Hops in the Backyard:
From Planting to Harvest and the Hazards in Between

By Stephanie Montell *Photos by Ulrich Gampert*
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Growing hops at home is easy if you know the tricks of the trade. But you better hurry - as spring turns to summer the prime time for establishing new starts is quickly passing.

Driving along Highway 99 in Oregon's Willamette Valley, just a few miles north of *BrewingTechniques* offices, you can see towering poles with climbing green vines reaching for the sky. To the uninitiate, the plants may look strange and unfamiliar, but they produce the favorite flower in a beer brewer's yard.

The female flower of the hop vine *Humulus lupulus* provides beer its characteristic bitterness, flavor, and aroma. Brewers have also exploited its natural preservative qualities for years. If you choose to grow hops at home they can deliver a great deal of satisfaction as well, bringing you one step closer to a truly unique hand-crafted beer.

The hop is a hardy, perennial plant that is easily grown at home, provided sufficient sun and climbing space are available. The hop produces annual vines from a permanent root stock known as the crown. Vines can grow 25 ft high in a single season but will die to the crown each fall. The crown also produces the underground stem or rhizome. The root-like rhizomes sprout numerous buds, which are the key to propagation.

GROWING HOPS

Basic Requirements: *Plenty of space*. Since healthy hop plants can grow up to 1 ft in a day, space is definitely an element to consider before planting a hop yard.

Site selection. The ideal hop yard must have direct sunlight, easy access to water, and plenty of room for vertical growth. Space along fences, garages, or property lines hold potential as hop yards. Hop vines also need a strong support system to grow successfully; tall poles and strong twine are commonly used to support the growing vines. Growers should avoid sites with electrical wires nearby because of potential problems caused by sprawling vines.

Soil. The soil must be loamy and well drained with a pH of 6.5-8.0. Because hops use large quantities of water and nutrients, the soil needs fertilizers rich in potassium,

phosphates, and nitrogen. Home growers can use manure compost and commercial fertilizer for this purpose.

Climate. Wherever the hops are planted, a minimum of 120 frost-free days are needed for hop vines to produce flowers. When the stems break soil, you must support vines off the ground to prevent disease and ensure proper growth. The vines keep growing until mid-July, when most hops are either in full bloom or past bloom, depending on the variety and location. Healthy vines can produce 1-21/2 pounds of dried flowers per plant.

Planting: Once the site has been established and the soil fertilized, planting can begin. In Northern latitudes, hops can be affected by freezing temperatures. To avoid loss of rhizomes to rot, plant after the threat of frost has passed. Vines will break the soil when temperatures have risen to the point at which most spring flowers start to appear. The actual onset of growth will vary from grower to grower depending on local spring temperatures. Growers need not worry if vines in Central California break before those in Montana: emergence varies with climate.

Planting begins with rhizomes (see photo, Figure 1). If your planting preparations are delayed, the rhizomes must be refrigerated in a plastic bag to prevent them from drying. Ideally, you should plant rhizomes in early spring, but no later than May; late planting limits the plant's growth potential. In colder climates, you can start rhizomes in pots and transplant them into the ground by June. When you are ready, plant the rhizomes vertically with the buds pointing upward or horizontally about 2 in. below the soil surface. Spacing between rhizomes varies. You can plant mixed varieties, but plant them at least 5 ft apart; identical varieties can be planted as close as 3 ft apart.

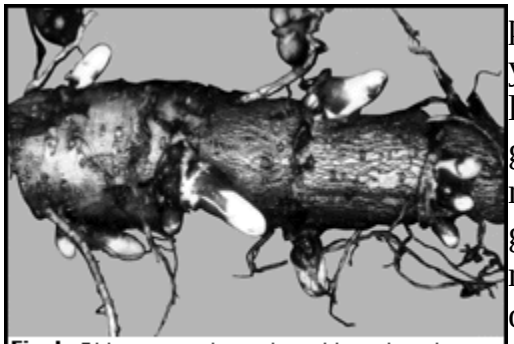


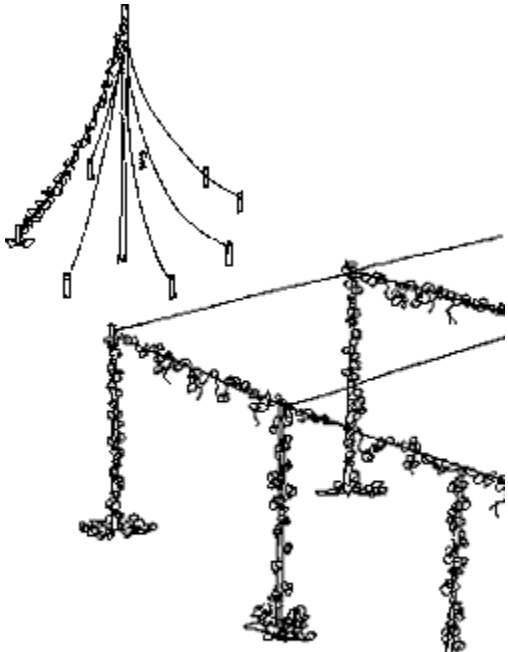
Fig. 1. Rhizomes are best planted in early spring, after the last frost and before the end of May.

