

HOW TO GROW, HARVEST & DRY HOPS

With the ongoing hops shortage and consequent price rises, home brewers are turning in record numbers to growing their own hops at home. Growing your own hops is an easy and fun way to expand your personal hop supply. Read below on how to grow and harvest hops in your own backyard

BASIC REQUIREMENTS FOR 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. Winds can be subdued with wind break cloth.

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 fertilizers 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-February when most hops are either in full bloom or past bloom, depending on the variety and location. Healthy vines can produce 500 - 1250 grams of dried flowers per plant.

The good news is that all of NZ is within the latitude for successful hop production.

PLANTING

Once the site has been established and the soil fertilized, planting can begin. Hops can be affected by freezing temperatures. To avoid loss of plants 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 as emergence varies with climate.

Planting begins with rhizomes or potted plants from a nursery. If your planting preparations are delayed, the rhizomes must be refrigerated in a plastic bag to prevent them from drying out. Ideally, you should plant rhizomes in early spring, but no later than November; late planting limits the plant's growth potential. In colder climates, you can start rhizomes in pots and transplant them into the ground by December. When you are ready, plant the rhizomes vertically with the buds pointing upward or horizontally about 2 in. below the soil surface. Plants can be placed in a hole with the top of the soil in the pot level with the top of the hole. Spacing between rhizomes varies. You can plant mixed varieties, but plant them at least 1,5 meters apart; identical varieties can be planted as close as 1 meter apart.

CARE & 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 30cm 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 (max 6 when established), is an essential task that must be done every week. Neglected trimming sessions can cause you to have a difficult harvest if you are struggling with tangled vines of different varieties.

DISEASES AND PESTS

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 Cascade are more susceptible to mildew than others. 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.

Wilt (*Verticillium* 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.

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.

Powdery mildew is one of the most widespread and easily identifiable plant fungal diseases. From vegetable gardens to rose gardens, ornamental trees and shrubs, almost no type of plant is immune.

If you find that some of your plants or trees have powdery mildew, don't worry. This fungus is host specific, meaning just because you find it on one plant species, does not make it a threat to other type plants in your landscape. Although there are many different species of powdery mildew, the symptoms all look about the same from one to another.

What to look for: You've likely seen it many times. White or gray powdery spots appear, often times covering most if not the entire leaf surface. It's also found on plant stems, flowers and even fruit. Fortunately, the symptoms of powdery mildew are usually worse than the actual damage. Rarely is it fatal to the plant.

Advanced stages can cause plant foliage to yellow, curl or turn brown and eventually cause the plant to defoliate prematurely. On flowering plants and trees, the fungus can lead to early bud drop or reduce the flower quality.

CONTROLLING AN EXISTING PROBLEM

Should you find the need to react to an existing condition of powdery mildew, early detection provides the best way to contain and potentially eliminate the problem. There are many commercial products that are effective at containing the spread. However, eliminating an existing problem is not a given.

Most conventional products are made for prevention and control, not elimination of an existing infection. That's why it's important to start a control program before powdery mildew occurs or at least at the earliest sign of detection.

There are many retail, off-the-shelf fungicide products that are effective at treating mildew. One of the most common active ingredients used for control is "chlorothalonil". Although effective, it coats the leaf surface with a white milky film that is quite noticeable.

Lesser know options include:

Baking Soda (sodium bicarbonate) -This is possibly the best known of the home-made, organic solutions for powdery mildew. Although studies indicate that baking soda alone is not all that effective, when combined with horticultural grade or dormant oil and liquid soap, efficacy is very good if applied in the early stages or before an outbreak occurs.

Use this recipe to make your own solution—mix one tablespoon of baking soda with a teaspoon of dormant oil and one teaspoon of insecticidal or liquid soap (not detergent) to a gallon of water. Spray on plants every one to two weeks.

Potassium bicarbonate— Similar to baking soda, this has the unique advantage of actually eliminating powdery mildew once it's there. Potassium bicarbonate is a contact fungicide which kills the powdery mildew spores quickly. In addition, it's approved for use in organic growing.

Mouthwash – If it can kill the germs in your mouth, certainly the fungal spores of powdery mildew are no match. And that’s the premise. Generic, ethanol based mouthwash can be very effective at control. Tests using one part mouthwash to three parts water worked for well for Jeff Gillman, Ph.D and Associate Professor at the University of Minnesota, Department of Horticulture. Just be careful when mixing and applying mouthwash as new foliage can be damaged.

