Hops

Botanical: Humulus Lupulus (LINN.)
Family: N.O. Urticaceae

Part Used

Flowers.

The Hop (*Humulus Lupulus*, Linn.) is a native British plant, having affinities, botanically speaking, with the group of plants to which the Stinging Nettles belong. The sole representative of its genus in these islands, it is found wild in hedges and copses from York southwards, being only considered an introduced species in Scotland, and rare and not indigenous in Ireland. It is found in most countries of the North temperate zone.

The root is stout and perennial. The stem that arises from it every year is of a twining nature, reaching a great length, flexible and very tough, angled and prickly, with a tenacious fibre, which has enabled it to be employed to some extent in Sweden in the manufacture of a coarse kind of cloth, white and durable, though the fibres are so difficult of separation, that the stems require to be steeped in water a whole winter. Paper has also been made from the stem, or *bine*, as it is termed.

The leaves are heart-shaped and lobed, on foot-stalks, and as a rule placed opposite one another on the stem, though sometimes the upper leaves are arranged singly on the stem, springing from altenate sides. They are of a dark-green colour with their edges finely toothed.

The flowers spring from the axils of the leaves. The Hop is dioecious, i.e. male and female flowers are on separate plants. The male flowers are 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, 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 a small fruit (achene), both fruit and bract being sprinkled with yellow translucent glands, which appear as a granular substance. Much of the value of Hops depends on the abundance of this powdery substance, which contains 10 per cent of Lupulin, the bitter principle to which Hops owe much of their tonic properties.

As it is, these ripened cones of the female Hop plant that are used in brewing, female plants only are cultivated, since from these alone can the fruits be obtained. Those with undeveloped seeds are preferred to ensure which the staminate plants are excluded, only a few male plants being found scattered over a plantation of hops.

We find the Hop first mentioned by Pliny, who speaks of it as a garden plant among the Romans, who ate the young shoots in spring, in the same way as we do asparagus, and as country people frequently do in England at the present day. The young tops of Hop used formerly to be brought to market tied up in small bundles for table use. The tender first foliage, blanched, is a good potherb.

The leaves and flower-heads have been used also to produce a fine brown dye.

The origin of the name of the Hop genus, *Humulus*, is considered doubtful, though it has been assumed by some writers that it is derived from *humus*, the rich moist ground in which the plant grows. The specific name *Lupulus*, is derived from the Latin, *lupus* (a wolf), because, as Pliny explains, when produced among osiers, it strangles them by its light, climbing embraces, as the wolf does a sheep. The English name *Hop* comes from the Anglo-Saxon *hoppan* (to climb).

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 till nearly two centuries afterwards. The liquor prepared from fermented malt formed the favourite drink of our Saxon and Danish forefathers. The beverage went by the name of Ale (the word derived from the Scandinavian *öl* - the Viking's drink) and was brewed either from malt alone, or from a mixture of the latter with Honey and flavoured with Heath tops, Ground Ivy, and various other bitter and aromatic herbs, such as Marjoram, Buckbean, Wormwood, Yarrow, Woodsage or Germander and Broom. They knew not, however, the ale to which Hops give both flavour and preservation. For long after the introduction of Hops, the liquor flavoured in the old manner retained the name of *Ale*, while the word of German and Dutch origin, *Bier* or *Beer*, was given only to that made with the newly-introduced bitter catkins.

It has been stated that the planting of Hops in this country was forbidden in the reign of Henry VI, but half a century later the cultivation was introduced from Flanders, though only to a limited extent, and it did not become sufficient for the needs of the kingdom till the end of the seventeenth century. The prejudice against the use of Hops was at first great. Henry VIII forbade brewers to put hops and sulphur into ale, Parliament having been petitioned against the Hop as 'a wicked weed that would spoil the taste of the drink and endanger the people.' In the fifth year of Edward VI, however, privileges were granted to Hop growers, though in the reign of James I the plant was still not sufficiently cultivated to supply the consumption, as we find a statute of 1608 against the importation of spoiled Hops.

Hops were at first thought to engender melancholy.

'Hops,' says John Evelyn, in his *Pomona* (1670), '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 diseases and a shorter life.'

Cultivation

It has been estimated that in pre-war times 70 per cent of the Hops used in brewing was home produce and 30 per cent imported, chiefly from the United States and Germany.

Hops are also grown in France, South Russia, Australia and New Zealand.

The cultivation of Hops in the British Islands is restricted to England, where it is practically confined to half a dozen counties: four in the south-east (Kent, Surrey, Hants and Sussex) and two in the western Midland counties (Worcester and Hereford). As a rule, over 60 per cent of home-grown Hops are grown in Kent.

