

THE RISE OF HOPS IN HINDUSTAN

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“Hops-The new player in the Indian brewing industry”

Abstract:

Hop shoots are also called as hops and scientifically known as *Humulus lupulus* belonging to the family Cannabaceae are native to the North American temperate. These plants are crawlers and can grow up to 30 feet height. Its flowers are widely used in breweries due to their unique flavor and aroma. The bitter taste and aroma of beer is due to the hops as they balance the sweetness in beer. This plant also has anti-cancer properties, rich in IPA (iso propyl alcohol) and also used in curing fatty liver disease and tuberculosis disease. Hops have been recently cultivated in India. The brewing industry of India has a new raw material for the preparation of alcoholic beverages. These hops have anti-cancer properties therefore minorly helps in reducing the risk of liver cancer and liver cirrhosis. A farmer named Amarendar Singh is going to be the first known farmer to cultivate this crop successfully and Bihar becomes the first state in India cultivating the hops. Scientists are investigating its characteristics and conducting trials.

Key words: Brewery, Strobile, Economical crop, Hopfield, Oleoresin, Hop house, flavonoids.

Botanical background:

Humulus lupulus is a perennial plant that belongs to the Cannabaceae family commonly called as hop shoots. It belongs to the order Rosales. The flower of the plant, called hop-cones or strobile. These hop shoots are widely used in the brewing industry. It is used as aromatic ingredient in many beer flavours. The hop plant is a vigorous, climbing, herbaceous perennial, usually trained to grow up strings in a field called a Hopfield.



Conditions suitable for Humulus cultivation:

As hops are a climbing plant, they are trained to grow up trellises made from strings or wires.

Spacing: Hop plants are planted in rows about 2 to 2.5 meters (7 to 8 ft) apart. Hop plants germinate from the soil in March.

Temperature: Hop production is limited above 35°N. Hop crowns are formed at -25°C. Hops can be grown in a wide variety of climates like semiarid, maritime, humid continental. and sub-tropical regions, with different cultivars being more adapted to different climatic conditions. Hop plants grow best in Hardiness Zones 5 through 9, but do well in most moderate climates. Some plant varieties are made to be heat-resistant.

Soil: Hops require rich and well drained soil. The soil must be rich with organic matter. Required soil PH is 6 to 7.

Nutrition: Hops require 224 kg of nitrogen per hectare. Compost should be added.

Irrigation: Drip irrigation must be used and it is the common method of irrigation used for Hop shoots. Mulching should be done in order to prevent loss of soil moisture as hops require moist soil.

Planting procedure: Dig holes about 1 foot deep for each rhizome and then apply some nutrients and include compost on a 1:1 mix with a standard soil blend. Then, plant about 5 feet from other Hop rhizomes to keep the two vines from tangling. Rhizomes must be situated vertically when covered. Keep the soil evenly watered without drenching.

Hop Vines: When vines reach about 1 foot long, begin to wind them around your trellis in a clockwise direction. Then, you can expect them to grow up to a foot per day during ideal conditions. And they need trellis to grow

it. But keep a note that it grows 30 feet height. So, it's better try it on a two-story home or barn, you can install eye hooks along a roof overhang and run twine down to the plants.

Pests and diseases of Hops:

Powdery mildew disease can affect yield and cone quality. Symptoms of powdery mildew are cultivar-specific. Sulfur and copper-based fungicides organically control powdery mildew disease. Aphids and spider mites are common Hop plant pests and can be treated with insecticidal soaps and oils and beneficial insects.

Harvesting:

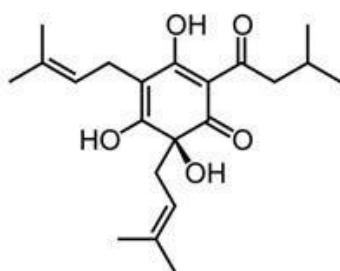
Harvest comes near the end of summer when the bines are pulled down and the flowers are taken to a hop house or oats house for drying. Hop cones yields different oils, like lupulin (a yellowish, waxy substance) an oleoresin, which imparts flavor and aroma to beer. Lupulin contains lupulin and humulone, which possess antibiotic properties, suppressing bacterial growth and favoring brewer's yeast to grow. The papery cones are discarded after the extraction of lupulin.

They yield 800-1500 pounds per acre (i.e) 362 to 680 kilograms par acre. Yield is actually cultivar specific.

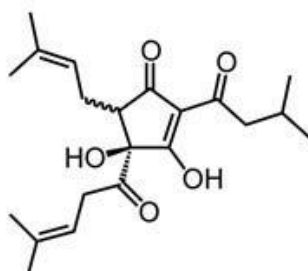
Noble hop varieties are Hallertau also called Hallertauer, Tetnang, spalt, Zatec commonly called as Saaz.

