



How to brew your own beer

Presented by the South Yeasters Home Brewers Club
www.southyeasters.co.za
(Sources: “The Beer Drinkers Handbook” by Kevin Trayner
“How to Brew” by John Palmer)



Introduction

Beer has a history and tradition that goes back thousands of years. The first people to make beer more or less as we know it today were the Sumerians from Mesopotamia. The basic ingredients of beer are malt, hops, water and yeast.

Malt

Raw barley is steeped in 5-15°C water for a few days and then allowed to dry during which it begins to germinate.



Fig 1. – Barley

During germination starches are broken down and proteins and enzymes are activated. These enzymes are responsible for converting water-soluble starches to maltose sugar, primary food for the yeast during fermentation; and dextrin sugar, which adds body. Proteins are essential to maintain yeast health and also aid in the body and head retention of the finished beer. To stop the germination, the damp grain is cooked or cured at temperatures ranging from 80-200°C depending on the type of malt required (pale to black). This is known as kilning.



Fig 2. – Pale Malt



Fig 3. – Different kinds of malt for different kinds of beer

The malted barley is now ready for the brewing process.

Hops

Hops are grown on very tall vine-like structures.



Fig 4. – Hop vines



Fig 5. – Saaz Hop Cones

The hops are compressed into pellets or dried and are then ready for use.



Fig 6. Hop Pellets

Hops are used in beer to add bitterness, flavour and aroma and are also a natural preservative. Each hop variety has a distinctive bitterness, flavour and aroma, but typically only one characteristic is dominant. Although many commercial brewers use hops in pellet form, there are still quite a few large brewing companies who still use the hops in its dried flower form (e.g. Budweiser). By way of interest, the nearest member of the plant family to hops is cannabis!

Yeast (The 'Magic' Catalyst)

There are literally thousands of different yeast strains and it was first properly understood when it was identified under a microscope in 1880 at the Carlsberg Brewery in Denmark. It is a microorganism that feeds on the maltose sugar in the wort, producing alcohol and carbon dioxide, and at the same time producing new yeast cells. Typically one kilogram of yeast will yield 3 kilograms of yeast at the end of the fermentation process. Yeast is very rich in Vitamin B.

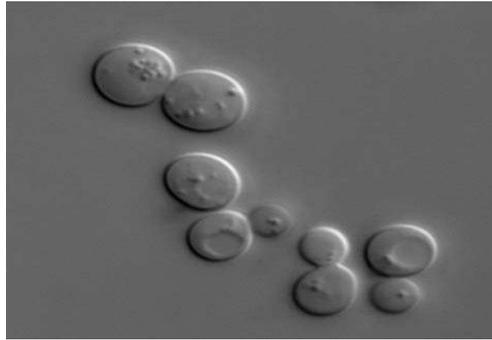


Fig 7 – Yeast Cells

There are two main types of yeast, namely Ale and Lager yeast. Ale yeasts are top fermenting, meaning that when the yeast starts to flocculate it floats to the top of the fermentation vessel, while Lager yeasts are bottom fermenting. Ale yeasts ferment quicker and prefer warmer temperatures (16-25°C) while Lager yeasts ferment longer and prefer colder temperatures (5-15°C). Yeast has a greater impact on the flavour and aroma of the beer than the malt, hops and water combined. Because of this, yeast strains are jealously guarded. The creation of different beer styles is made possible by the adaptability and 'magic' of this simple microorganism.

Water

Beer comprises up to 95% water, therefore differences in water chemistry, such as hardness, softness and mineral content, contribute greatly to the character and style of beer. Newlands Brewery for instance, uses untreated water from an underground lake. The soft waters of Pilsen, in the Czech Republic, complement the subtle malt flavours and aromatic Saaz hops of the classic Pilsner style. The hard waters of Burton on Trent result in the classic English Bitter and the slightly brackish "black water" (dubh lin) gives us the nectar which is called Guinness.