In the years 1898-1907, the average annual acreage of Hops under cultivation in this country was 48,841 acres (being 51,127 acres in 1901 and 33,763 acres in 1907). The average annual yield per acre for these ten years was 8.84 cwt., and the average annual home produce 434,567 cwt. In 1907 Kent had under cultivation 28,169 acres; Hereford, 6,143; Sussex, 4,243; Worcester, 3,622; Hants; 1,842, and Surrey, 744.

Hops require deep, rich soil, on dry bottom, with south or south-west aspect - free circulation of air is necessary. The ground is generally well pulverized and manured to considerable depth by plough or spade before planting. Hops in Kent are usually planted in October or November, the plants being placed 6 feet apart each way, thus giving 1,210 plant centres to the acre. The plants are usually set in 'stools' of from three to five, a few inches apart. They are obtained from cuttings or suckers taken from the healthiest old shoots, which are usually planted out closely in nursery lines a year before being planted permanently.

Very little growth takes place the first year. Some planters still grow potatoes or mangels between the rows of the first year, as the plants do not bear much till the second year, but this is considered a mistake, as it exhausts the ground.

As a rule, the plants are not full bearing till the third year, when four to six poles from 14 to 18 feet long are required for each stool. The most used timber for Hop poles is Spanish Chestnut, which is largely grown for this special purpose in coppices in hopgrowing districts. Ash is also used. The poles are set to the plants in spring, before growth commences, and removed when the latter are cut away in autumn. The plants are then dressed with manure, and the soil between the stools stirred lightly. Much of the Hop-land is ploughed between the rows, but it is better to dig Hop-land if possible, the tool used being the Kent spud.

Experiments in Hop manuring have been conducted in connexion with the South-East Agricultural College, Wye. The main results have been to demonstrate the necessity of a liberal supply of phosphates, if the full benefit is to be reaped from application of nitrogenous manures. Manuring is applied in the winter and dug or ploughed in. London manure from stables is used to an enormous extent. Rags, fur waste, sprats, wood waste and shoddy, are also put on in the winter. In the summer, rape dust, guano, nitrate of soda and various patent Hopmanures are chopped in with the Canterbury hoe. Fish guano, or desiccated fish, is largely used; it is very stimulating and more lasting than some of the forcing manures.

Hop-land is ploughed or dug between November and March. After this, the plants are trimmed or 'dressed,' i.e. all the old bine ends are cut off with a sharp curved Hop-knife and the plant centres kept level with the ground. Much attention is required to keep the bines in their places on the poles, strings or wire during the summer.

The Hop cones - or strobiles - are fit to gather when a brown-amber colour and of a firm consistence. The stalks are then cut at the base and removed with the poles and laid horizontally on frames of wood, to each of which is attached a large sack into which the Hops fall as they are picked. When picked, the Hops are at once taken to the kiln or oast-house, and dried, as they are liable to become spoiled in a few hours, especially when picked moist. 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. When the ends of the stalks shrivel, they are removed from the kiln and laid on a woodenfloor till quite cool, when they are packed in bales, known as 'pockets.'

The difficulties attendant upon the cultivation of Hops have been aggravated and the expenses increased in recent years by the regularly recurring attacks of aphis blight, due to the insect *Aphis humuli*, which make it necessary to spray or syringe every Hop plant, every branch and leaf with insecticidal solutions three or four times and sometimes more often in each season. Quassia and soft soap solutions are usually employed: the soft soap serves as a vehicle to retain the bitterness of the quassia upon the bines and leaves, making them repulsive to the Aphides, which are thus starved out. The solution is made from 4 to 8 lb. of quassia chips to 100 gallons of water.

Another pest, the Red Spider (*Tetranychus 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. The Quassia and Soft Soap Hopwash is of little avail in the case of Red Spider. Some success has attended the use of a solution consisting of 8 to 10 lb. of soft soap to 100 gallons of water, with 3 pints of paraffin added. It must be applied with great force, to break through the webs with which the spiders protect themselves.

Hop washing is done by means of large garden engines worked by hand or by horseengines: even steam-engines have sometimes been employed.

Among fungoid parasites, Mould or Mildew is frequently the cause of loss to Hop planters. It is due to the action of the fungus *Podosphaera castagnei*, and the mischief is more especially that done to the cones. The remedy is sulphur, employed usually in the form of flowers of sulphur, from 40 to 60 lb. per acre being applied at each sulphuring, distributed by means of a blast pipe. The first sulphuring takes place when the plants are fairly up the poles and is repeated three or four weeks later, and even again if indications of mildew are present.

