

Brew the best of
YOUR OWN®

HOP GROWING



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GROW YOUR OWN HOPS AT HOME

BY JOE & DENNIS FISHER

Nothing says “a homebrewer lives here” like a glorious tangle of hop vines growing up the side of your house. Hop plants are easy to grow, hard to kill, come back year after year, and with little care produce bountiful harvests of that most important of all flowers, the hop. Hops are also easy to propagate, meaning you can share them with your homebrewer friends, trade varieties and start new hopyards. Truly a large-scale plant, they produce big roots, big vines, big leaves and big bags full of spicy cones for your homebrewing pleasure.

Hops have been used as medicinal and flavoring herbs for thousands of years, and cultivated for at least a thousand. They grow worldwide, and will flourish just about anywhere in the United States, though today most are grown in the vast commercial hopyards of the Pacific Northwest. If you have a little space and the desire to do it, you can grow, pick, dry and store all the hops you need to brew beer. Why grow your own? Well, it’s fun. And using homegrown hops will improve the quality of your homebrew by giving you access to the freshest, best hops available.

You’ll save money by using your own hops instead of buying them. The plants are vigorous, beautiful and can be trained to provide privacy, shade or to cover fences or outbuildings. Even if you don’t brew with them, a trellis full of aromatic hops will impress your guests with your enthusiasm for and knowledge of beer.

FIRST, A BIT OF BIOLOGY

The hop plant (*Humulus lupulus*) is a vining perennial that arises from a fleshy underground rootstock or “rhizome.” The bine (not a vine — the bine is the botanical term for a spiny tendril) grows rapidly, and during the height of the season can grow up to a foot per day, topping out at a height of 30 or 40 feet. The hop cones are borne on lateral shoots that arise from the same nodes as the plants’ leaves. Hop



plants can tolerate dry, sandy soil or even clay, but will not produce well under such conditions. Hops prefer a rich, moist soil in full sun.

Hop plants are either male or female. Only the female vines produce the familiar hop cones (or strobiles) that are used in brewing. Males are easily identified when they blossom, because their blooms are small, five-petaled flowers. Any males that appear in your hop yard should be uprooted and returned to the supplier (male plants also pollinate the cone and lead to seeded hops, which are

unwanted by most brewers for a variety of reasons).

SELECTING HOP VARIETIES

Ideally, the hop varieties that you plant should be well adapted to your climate and soil, so they will grow vigorously and produce abundantly. One way to find out which varieties will work for you is to talk with other growers or inquire at your local homebrew store. Your cooperative extension, university, or local seed company may also be able to help. If you have a variety that you like to

brew with and just want to plant it, go right ahead! You'll know in a season or so if it's right for your region.

One thing to keep in mind when growing hops is that alpha-acid content depends on growing conditions such as soil chemistry, moisture, sunlight and latitude. Also, home-grown hops tend to be more bitter and aromatic than those bought in a homebrew store, simply because they are that much fresher.

You can order rhizomes through your local brewstore or directly from a supplier. Start with just a few varieties; for instance, you could pick an all-purpose workhorse like Cascade and an early German type like Perle. Both of these are hardy cultivars that will do well just about anywhere and will give you some interesting options for brewing. With Chinook and Willamette you would have four varieties

offering a good cross-section of bittering and aromatic types.

Some cultivars are more challenging. Our friend Brad Hunter, who grows a lot of hops at his farm in Apleton, Maine, has this to say about these "advanced" types: "I would steer clear of the 'noble' types and all the Hallertau 'sisters,' like Crystal and Mount Hood, until you have established your hardy all-purpose yard and have the freedom to experiment."

Joel Balano-Stott, at the Purple Foot in Waldoboro, Maine, says that he usually gets his hops in March or April, and he only orders varieties that have been popular in the past, such as Cascade, Goldings and Fuggles. If you want a particular variety it's best to order ahead. Early March is a good time to put in your order. "Hop suppliers have a short window

of harvest," says Joel. "They need to get the rhizomes out of the ground before they start to grow, and with hops, once the frost is off, the shoots start growing." His rhizomes usually cost between \$2.50 and \$4.50 each, and that's about average. Joel grows his own Cascade rhizomes for sale.

When your rhizomes arrive, take a good look at them. They should be in good condition, firm, with no signs of disease. If they appear dry, flabby, shriveled or otherwise unhealthy, send them back. You can store your hops in the fridge until ready to plant.