Chemical background of Humulus:

Hops contain alpha acids, the humulone that causes the bitter taste of beer, humulone that has been exposed to heat so that it becomes bitter, is known as *Iso-humulone* or *Iso alpha acids* because it has undergone the transformative process known as *Isomerization*.



humulone



isohumulone

Then comes the beta acids, the lupulin which causes the desirable aroma off beer, essential oils like terpene hydrocarbons consisting of myrcene, humulene and caryophyllene and flavonoids. Hops also contains phytoestrogens and are rich in antioxidants.

Myrcene is responsible for the pungent smell of fresh vegetables. The products that are obtained from oxidation of humulene gives the special aroma of beer caused by hops.

Types of Hops:

There are many varieties of hops, but they can be all concentrated in three types:

- ❖ Noble Hops
- ❖ American Hops
- ❖ English Hops
- The Noble Hops come from Germany and the Czech Republic, and they are considered the most classic types of hops. They include strains like Saaz and Tettnanger. These types of hops have low levels of alpha acid and comes with high levels of the aromatic essential oil humulene.
- American Hops tend to be bolder and very aromatic. They have high levels of essential oil myrcene, which gives them a scent of pine and citrus. You can include the Cascade and Centennial strains in this particular type.
- Lastly, English hops are more delicate and subtle. They have low levels of myrcene, which gives them touches of earth, woods, herbs, among others. In comparison with the Nobles Hops and American Hops, the English Hops represent a small amount of the species grown around the world, but they are essential for brewing their British ale.

Let's see the **USES** of this costliest crop:

1. Hop shoots' fruit, flower, and stem are used in making beverages, including beer. It is used as a stability agent while making beer to balance the sweetness of the beer.
2. In the manufacture of antibiotics, as well as for other medicinal purposes. The drug made from the stalks of this plant has been found to have a high effect on the treatment of tuberculosis (TB).
3. Hop shoots are well known in European countries for protecting skin in the cold climate as its antioxidants help in skin gleaming.

4. Hop shoots play an important role in the treatment of cancer. Hop acids, namely humulones and lupulins, block leukemia cells from damaging the bones.
5. Hops are used in herbal teas and in soft drinks like julmust (used as soda in Sweden), malta (American soft drink) and kvass.
6. Hops may be used in herbal medicine in a way similar to valerian, as a treatment for anxiety, restlessness, and insomnia.
7. The drug made from the stalks of this plant has been found to have a high effect on the treatment of tuberculosis (TB).
8. Also used as ornamental crop due to its unusual foliage color like purple.

Hops in Brewing Industry:

Hops contain pinhead-sized glands of lupulin, a sticky substance that's secreted when boiled. Lupulin contains the essential oils, bitter acids, and resins that do the following four big jobs in beer making. "*A lot of work for a tiny flower.*"

- ✓ Contribute bitterness- it counterbalances the sweetness of the cereal used, the alpha acids in the hops are responsible for bittering the beer.
- ✓ Provide aroma- Hops' unmistakably pungent aromatics (sometimes described as spicy, herbal, floral, piney, and citrusy) are unique.
- ✓ Natural preservation of beer- the beta acids have been found to counteract and delay the inevitable effects of bacterial spoilage, thereby giving beer a longer shelf life, which was realized several centuries after the advent of regular hop usage.
- ✓ Adding flavor- The popular beer manufacturer Corona certainly uses hops in its production which is the reason for the hoppy flavour of it. The paulaner's extra dry premium pilsner which has an amazing flavour as told by the liquor lovers uses magnum hops for flavouring.

The distinctive aroma of each type of hop comes from the essential oils that dissipate during the boiling part of brewing, so some hops are added after that stage in order to get their aroma into the beer, in a step known as *late kettle hopping*. If the brewer wants even more hop aroma in the beer, he'll add hops directly to the beer in the fermenter or aging tanks in a process known as *dry hopping*.

Brewers take into account all these variables such as bitterness, flavour, and aroma while designing a beer recipe.

Conclusion:

According to the NDTV this hop values 1 lakh rupees per 1 kilogram. A farmer named Amarender Singh of Bihar state of India started growing this and had seen successful flowering. Scientists are verifying its characteristics and more suitable characters for its sustainable existence in India. The government of India should show more interest and awareness in farmers towards the hop shoots. Many extension programs and researches should be done for further development of this valuable crop. This crop will be a game changer for the farmers and to the Indian economy also. This will be a great foreign exchange for us and also huge development can be seen in the Indian brewing industry.



Farmer Amarender singh in his field of hopshoots.

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- ❖ CNBC TV 18 reported about this crop growing in Bihar on April 1, 2021.

- ❖ IAS officer Supriya Sahu on March 31, 2021, tweeted an article of the New Indian Express about hop-shoots being grown by an Indian farmer.