Care and Feeding: Like any young plant, too much water may cause more harm than good. During their first year, young hops have a minimal root system and require frequent short waterings. Mulching the soil surface with organic matter is a great method for conserving moisture and helps control weeds. After the first season the plant is established, and less-frequent deep watering such as drip irrigation works well. Don't expect much growth or many flowers during the first year because the plant is establishing its root system. Instead, look forward to the second year when hops are full grown and produce healthy crops of fragrant flowers.

When the hop vines are about 1 ft long, select two or three strong vines and wrap them clockwise around a support system. The support system can be a trellis, tall pole, or strong twine. Hops mainly grow vertically, but lateral sidearms extend off the main vine. The main concern is to support the vines and prevent the sidearms from tangling. Tangled vines become an especially great concern when mixed varieties are planted in the same yard.

In newly planted hop yards, the growth that appears is a cause for celebration. Growers have a tendency of letting every shoot grow and climb. Although this is understandable, leave only selected shoots and trim the weaker ones at ground level. This may be painful for the first-time gardener, but it forces the strength of the root into the hardier shoots. The selected shoots will take care of themselves once they've been trained, or wrapped.

The early growth of a hop yard is amazing to watch; if you are not attentive, however, a jungle of vines is sure to develop. Severe trimming, like two to three shoots per vine, is an essential task that must be done every few weeks. Neglected trimming sessions can cause you to have a difficult harvest if you are struggling with tangled vines.



Although commercial growers train their hops on poles, home growers can use square trellises, which are more ornamental and more adaptable to backyard spaces.

DISEASES AND PESTS

Growing hops at home is a rewarding project; however, a few hazards merit concern. Hops have unseen enemies that can cause much frustration. With a close eye, however, you can spot these diseases and pests before your hop vines wither or become unmanageable.

Downy mildew (*Pseudoperonospora humuli*) is the main culprit of unhealthy hops. The mildew appears in the spring when the new shoots begin to grow. While some shoots are healthy, others will look brittle or spiky. Once the shoot develops into a spike, it will no longer grow. Other characteristics to look for are curled underleaves with a silvery upper surface and black underside. Infected leaves must be removed because they are a source of infection for the rest of the vine.

Downy mildew needs moisture to germinate, making sprinkle irrigation a bad idea when your vines show mildew infection. Drip irrigation is a better source of watering

because the foliage remains dry and the water goes right to the roots where it is needed. The chances of downy mildew infecting your plants will be less if you strip the bottom 3 ft of the vines; these bottom leaves produce no cones, so your harvest will be unaffected. Keeping the vines clear of weeds and leaves will prevent moisture from becoming trapped against the plants. Some hop varieties such as Willamette and Cascade are more susceptible to mildew than others; Nugget and Perle are quite hardy. Basically, mildew is sometimes an inevitable result of rainy weather - something only Mother Nature can control. Humans are not without resources, though. Downy mildew can be controlled by spraying a fungicide containing copper hydroxide. Systemic fungicides such as Ridomal (Geigy Corp., Ardsley, New York; metal axyl, active ingredient) and Aliette (Chem Service Inc., West Chester, Pennsylvania; aluminum tris, active ingredient) provide longer protection but may not be readily accessible to home growers.

Wilt (*Verticillum wilt*) is another disease that damages hops. Characteristics to watch for are leaves with a dull green tissue alternating with yellow bands. Again, you remove the infected leaves to prevent wilt from spreading. The fungicides used against downy mildew can also be used to fight wilt.

Various bugs and worms inhabit hop yards. Some are beneficial, others can cause great distress. The translucent pale-green bug known as the hop aphid (*Phorodon humuli*) is the most common and dangerous pest because it can destroy a whole hop yard. Fortunately, aphids are easily seen on leaves' undersides; they reproduce so quickly, they'd be hard to miss. They appear in cool weather and, once hatched, will spread to all parts of the vine. Although aphids are easy to kill, tall vines and abundant leaves are difficult to spray effectively.