PLANNING THE HOPYARD

The hop garden, or hopyard, should be situated in a place with good air circulation, rich, well-drained soil, and as much direct sunlight as possible. While hops don't seem to mind poor ground, they will establish more quickly and produce more bountifully in good loam. If your only available soil is less than choice, you can always build it up with lots of compost and manure. Acidic soils will need lime, since hops like a pH of around 6 to 6.5. A soil test will tell you exactly what your pH is and what amendments you may need to add. Kits are unreliable, but will probably tell you something useful about your pH. Professional soil tests from universities, cooperative extensions or private labs are much better.

The sunlight factor is more critical. Hops will thrive in partial shade, but like sun for fast growth and good flower production. In the summer our hopyards get direct sun from about eight in the morning until five in the afternoon. Try for at least six hours of direct sunlight a day, and more than that if possible.

When siting the hopyard, think about vertical space. Hops are big, space-hungry plants that like to climb. You can restrict their growth by pruning if you need to, but they won't produce as well.

Our favorite place to site a hopyard is against the south-facing wall of a two- or three-story house. This provides a protective wall to the north, with plenty of sun and space to grow. With adequate moisture and food, this situation is ideal for fast hop growth.

You can also grow hops over fence-



es, up pillars or flagpoles, over stones walls or arbors, and up trees. They won't be as easy to manage or pick, but they will grow and produce, if not as abundantly as on a trellis. If you are looking for a fast-growing ornamental bine, hops are a good choice.

PLANTING YOUR RHIZOMES

Once the site is chosen, it's time to prepare the soil. If you can start a season in advance, that's great; if not, don't worry. Hops are essentially big weeds. They will probably thrive where you put them. Ideally, you can rototill or dig a bed about 4 feet wide by 3 feet for each hop hill. If you do this the year before, you can plant a cover crop like buckwheat, clover or rye grass to smother weeds and improve the soil. Perennial weeds will be your worst enemy in the hop bed, and if you can suppress them before you plant your hops you will be ahead of the game. Till again in late summer and plant winter rye. If you till this under in the spring just before planting, you will have a beautiful hop bed.

We realize you'll probably wait until just before planting to till or dig. No problem. Just use plenty of mulch to keep the weeds down, and let the hops do the rest. Straw mulch is best, but hay works well, too. You'll get grass weeds but they will be easy to pull from the loose, protected soil under the mulch.

We like to plant hops as early as the soil can be worked, which is usually May or June around here (we live in Maine). Hops can actually be planted just about anytime, but an early planting is necessary if you want a crop the first year.

Dig a generous hole for each hop hill, and space the hills three feet apart. You can put some gravel in the bottom in wet soils to improve drainage (hops love gravel). Pour a couple of gallons of water in the hole. Refill the hole with a mixture of compost and topsoil. We like to add about a handful each of azomite, rock phosphate, greensand and bloodmeal to each hill as soil amendments. We bury a tomato cage in each hole to tie trellis strings to. The hops will grow around the cage and hold it tightly. It doesn't matter how much of the cage is above the ground, as long as you

have something to tie to. But at least a foot should be buried to provide a strong anchor. (An average tomato cage is 2.5 feet high, so leave 8 inches above ground. The cages can also be cut down if they are too big.) A stake will also work, or a big earth staple made of heavy wire bent in a U shape.

Now take out your rhizomes. Notice that there probably are some green bumps or sprouts along one side — this is the top of the rhizome and should face up. The bottom side will probably have some rootlets attached. Most growers recommend planting two rhizomes of the same variety per hill. Place the rhizomes in the hole and heap an inch or two of soil over it, allowing the sprouts, if any, to show. Water the hill and stand back. If you've already pre-soaked the hole, you won't need much at this point — just enough to firm the soil and eliminate airholes. Later on, when the plant starts to grow, you will need more, especially in a dry season and if the soil is at all sandy.

We mark each hill with an oak stake with the variety name painted on it. It's easy to lose track of your varieties, and once lost it's almost impossible to tell them apart. Make a map of your hopyard and put a copy in your computer, just in case.

GROW HOPS IN SMALL SPACES

You may have seen hops growing in barrels in front of a microbrewery or homebrew store. It's easy to grow hops this way, and yields will be good if you remember a few rules.