Vinegar – Similar to mouthwash, the acetic acid of vinegar can control powdery mildew. A mixture of 2-3 tablespoons of common apple cider vinegar, containing 5% acetic acid mixed with a gallon of water does job. However, too much vinegar can burn plants but at the same time, higher concentrations (above 5%) are more effective.

Sulfur and Lime/Sulfur – Direct contact by sulfur prevents disease spores from developing. When mixed with hydrated lime, the solution will penetrate leaves for even greater effectiveness. A widely available version of this combination includes copper sulphate and hydrated lime, known as Bordeaux mix. However, all of these solutions can burn plant tissue and is damaging to microorganisms in the soil and harmful to beneficial insects. It is also considered moderately toxic to mammals and humans. Use sparingly and with caution if at all.

Milk – The latest player in the fight against powdery mildew is milk. It’s not clear yet why it works so well, but it is believed that naturally occurring compounds in the milk are at work to combat the disease while also boosting the plant’s immune system. One experiment showed good results by applying a weekly dose of one part milk to two parts water.

Water – Ironically, dry conditions and high humidity are the most favorable conditions for powdery mildew to form. But straight water is its enemy because it washes off the spores before they have time to embed. However, water isn’t something that I promote for control because wet foliage is friend to many other plant diseases. If you’re going to try this option, do so early in the day so foliage has time to dry out quickly.

Neem oil – This is a readily available organic option to disease and pest control. Neem oil is extracted from the neem tree, native to India. This is an effective disease control and a broad spectrum, natural insecticide that is kinder to beneficial insects and mammals. As for controlling powdery mildew, results vary but it is not the best option. Results are usually moderate at best.

HARVEST, DRYING & STORAGE

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, weather and location. In NZ the harvest usually starts in March but can sometimes be as early as mid February and continues through to early April. 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. I sometimes use a wire gauze window screen frame (normally used for keeping flies and moths out) raised on 2 bricks for air circulation, placed in a warm room but avoiding direct sunlight and a friend uses a hanging cotton clothes organiser unit with a fan heater below it.

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 fly 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 Sistema® KLIP IT™ rectangular 5 or 7 L with 4 clip seals. 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 container 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.

MORE ON STORAGE

Hops have three main enemies: heat, light and oxygen. Heat accelerates the chemical breakdown of hops including both aromatic oils and the precious alpha acids that provide most of the bitterness in beer. The relationship between temperature and hop bitterness is exponential – it is cut in half for every 15 degrees C (27 F) of lowered temperature. Hops stored at 75F will degrade almost 4 times as fast as hops stored in a freezer. To slow the aging of your hops, always store them in the freezer at a temperature between 30F and -5F (-1 to -21 degrees C).

Light is also a natural enemy of hops. Hop cones are susceptible to breakdown from sunlight from the first minute they are picked, so hop growers go to great lengths to make sure that hops are not exposed to sunlight after picking. Hop cones exposed to light will break down rapidly, leaving off flavors in your beer. When possible, store your hops in a dark place and avoid exposure to sunlight.

Oxygen is also an enemy of hops because hop oils and alpha acids will oxidize. Oxidized alpha acids lose their bitterness, and old hops will take on a “cheesy” aroma. A plastic/poly bag is the worst storage vessel for your hops because plastic bags are still permeable to air. You can smell the hops right through a typical plastic bag, which is an indicator that it is not much of an oxygen barrier.

An oxygen barrier bag or an airtight jar make a much better container, though these still typically contain some air. The best container is a vacuum sealed oxygen barrier such as a vacuum packed foil pouch, typically made from a layer of food grade plastic and layer of mylar.

Note that whole hops degrade faster because of the larger surface area exposed to air. Most hop processors will at some point pelletize their aging hops because the highly compressed pellets age more slowly than whole hops. Pellets also take less space and are easier to vacuum pack, which is why they are often used in homebrewing and microbrewing.

SOME PHOTO IDEAS FOR GROWING HOPS AT HOME

GO TO: <http://wildabout hops.nz/growing.html>

TO BUY HOP PLANTS

GO TO: <http://wildabout hops.nz/index.html>