



Ethnobotanical Leaflets



Hops: Not Just A Beer Ingredient

By Heather Newby

The hop, *Humulus lupulus*, is a cultivated flowering plant, green in color that has many economically important roles. The hop belongs to the hemp family, Cannabinaceae. There are many features that are distinctive about this plant. A hops plant has yellow lupulin glands between the petals, which is used for preservative and flavoring characteristics in beer. The bitterness of the hop is used to balance the sweetness of the malt, and the essential oils add a flavor and aroma which cannot be achieved by using any other plant. The hop plant is a perennial spiraling vine, which will grow in almost any climate given enough water and sunlight. It can climb either string or poles and can reach height of 40 feet. The flowers are usually dried before use. Farmers have developed a systemic approach to the cultivation of hops. There are also a number of chemical compounds present in this plant that give rise to its economic value. (1)

The hop plant has several structurally distinctive properties. The root is stout and perennial. The stem that arise from it every year is of a twining nature, reaching a great length, flexible and very tough, angular and prickly, with a tenacious fiber. This fiber has been explored in the manufacturing of a white, durable cloth. The cloth is not of wide use because the fibers are so difficult to separate. Normally, the stems require to be steeped in water a whole winter before they can be utilized. Paper has also been made from the stem of the vine. The leaves are heart-shaped and lobed, on stalks, which are oppositely placed on the stem. The leaves have three to seven lobes and are dark green in color with finely toothed edges. (5)

The flowers of this plant arise from the axils of the leaves, The hop is dioecious with the male flowers in loose bunches or panicles, 3 to 5 inches long. The female flowers are in leafy cone-like catkins, called strobiles. When fully developed, the strobiles are about 1 1/4 inch long. They are oblong in shape and rounded, consisting of a number of overlapping, yellowish-green bracts attached to a separate axis. If these leafy organs are removed, the axis will be seen to be hairy and to have a little zigzag course. Each of the bracts enfolds at the base revealing a small fruit or achene. Both the fruit and the bract have small, yellow lupulin glands. These are what contain the alpha and beta acids and essential oils, which give each type of hops its characteristic bittering and flavoring properties. (2)

The most valuable hop plants are hybrids, which means that their own seeds do not produce plants that are like wild hops. Therefore, hop plants must be propagated by root cuttings or by the planting of hybrid seedlings. Although there are both male and female plants, the best hops come from fields where only female plants are grown. This prevents seed production, which would detract from the value of the fruit. (1)

The hop can be traced back to a garden plant of the Romans, this first mentioned by Pliny. The origin of the name of the hop genus, *Humulus*, is derived from humus, the rich moist ground in which the plant grows. The specific name, *lupulus*, is derived from the Latin word *lupus* meaning wolf. Pliny states the twining effect of plant growth is similar to the embrace a wolf has on a sheep, The term hop comes from the Anglo-Saxon word *hoppen*, which means to climb. (5)

Hops appear to have been used in the breweries of the Netherlands in the beginning of the fourteenth century. In England, they were not used in the composition of beer until nearly two centuries afterwards. The beverage went by the name of *Ale* and was brewed either from malt alone, or from a mixture of a variety of constituents including hops. The preservation and flavor of hops went unknown for many years until John Evelyn wrote in Pomona, "Hops transmuted our wholesome ale into beer, which doubtless much alters its constitution, This one ingredient, by some suspected not unworthily, preserves the drink indeed, but repays the pleasure in tormenting disease and a shorter life'. (5)

Hops grow from the rhizomes of female hop plants. Rhizomes look like root cuttings but are stems and have buds growing from them that will become new vines. Rhizomes also contain stored nutrients to support initial growth. Hops vines spiral up and intertwine or will climb up another type of support. Depending on the latitude, location, and variety, they sprout from March or April and grow through the summer and early fall. A single plant can easily grow 40 feet tall when it is mature, but growth in the first year is usually much less. In most instances by the second or third year the plants will exhibit full growth. Height is very closely linked to the amount of sunshine the plant gets. Hops grow best in full sun and should be placed in an area with the best possible Southern exposure, They grow best in loose, well-drained soil. Blended peat moss and sand make a good growing environment. (1)

Hops require a lot of water. Studies prove that once-a-day waterings give greater growth and yield, Hops also require a fertilizer to grow to optimum levels. Composted cow manure has shown to be a sufficient well-balanced fertilizer that supports hops growth, As the vines grow over a foot tall they should be trained to grow up a twine. Hops have a natural tendency to wrap clockwise around the twine. (5)