The most important rule is that the plants still need plenty of sunlight. Also, both overwatering and underwatering should be avoided. Hops need to be fed well to grow well — especially in a pot, where they are entirely dependent on you for nutrients.

The used half-whiskey barrels that you can find in garden centers are ideal for hop growing. Drill a dozen or so half-inch holes in the bottom. Put two inches of crushed rock in the barrel for drainage. Then fill the barrel with a good quality potting soil mixed with compost and soil amendments (see the section on planting). Plant your hop rhizomes just as if you were

putting them in the ground. You can trellis your hops many different ways — for instance, if you are growing on a covered porch, you can train it up the posts and along the eaves. If you live in an area with hard freezes in wintertime, move the pot to a sheltered area or indoors after the bines die back in the fall.

TRELLISING THE BINES

The typical "straight pole" hop trellis was designed for commercial harvesting. We don't really like these for the home hopyard, since they tend to be enormous and awkward, and unless they are really well-supported it's unsafe to put a ladder against them. We have one that's 12 feet (3.7 m) high and 70 feet (21.5 m) long, not exactly a size suitable to the backyard. We made ours just strong enough to hold the hop bines and pick from a three-legged apple ladder. A better choice might be the old fashioned "tent pole." This is just a wooden pole (for instance a beech, spruce or cedar sapling) about 2 to 3 inches (5 to 8 cm) wide at the butt and 10 to 15 feet (3 to 4.5 m) long. Stick them in the ground upright, one or two per hill, and let the hops climb. At harvest time just cut the bines, uproot the pole, and lay it on the ground for picking. People have been growing hops this way for hundreds of years, and it works well. Commercial hopyards all used poles before the industry was mechanized.

You can also string a trellis wire between trees or buildings. Make sure the connections are strong because the wire will have to hold a lot of weight and stand up to the wind. Use turnbuckles to tighten the wire. The trellis strings can be looped over the wire. The wire should be at least 10 feet tall (higher is better), but the higher you go, the more trouble you may have getting the bines down at harvest time.

If you decide to grow hops against your house or other building, trellising is a snap. This is really the best option for the home hopyard, and the masses of foliage growing vertically up your house will amaze your neighbors and impress your friends. Just hammer a big staple in the overhang of your roof, above each hill. A trellis string is tied to one side of the tomato

cage, looped through the staple and then tied to the opposite side of the cage, forming an inverted V. The hop bines will grow up each side of the V and meet at the roofline.

We use untreated jute twine, as heavy as we can get. If it is untreated and too light it will degrade and break. Treated twine will last all season, but we don't use it. Cotton string, lightweight nylon or other synthetic line will also work. Trellis wire, the same kind grapes are grown on, is great but it's an expensive alternative.

TRAINING THE BINES

The hop shoots will emerge a few weeks after planting and will start hunting around for something to climb. If your trellis strings or hop poles are already in place, the shoots will often find them by themselves. If not, you can help them by gently twisting the bines around the support. Hops grow clockwise, so train them in that direction and the small spines on the shoots will help them grab and hold. We like to train three vigorous shoots per string or pole and cut the rest back.

We usually mulch our hops to control weeds and to keep the soil from drying out. Once the shoots have appeared, you can heap mulch over the whole bed. As this breaks down it will feed the soil and you can keep adding more. A good weed-controlling combination is a couple inches of dry leaves covered by six inches of straw or hay.

Through early summer, hop growth accelerates. The plants will usually overtop their supports in a few weeks (unless they are very tall) and start to fan out at the top, looking for something else to climb. They may double back or grow out into another bine or try to climb your roof. At the same time the side shoots will be developing along the length of the bines, where the flower will soon appear.

TENDING YOUR HOPS

Hops don't require much care. You should keep an eye on the side shoots to make sure they don't attack a neighboring bine. If the bines become intertwined it makes picking more difficult and it's hard to tell the vari-

eties apart. We rarely prune our bines, except to discourage too many shoots or to remove diseased foliage. When pruning, use a sharp knife and make a clean cut.

Watering in the morning is good practice; when you do this, avoid splashing soil on your bottom leaves. You can prune the first three feet of leaves, especially if these have already turned yellow.

