store in the refrigerator. This keeps a month or longer.

Mary Anne Gruber is the Director of Technical Services for Briess Malting Company where she has worked for 40 years. She began her career in the QA/QC lab and has worked in nearly every function including malting, pilot brewing, milling, R&D, extract production and sales.



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