HOP CULTURE IN CALIFORNIA

The Hop plant (*Humulus lupulus*) is a vigorous growing perennial of climbing habit, with a root system of deep penetrating feeder roots, shallow underground roots or stems, and with large roots for the storage of food. The vine is deciduous. drying each fall and producing a new growth each spring. The hop is dioecious, the male and female blossoms produced on separate plants, the hop of commerce being the pistillate or female flower. These flowers, commonly called cones, consist of a number of scales or bracts borne in clusters around a short stem or axis. At the base of each bract is the flower which, if fertilized, produces a seed. It is the common practice in California to produce unfertilized hops. "On each side of the flower or seed and on stem and sides of each petal is secreted a yellow granular substance somewhat resembling pollen, known as lupulin, sometimes called hop flour or hop meal, which is largely responsible for the commercial value of hops."

VARIETIES

Brewer's Gold - Mildew resistant. Ripens August-September. Shoots can be eaten like asparagus.
Bullion - English bittering hop; 7-8% bitterness. Good yielding.
Cascade - Fuggles X Serebrianka. Ornamental type with variegated leaves. Excellent taste. Adds flavor and aroma to light lagers; 4-6% bitterness. Hardy in Zone 4. Bred at Oregon State University.
Centennial - Moderate yielding. Cascade-like aroma; 11% bitterness.
Chinook - Good aroma; 11-13% bitterness. Moderate yielding.
Hallertauer - German aroma type; 3-4% bitterness. Moderate yielding.
Hersbrucker - similar to Hallertauer.
Fuggle - One of the main varieties used in the Pacific Northwest. Early maturing.
Mt. Hood - Hallertauer hybrid. 3-5% bitterness. Good yielding.
Nugget - Vigorous producer of large hop cones. High bittering; 11-14%.
Old Early Cluster - The type used for the first stages of brewing beer. Hardiest of all hops. Brought to America with the Pilgrims of English origin. Appeared in Washington state in the late 1800s as an earlier variety that produces two weeks before the original Old Cluster hop. Hardy in Zone 4.
Old English Cluster - (also: Pacific Coast Cluster) Late maturing variety used extensively in California.
Perele - All purpose German type. 7-8% bitterness.
Tettnang - (Tettnager) Spicy German aroma type. Used by some of America's major brewers. Favorite for lager beers. Prized for its mildness; 3-4% bitterness. Not as hardy as others but still classified as Zone 4.
Willamette - Improved Fuggle type. Excellent all-purpose hop. 4-6% bitterness. Disease resistant.

PLANTING HOPS

Hops may be propagated from seed or root cuttings. Roots, however, are almost universally used because of the great variation in plant type which occurs when grown from seed. Yields will vary from one pound to three pounds of cones, dry weight, per hill; the average being two pounds. Green weight will be about three and a half times dry weight.

Root cuttings are preferably one-half inch in diameter and eight inches long. These cuttings can be taken in January or February in California. It is preferable to set these roots out in February, although successful plantings have been made as late as the last of April. Two or three cuttings are planted in each hill; each cutting set a few inches apart around the stake set for each hill and planted sufficiently deep so as to be covered with two to three inches of soil. Treating roots prior to planting with a fungicide may aid in preventing root rot.

CLIMATIC REQUIREMENTS

Hops can be grown in practically every part of California, as far as climate affects the plant. Although long continuous very low temperatures will kill the roots, there are few areas in this state where this is a danger. Rains during harvest reduce the quality of the crop; damp, wet weather increases the hazard of mildew or aphid attacks, and extremely hot weather and winds may reduce the quality and quantity of the cones.

TRELLISING AND TRAINING HOPS

From an overhead support about 14-17 feet high, strings are run to the ground, at the hills, being fastened to the light stakes there. The strings are practically vertical and when the vines are once started up, they require 3 separate trainings at about intervals of fifteen days.

Only two vines are allowed to a string and four to six vines from each plant. All suckers and branches about the lower part of the vine are kept off to force growth into the desired shoots.

CULTURAL OPERATIONS

Cultivaton of hop yards need not be in excess of that necessary to control weed growth and prevent the soil from becoming compacted. Pruning of hop roots is an annual procedure and usually takes place in February or March. To prune the roots it is necessary to completely remove the dirt from them. The soil is removed from the plant on all four sides, thus exposing the hill. The surface roots or runners are cut away with a sharp knife, leaving the crown. The dirt is then replaced around the plant. Ideal soils are well drained sandy loam or loam. Crown rot and root rot organisms invade roots in waterlogged or poorly drained soils.

The hop vine starts growth in April, and by May has made sufficient growth to start training on trellises. Short, hook-like appendages occur on stems and leaves and the terminal portion of the vine twists sufficiently rapidly to make training an easy process. It requires three years to secure maximum production of the hop plant, 50% of crop the first year, 85-90% second, full crop third, from root cuttings.

HARVESTING

August and September are the top harvesting months in California. In the Sacramento Valley the crop matures from one to two weeks earlier than hops grown in the coastal area. To harvest, vines are cut near the base of the stem and at the top, wire loaded on trucks or trailers and hauled to stationary picking machines where the hop cones are removed. The remainder of the plants are usually chopped and returned to the hop yard or field. When the hop is picked, it contains from 65-75% moisture, therefore drying to 10-14% moisture is necessary to prevent spoilage.

DRYING HOPS

Hops can be dried on a small scale by placing in a box container with a screened bottom covered with burlap cloth and heated air forced through the hops from below. The hops can be about 18-36 inches deep in the box. The air can be heated to a temperature of 150-160°F (66-71°C). Eleven to twelve hours drying time should be sufficient.

When properly dried, the bracts will be prefectly dry, but the stems of the cones will still be soft and pliable. Insufficiently dried hops are apt to mold or heat and if highly dried, the bracts break off and the lupulin falls out, seriously injuring the quality of the hops.

DISEASES

Common pests and diseases of hops are aphids, downy mildew, red spider, crown gall, and crown rot.

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