Homegrown hops aren't bothered much by disease. Still, it's smart to know what symptoms to look for. Downy mildew is the most notable hops disease in the United States. It only effects hop plants, and may not be found in all areas. It appears first in early spring, when the shoots emerge. Affected shoots will appear silvery-black and stunted. Remove and burn any affected plants. Downy mildew also can be controlled with a copperbased fungicide such as Kocide 2000. Since the mildew spores need water to germinate, it's a good idea to avoid wetting the foliage when watering. Removing the leaves along the first few feet of bine can also prevent infection.

Powdery mildew wiped out the hop industry in the eastern United States in the early 19th century. It appears as white, furry spots on either side of the leaves which soon spread to cover the entire leaf. Remove and burn any affected leaves. Powdery mildew can be controlled with a sulfur-based fungicide. Both of these diseases tend to be worse during rainy summers.

Although homegrown hops are generally vigorous and can tolerate certain amount of insect damage, insect pests can be a problem. Japanese beetles are especially voracious and difficult to control. A labor-intensive but effective control for these bugs is hand-picking in the early morning. Beneficial nematodes watered into the soil can control this beetle's larvae and keep their numbers low. Another problem pest is a specialized caterpillar called the hop merchant, larvae of the Question Mark butterfly. One or two sprayings a year with Bt will completely control this pest.

Hops also can be plagued by aphids and spider mites. Joel at the Purple Foot suggests cutting off the lower

three feet of leaves to discourage aphids. Unfortunately, they are hard to get rid of once you've got them. Aphids tend to attack water-stressed and otherwise weak plants. Keeping plants well-watered will help. It's also not a complete disaster if you get a few aphids on your hops. You can winnow them off the cones pretty easily.

We've never had much trouble with spider mites — they are usually more of a problem with indoor plants, greenhouses and commercial hopyards. Cuke beetles are only a problem west of the Rockies; covering the young shoots with spun-bonded row cover should keep them off until the bines are big enough to fend for themselves.

In the first year especially, hops need plenty of water. Try not to splash soil up onto the leaves, since this encourages disease. One or two deep waterings per week is better than several shallow waterings. At mid-season (around July in the Northeast) you will start to notice yellow leaves at the base of the plants. This is a common condition that can be helped by feeding and spraying the lower leaves with compost tea. Some growers advocate pruning off the bines' lower leaves for the first two feet or so.

To make compost tea for disease control, you need a well-aerated mixture with not too many nutrients in it. Put some compost in an old sock (for instance) and dangle it in a five-gallon bucket of water. Slosh it around a couple times a day to get some air into it, and after a week you can apply it. Dilute by 1/2 with water and apply with a hand sprayer or backpack sprayer. The disease-fighting agents are the microbes growing in the solution. Don't get the spray on any cones.

Hops really appreciate additional feeding at blossoming time. At about midseason, tiny burrs will begin to form on the side shoots. These are potential hop cones. When they form, feed each hop hill a few shovelful of compost or rotted manure.

PICKING YOUR HOPS

Ready-to-pick hops are aromatic and feel slightly dry and springy to the

touch. They will be full of yellow lupulin powder, which you can see by pulling a flower open. Most flowers of a given variety will mature around the same time, so you can pick them all at once. Don't let them go too long after maturity, because they will start to turn brown and lose quality.

The best way to pick hops is on the ground. Cut the string or pull the pole and lower carefully. The hop bines will be heavy, so you may want to use a line and a pulley to bring them down.

Picking is a two-handed job. Hold the cluster with one hand, and strip off the flowers with the other. We usually pick into paper bags, labeled to keep varieties separate.

POST-HARVEST MAINTENANCE

Once the hop cones have been picked, the bines should be cut off about three feet from the ground. Then allow the bines to die back. You need to do this to avoid shocking the plants too much and weakening them as they go into winter.

After the first hard frosts in autumn, cut the hop bines a few inches from the crown. Feed the hop hills generously with compost or well-rotted manure, and renew their mulch.

Spring care of mature hills just involves "root pruning" to control plant sprawl. Pull back the mulch and cut around the hills with a spade or garden knife about two feet out from the crown. Pull up any rhizomes you cut off. This will contain the plant in the bed and keep it from taking over your garden or lawn. The cut-off rhizomes can be potted and given to friends or transplanted to start new hopyards. Remember to label them! Root pruning is done once a year, in early spring, before the plants really start growing.