The hops are fully mature and ready for picking when two changes take place. First, immature hops have a damp, soft feel and when squeezed slightly tend to stay compressed. Mature hops feel more like paper, they spring back into place when squeezed, and feel noticeably lighter. The second key test is to pick an average sample hop and cut it lengthwise down the center. When ready to pick, the yellow powder (the lupulin sacs containing the essential oils and bitter compounds) will be a dark shade of yellow, and it will have a pungent odor, If a light shade of yellow, then it is likely the hops are immature. (2)

Freshly picked hops are roughly 80 percent water. Therefore, if left alone they will spoil rapidly. For proper storage most of the water is removed by drying. During the process of drying which is carried out in a similar manner to the drying of malt, great care is required to prevent overheating, by which the essential oil would become volatilized, The hops are spread 8 to 12 inches deep, on hair-cloth, also being sometimes exposed to fumes of burning sulphur. The sulphur allows the plant to retain its yellow color. When the ends of the stalks shrivel, they are removed from the kiln and laid out until cooled. After they are sufficiently cooled, the hops are packed into bales, known as "pockets." (2)

The difficulties attendant upon the cultivation of hops have been aggravated and the expenses increased in recent years by the regularly recurring attacks of aphid blight, due to the insect *Aphis humuli*, which make it necessary to spray every branch and leaf with insecticidal solutions three or four times a growing season, For a natural approach to getting rid of the Aphids, a farmer can plant plants that attract ladybugs, which will feed on the aphids. Another pest, the red spider, *Teranychus telarius*, is most destructive in very hot summers. Congregating on the under surfaces of the leaves, the red spiders exhaust the sap and cause the leaves to fall. Among fungal parasites, mold and mildew are frequently the cause of loss to hop farmers. It is due to the action of the fungus *Padospharea castagnei*, which affects the cones of the plant. (6) The aromatic odor of the hop strobiles is due to a volatile oil, of which they yield about 0.3 to 1.0 percent. This oil consists chiefly of the sesquiterpene, Humulene. Petroleum spirit extracts 7 to 10 percent of a powerfully antiseptic soft resin, and ether extracts a hard resin. The petroleum spirit extract contains the two crystalline bitter principles Lupamaric acid and Lupulinic acid. These bodies are chiefly contained in the glands at the base of the bracts. The chief components of Lupulin are about 3 percent of volatile oil, which consists chiefly of Humulene, together with various oxygenated bodies to which the oil owes its peculiar odor. (7)

Hops have tonic, nervous, diuretic and anodyne properties. Their volatile oil produces sedative and soporific effects, and the Lupamaric acid or bitter principle is used as a tonic for nausea. For these reasons, hops improve the appetite and promote sleep. Hops have been used for centuries to reduce nervous tension. Hops acts as a natural sedative to calm the nerves and reduce stress and anxiety. Hops also promote a good night's rest by counter-acting the effects of sleeplessness and insomnia. Hops are rich in vitamins C and B-complex, and also contain various minerals. The natural antibiotic and antibacterial properties found in hops are beneficial in promoting healthy kidney functions, treating urinary tract infections and reducing painful urination.

Hops are beneficial as a digestive aid, stimulating the production of digestive fluids. Hops have been known to stimulate appetite and relieve constipation and painful menstruation and headaches. Many herbalists even believe that a pillow of warm hops will often relieve a toothache or an earache. Hops are even occasionally administered as a hypnotic drug. (3)

Although there are numerous uses of hops as described above, hops are best known for their role in brewing. The flavor and aroma of beer is directly related to the variety of hops that are used in the brewing. Examples of bittering hops include Brewer's Gold, Bullion, Centennial Chinook, Cluster, Eroica, Nugget, and others. Aromatic hops include Cascade, Challenger, Crystal, Fuggles, Liberty, and many others. (5)

One of the most fertile and productive growing areas in the world is the Pacific Northwest region of the United States. Besides rich volcanic soils, moderate temperatures, and plenty of sunlight, the area also features an abundant supply of water for irrigation, making it ideal for growing hops. Pacific Northwest hops and hop byproducts are now exported around the world. On an annual basis, 60% of all hop production from this region goes overseas. The rest remains in the US for domestic consumption. (5)

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