Sulphur is also successfully employed in the form of an alkaline sulphur, such as a solution of liver of sulphur, a variety of potassium sulphide.

Parts Used Medicinally

(*a*) The strobiles, collected and dried as described. (*b*) The Lupulin, separated from the strobiles by sifting.

Chemical Constituents

The aromatic odour of the Hop strobiles is due to a volatile oil, of which they yield about 0.3 to 1.0 per cent. It appears to consist chiefly of the sesquiterpene Humulene. Petroleum spirit extracts 7 to 14 per cent of a powerfully antiseptic soft resin, and ether extracts a hard resin. The petroleum spirit extract contains the two crystalline bitter principles (a) Lupamaric acid (Humulone), (b) Lupamaric acid (Lupulinic acid). These bodies are chiefly contained in the glands at the base of the bracts. The leafy organs contain about 5 per cent of tannin which is not a constituent of the glands. Hops yield about 7 per cent Ash.

The oil and the bitter principle combine to make Hops more useful than Chamomile, Gentian or any other bitter in the manufacture of beer: hence the medicinal value of *extra-hopped* or *bitter* beer. The tannic acid contained in the strobiles adds to the value of Hops by causing precipitation of vegetable mucilage and consequently the cleansing of beer.

Fresh Hops possess a bitter aromatic taste and a strong characteristic odour. The latter, however, changes and becomes distinctly unpleasant as the Hops are kept. This change is ascribed to oxidation of the soft resin with production of Valerianic acid. On account of the rapid change in the odour of Hops, the recently dried fruits should alone be used: these may be recognized by the characteristic odour and distinctly green colour. Those which have been subjected to the treatment of *sulphuring* are not to be used in pharmacy. This process is conducted with a view of improving the colour and odour of the Hops, since sulphuric acid is found to retard the production of the Valerianic odour and to both preserve and improve the colour of the Hops.

Lupulin, which consists of the glandular powder present on the seeds and surface of the scales, may be separated by shaking the strobiles. The drug occurs in a granular, brownish-yellow powder, with the strong odour and bitter aromatic taste characteristic of Hops. The glands readily burst on the application of slight pressure and discharge their granular oleo-resinous contents. Commercial Lupulin is often of a very inferior quality, and consists of the sifted sweepings from the floors of hop-kilns. It should contain not more than 40 per cent of matter insoluble in ether and not yield more than 12 per cent of ash on incineration. A dark colour and disagreeable odour indicates an old drug.

The chief constituent of Lupulin is about 3 per cent of volatile oil, which consists chiefly of Humulene, together with various oxygenated bodies to which the oil owes its peculiar odour. Other constituents are the two Lupamaric acids, cholene and resin.

Lupulin is official both in the British Pharmacopoeia and the United States Pharmacopoeia.

Medicinal Action and Uses

Hops have tonic, nervine, diuretic and anodyne properties. Their volatile oil produces sedative and soporific effects, and the Lupamaric acid or bitter principle is stomachic and tonic. For this reason Hops improve the appetite and promote sleep.

The official preparations are an infusion and a tincture. The infusion is employed as a vehicle, especially for bitters and tonics: the tincture is stomachic and is used to improve the appetite and digestion. Both preparations have been considered to be sedative, were formerly much given in nervousness and hysteria and at bedtime to induce sleep; in cases of nervousness,

delirium and inflammation being considered to produce a most soothing effect, frequently procuring for the patient sleep after long periods of sleeplessness in overwrought conditions of the brain.

The bitter principle in the Hop proves one of the most efficacious vegetable bitters obtainable. An infusion of 1/2 oz. Hops to 1 pint of water will be found the proper quantity for ordinary use. It has proved of great service also in heart disease, fits, neuralgia and nervous disorders, besides being a useful tonic in indigestion, jaundice, and stomach and liver affections generally. It gives prompt ease to an irritable bladder, and is said to be an excellent drink in cases of delirium tremens. Sherry in which some Hops have been steeped makes a capital stomachic cordial.

A pillow of warm Hops will often relieve toothache and earache and allay nervous irritation.

An infusion of the leaves, strobiles and stalks, as Hop Tea, taken by the wineglassful two or three times daily in the early spring, is good for sluggish livers. Hop Tea in the leaf, as frequently sold by grocers, consists of Kentish Hop leaves, dried, crushed under rollers and then mixed with ordinary Ceylon or Indian Tea. The infusion combines the refreshment of the one herb with the sleepinducing virtues of the other.

Hop juice cleanses the blood, and for calculus trouble nothing better can be found than the bitter principle of the Hop. A decoction of the root has been esteemed as of equal benefit with Sarsaparilla.