DRYING YOUR HOPS

If you have a hot, dry, dark attic or other space with good airflow, then you can dry your hops on window screens or even in paper bags. We've done this successfully many times, but not everyone has access to a good drying room. The next best choice for small amounts of hops is a food dryer set to low. If you expect a large har-



vest, think about building an oast, or hop dryer. This can be a large box with sliding screens or drawers with a hair dryer for forced hot air. Plans for a hop oast are provided, beginning on page 22, of this digital download.

However you dry your hops, they need to dry quickly to avoid molding or browning. Don't pile them too high — a few inches at most. Hops are dry when they feel light and crinkly without any detectable moisture content. After drying, a first-year hop harvest should yield a few ounces per hill.

STORING YOUR HOPS

Dry hops can be stored in 1-gallon (4-L) size freezer bags in a freezer, where they will keep well for a year or more. A bag will hold about an ounce (28 g) of loose hops. Place the hops in the bag, press lightly to expel as much air as possible, and seal. Make sure to label different varieties and date each bag. If you have a vacuum sealer, then you can suck the air out of the bag and pack much more hops into the bags.

USING YOUR HOPS

Most people who grow their own hops prefer to use them only for aromatics, dry hopping, or flavoring, since their delicate aromas are destroyed by a full boil. This is an option if you don't have a big harvest and want to find the highest and best use for it. But if your harvest is large and you're growing high alpha acid varieties, you'll want to know how to bitter with them.

Aoma hops can be used 1-1 in recipes, but bittering hops should be used with a little more caution — maybe cut down the amount a little. You can't really know how strong your hops are until you try them. It may require some experimentation to find exactly the right proportions, but starting with a small amount will guarantee that you never overhop a batch. Brewing with undried hops can contribute a grassy flavor and very little bitterness or aroma. We don't suggest it, however you'll see "wet hop" beers released each fall shortly after harvest so some people do like the flavor/aroma of these undried hops. 

GROWING HOPS IN CONTAINERS

BY CHRIS COLBY

Many homebrewers may be interested in growing the hop plant (*Humulus lupulus*), but lack a suitable in-ground space to do so. This leaves the option of growing hops in a container. Growing hops in containers can be a challenge, but — if you understand a few key elements of container gardening — you can grow healthy plants that will yield a bountiful harvest of cones. I've grown hops in containers for four years now and have figured out what it takes. Some folks will say that growing hops in containers can't be done. Then again, the same kind of person will say that about tomatoes, too, and I've grown them successfully in containers for 10 years.

There are advantages and disadvantages to growing hops in containers. The main advantage, of course, is being able to grow hops where you normally wouldn't. And, if you use an adjustable trellis, harvesting the cones is also much easier compared to with a regular trellis. It is also a great way to propagate rhizomes, as first year rhizome growth often exceeds that of in-ground hops.

The primary disadvantage of growing hops in a container is that it takes a bit of work. Likewise, overall growth and crop yield is less than with in-ground hops.

LOCATION

The first thing you need is to scout a suitable location. This can be a porch, patio, deck, driveway, yard or anywhere that gets the right amount of light. To determine this, look around your prospective growing area every hour for an entire day. The pattern of light and shade will change as the sun arcs across the sky. If you live in a prime hop growing latitude, look for a location that gets sun all day long. If this isn't available, find an area that gets as much sun as possible from the late morning to afternoon.

If you live in the South, hot summer weather can make it harder to grow hops. In the hottest parts of the



Photos by Chris Colby

US, hops will die in the summer heat, even if watered adequately. However, if Southern hop growers locate their plants so that they get morning sun, but are shaded in the hottest part of the day, you grow them successfully.

The pattern of sun and shade will also migrate as the growing season progresses and the sun climbs progressively higher in the sky. A nice benefit of growing hops in containers is that you can move them to take advantage of this, if needed.

REQUIRED MATERIALS

Once you've selected a spot, you'll only need a few items that can be found at almost any nursery or home and garden center. For starters, you'll need a container. In order to give the roots enough room to spread, you'll

need a pot or planter with a minimum 20-inch (51-cm) diameter. When growing hops in a container, the biggest shortfall you will need to overcome is the fact that you are cramping the plant's roots. Everything you do when planting and tending the plant during the growing season will be aimed at mitigating this deficiency.

A simple adjustable trellis can be made from a 1" x 2" X 8' or similarly sized stake, a #6 (or similar) hook and eye and some hop twine. You will also need some regular twine (jute or sisal or whatever works for you). You can also employ any trellis system that works with in-ground hops, for example, stringing hop twine down from the edge of your roof.