Other grains

Although malted barley is the primary grain used in brewing, other grains can be added during the brewing process. These are wheat, maize, rice, rye and oats. Most SABMiller beers, with the exception of Miller's Genuine Draft, which is a mixture of malt and rice, and Sterling Light Lager, which contain malt only, consist of a mixture of malt and maize (usually in the form of maize syrup). Only malted barley is used for beers brewed according to the Reinheitsgebot.

Basic steps

Malt is crushed/milled to expose the starches. The crushed malt is added to hot (60-70 °C) water to make a porridge-like mixture called the mash. The mash is retained at this temperature range for at least 90 minutes to allow the enzymes to convert the starch to sugar.

(known as single-infusion mashing). The sugar is washed out of the mash by a process called sparging. The resulting sugar water extract is called wort (pronounced “wurt”). The wort is now boiled for 60-120 minutes (depending on the style) during which are added at different stages for bitterness, flavour and aroma. During the boiling process the bittering, flavouring and aromatic properties of the hops are released. The boiled wort is then whirlpooled to separate the wort from the solids and then quickly cooled to below 25°C and transferred to the fermentation vessel. Yeast is pitched (added) and then the wort is left for 7-10 days to ferment. Once fermentation is complete the beer, known as green beer, is then bottled/kegged and left for another 2-4 weeks to mature. It is now ready for drinking. Because home brewed beer is seldom filtered and therefore contains a certain amount of live yeast (rich in Vitamin B), it can stay drinkable for long periods (up to 24 months).

Health

It is well known that alcohol in moderation is good for the circulation. Vitamin B in its various complexes promotes healthy skin, eyes, hair and digestion. Amino acids which would otherwise be destroyed by pasteurisation are the building blocks of protein and complement body growth and cell regeneration. More recently, it has been discovered that both malt and hops can assist the body in resisting cancer.

Getting Started



Fig 8. – Beer Kits

Many home brewers start brewing by using beer kits. A tin with hopped malt extract is supplied that is to be mixed with water and sugar and then yeast added. Although this method eliminates the crushing, mashing, sparging and boiling steps, the resultant beer is normally of a different quality. However this is a good way to get started and many home brewers that have converted to full grain brewing started this way.

Equipment

Basic Equipment



Fig 9. – Basic equipment to get started

More Sophisticated



Fig 10. – Conical fermenter



Fig 11. – Three tier gravity feed set-up

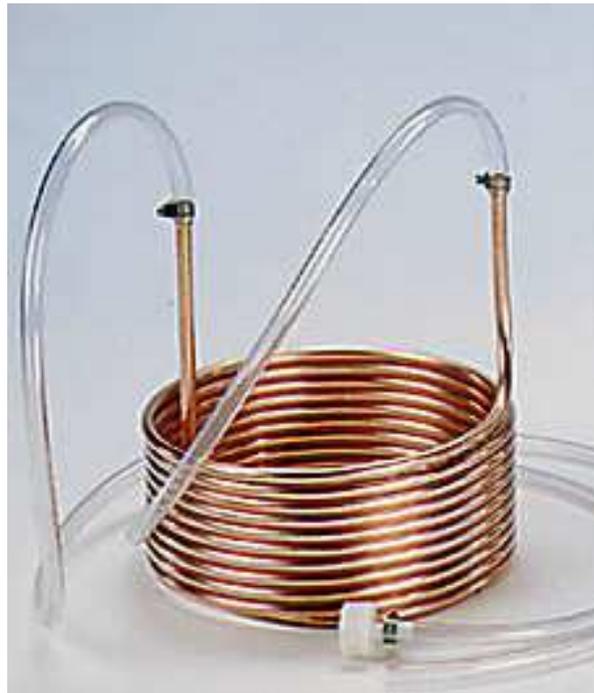


Fig 12. – Immersion chiller

Conclusion

Home brewing is an extremely satisfying hobby and allows one to experiment with different recipes and ingredients. Getting started does not cost a lot (R400-R500), although there are some home brewers who have evolved to very technical brewers and have very expensive equipment (R10, 000 – R30, 000). Brewing can become very technical, but on average it is quite a simple process.