As an external remedy, an infusion of Hops is much in demand in combination with chamomile flowers or poppy heads as a fomentation for swelling of a painful nature, inflammation, neuralgic and rheumatic pains, bruises, boils and gatherings. It removes pain and allays inflammation in a very short time. The Hops may also be applied as a poultice.

The drug Lupulin is an aromatic bitter and is reputed to be midly sedative, inducing sleep without causing headache.

It is occasionally administered as a hypnotic, either in pills with alcohol, or enclosed in a cachet.

Preparations of Lupulin are not much used in this country, although official, but in the United States they are considered preferable for internal use.

RECIPES FOR HERB BEERS

Formerly every farmhouse inn had a brewing plant and brewhouse attached to the buildings, and all brewed their own beer till the large breweries were established and supplanted home-brewed beers. Many of these farmhouses then began to brew their own 'stingo' from wayside herbs, employing old rustic recipes that had been carried down from generation to generation. The true value of vegetable bitters and of herb beers have yet to be recognized by all sections of the community. Workmen in puddling furnaces and potteries in the Midland and Northern counties find, however, that a tea made of tonic herbs is cheaper and less intoxicating than ordinary beer and patronize the herb beers freely, *Dandelion Stout* ranking as one of the favourites. It is also made in Canada.

Dandelion is a good ingredient in many digestive or diet drinks. A dinner drink may be made as follows: Take 2 OZ. each of dried Dandelion and Nettle herbs and 1 OZ. of Yellow Dock. Boil in 1 gallon of water for 15 minutes and then strain the liquor while hot on to 2 Lb. of sugar, on the top of which is sprinkled 2 tablespoonsful of powdered Ginger. Leave till milk-warm, then add boiled water gone cold to bring the quantity up to 2 gallons. The temperature must then not be above 75 degrees F. Now dissolve 1/2 oz. solid yeast in a little of the liquid and stir into the bulk. Allow to ferment 24 hours, skim and bottle, and it will be ready for use in a day or two.

A good, pleasant-tasting botanic beer is also made of the *Nettle* alone. Quantities of the young fresh tops are boiled in a gallon of water, with the juice of two lemons, a teaspoonful of crushed ginger and 1 Lb. of brown sugar. Fresh yeast is floated on toast in the liquor, when cold, to ferment it, and when it is bottled the result is a specially wholesome sort of ginger beer.

Meadow Sweet was also formerly much in favour. The mash when worked with barm made a pleasant drink, either in the harvest field or at the table. It required little sugar, some even made it without any sugar at all.

Another favourite brew was that of armsful of Meadowsweet, Yarrow, Dandelion and Nettles, and the mash when 'sweetened with old honey' and well worked with barm, and then bottled in big stoneware bottles, made a drink strong enough to turn even an old toper's head.

Old honeycomb from the thatch of an ancient cottage, filled with rich and nearly black honey, when boiled into syrup and then strained, was used in the making of herb beer, while the wax was put at the mouths of the hives for the bees.

Dandelion, Meadowsweet and Agrimony, equal quantities of each, would also be boiled together for 20 minutes (about 2 OZ. each of the dried herbs to 2 gallons of water), then strained and 2 lb. of sugar and 1/2 pint of barm or yeast added. This was bottled after standing in a warm place for 12 hours. This recipe is still in use.

A Herb Beer that needs no yeast is made from equal quantities of Meadowsweet, Betony, Agrimony and Raspberry leaves (2 OZ. of each) boiled in 2 gallons of water for 15 minutes, strained, then 2 lb. of white sugar added and bottled when nearly cool.

In some outlying islands of the Hebrides there is still brewed a drinkable beer by making two-thirds Heath tops with one-third of malt.

HOP BITTERS, as an appetiser, to be taken in tablespoonful doses three times in the day before eating, may be made as follows: Take 2 OZ. of Buchu leaves and 1/2 lb. of Hops. Boil these in 5 quarts of water in an iron vessel for an hour. When lukewarm add essence of Winter green (Pyrola) 2 OZ. and 1 pint alcohol.

Another way of making Hop Bitters is to take 1/2 oz. Hops, 1 OZ. Angelica Herb and 1 OZ. Holy Thistle. Pour 3 pints of boiling water on them and strain when cold. A wineglassful may be taken four times a day.

To make a good HOP BEER, put 2 OZ. Hops in 2 quarts of water for 15 minutes. Then strain and dissolve 1 lb. of sugar in the liquor. To this add 4 quarts of cold water and 2 tablespoonsful of fresh barm. Allow to stand for 12 hours in a warm place and it will then be ready for bottling.