Organic insecticides such as insecticidal soap work well against aphids. Also, commercial sprays like Diazinon and malathion are available. The use of Diazinon, however, carries a 14-day waiting period between spraying and harvest, a limitation that must be considered before using it.

An alternative to spraying is to invest in the aphids' natural predator - the ladybug. Although ladybugs are environmentally safe and an easy solution, they are no panacea. One concern is the availability of a large number of ladybugs; however, sufficient quantities can be obtained at many nurseries and gardening shops. Another challenge is keeping the orange flying bugs on the infected plant. Simple behavior modification provides an effective solution. If ladybugs are placed in a refrigerator, they will be forced to use their energy to keep warm. After a day, release the hungry ladybugs on the vine and they will happily cure any aphid problem.

Although hops love the sun, the warm weather can also bring spider mites (*Tetranychus urticae*). Spider mites are barely visible to the naked eye, but their arrival is easily detected. Fine white webs under leaves and small freckle-like spots on the upper leaf surface are sure signs of spider mites, as are defoliation and red, rust-colored cones. Because the mites like the sunlight, they tend to infect the top of a vine and work their way down. If you suspect mites to be the problem, inspect the parts of the vine closest to the sun. Many of the sprays used on aphids are effective against spider mites, too.

The western spotted cucumber beetle is another insect to look for. Although similar to ladybugs in size and shape, the beetles vary in color. Cucumber beetles are yellow-green with black dots, and they move much like aphids through hop vines. If the tips of hop vines and cones are damaged, the cucumber beetle is usually the culprit. Diazinon works well against this pest, too.

It is important to note that the diseases and pests with the Latin name of humuli are specific to hops and do not infect other plants. For further cures to these diseases and pests, consult someone knowledgeable in gardening or agriculture.

HARVEST

If nature has been kind, harvest time is a period of great satisfaction. All the patience and care comes in the form of fragrant green cones that are so essential to good beer. The harvest date varies with variety and location. In the Pacific Northwest, harvesting usually begins in the middle of August and continues until the middle of September. Hallertauer, Tettnanger, Fuggle, and Saaz varieties ripen faster than Cascade, Willamette, Nugget, Bullion, and Spalt. Cones at the tops of vines are likely to mature faster because they have been exposed to the sun longer. Because cones mature at different rates, expect to engage in several harvesting sessions.

But how do you know when it is time to pick your hops and reap the rewards? It is best to determine the readiness for picking by feel and smell. If the cone is too green, it feels slightly damp to the touch and has a softness to its scales. If you squeeze the cone, it will stay compressed in your hand. A ready cone will feel papery and light. It will feel drier than a green cone, and some varieties take a lighter tone as they mature. If your hands quickly take up the smell and are slightly sticky due to the yellow powdery lupulin, that cone is ready for harvest.

Once the cones have been harvested, your job is not over. The cones must be properly dried to optimize their qualities during storage. Although hops can be used fresh, the results will be unpredictable. Hops are 70% moisture when ripe, but only 10% when dried to the equivalent of commercial hops. Drying hops enables you to accurately

predict and control their use in recipe formulations. This can be done in a food dehydrator, homemade hop dryer, or well-vented oven.

If you choose to construct a dryer, good airflow is crucial, and the temperature must not exceed 140 °F. Drying hops in cooler temperatures takes longer, but a better quality hop is obtained. For drying the low-tech way, you can use a window screen. After cleaning the screen, spread the hops around evenly. It is best to place the screen off the ground and in an enclosed area to keep wind and bugs from creating problems. You need to fluff the cones daily to bring the inner cones to the outside of the pile. If cones are not properly dried, they become moldy, wilted, or even rancid and cannot be used for brewing. They are ready for storage when springy to the touch and the lupulin powder easily falls out. Another indicator is when the central stem breaks rather than bends. The stem takes much longer to dry than the petals, so you will know when the cones are ready for storage. This should take approximately three days.

Cones are best stored in a zipper-type plastic bag or other sealable plastic bag. It is important to make sure the cones are sufficiently dry because any moisture trapped inside the bag will cause the hops to spoil. Fill the bag until the cones are well compressed. Once the bags have been sealed and properly labeled, store them in a freezer. It is unwise to thaw and refreeze stored hops because their quality and freshness can be lost. (For further information on hop storage, refer to the January/February l994 issue of*BrewingTechniques*.)

HERE'S TO HOMEGROWN BREW

Growers should not let these potential hazards stop them anymore than the potential of brewing a bad batch of beer. With a little homebrew and plenty of vertical space and sun, growing your own hops is easy and fulfilling. Besides, it's rumored that a homegrown hop is the best variety because it is flavored full of self-satisfaction.