Also, you need a medium to grow the hops in. Even with a large planter,



You will need about 2 cu. ft. (0.06 m³) of potting soil for each 20" planter.

you will be cramping the roots of the hop plant and therefore you need your growing medium to fit this application as best as possible. Specifically, you need a medium with excellent drainage. Ordinary mineral soil — i.e. the “dirt” in your backyard — is a poor choice for this. Instead, use potting mix. This medium, sold at all nurseries and garden centers, provides excellent drainage and is very lightweight when dry. For each 20" planter, you will need a little over 2.0 cu. ft. (0.06 m³) of potting mix.

Finally, you will need hop rhizomes and some liquid fertilizer. Each planter will hold one rhizome and require up to 2 cups of a balanced all-purpose liquid fertilizer over the growing season.

PREPARATION

Planting the rhizomes is easy. Begin by filling the planter with potting mix. Add the mix all the way to the top (or even until there is a slight hill). Shake the pot to settle the mix, but do not compact it with your hands. Over the growing season, the “soil” will compact a little every time you water it. You’ll notice this most the first time you water the plant.

Do not put gravel or mineral soil in the bottom of the pot and top up with potting mix — you need the entire container filled with potting mix. (Also, contrary to nearly universal belief, gravel in the bottom of a pot actually hampers drainage.) With a

container full of potting mix, you will have a medium that will hold the right amount of water for the plant, but let the rest flow out of the container.

If you choose to use the adjustable trellis I describe, set it up when you plant the rhizome. Adding it later can cause damage to the plant’s growing roots. To install the trellis, just screw a hook and eye into the end of a stake and insert this into the pot. Wiggle the stake front to back and side to side, which will create a little space around the wood. Tamp more potting mix into this space to give the stake added support.

Finally, plant the rhizome. To do this, just dig a little trench or hole and plant the rhizome 2 or 3 inches (5.1–7.6 cm) below the “soil.” I have planted rhizomes horizontally and vertically and both methods work fine. Replace the potting mix above the rhizome and keep it moist until the first sprouts appear.

GROWTH AND CARE

Once your hops have been planted, you will need to tend them over the growing season. Even though your planters may look large, the volume that a hop’s root system would normally occupy is much larger. As such, your primary goal in caring for your hops is to compensate for this.

First off, however, you’ll need to train the growing shoots to a trellis. Commercial growers train 4 to 6 shoots per rhizome to their trellis

wires. To partially compensate for the constriction on root volume, I initially train only two shoots to my trellis wire. I feel it’s better to grow two to three healthy, productive vines than more that grow slowly and yield only small cones.

If you use my adjustable trellis idea, just thread the hop twine through the hook and eye and train the shoots to one end. Loosely tie off the other end to the base of the stake. (I’ll explain how to adjust this later.)

WATERING

When watering your hop plant, you should think about its root system. You planted a rhizome, a woody, below-ground structure that sends out both shoots — which grow into the above-ground bines — and little white, fibrous roots. By fairly early in your first growing season, these roots will completely fill the container. By late in this growing season, the space the roots occupy will be much less than it would be for an in-ground plant. So, the way you water the plant needs to take this into account.

When I water my hops plants, I make sure to soak their entire growing matrix. I add water until I see it draining from the bottom of the pot. This ensures that every bit of root surface area has access to water. I then wait for the potting mix to almost dry out and repeat. (In the hottest stretches of my summer, when the high temperatures get above 100 °F (38 °C) every day, I need to soak the plants every day.)

Keep in mind that you need to water your hop plants according to their needs, not according to a calendar. Every time you water, you should seek to add it just before the plants really need it. Don’t wait until the leaves start wilting to water; instead monitor the top layer of potting mix. When wet, potting mix looks black, but it becomes progressively more grey as it dries. Learn to spot when the planter is running low on water and add water before the lack of it begins to stress the plant. Remember that potting mix has great drainage properties, so you really can’t overwater unintentionally. As such, I tend to err on the side of watering too often.

This “drench and dry” approach to



The roots will not have as much space to expand in a pot, however with proper nutrients and watering they should still grow well and provide a sufficient crop each year.

water is far superior to adding smaller amounts of water on a more regular basis. If you do this, all you're doing is keeping the roots in the top layers of the potting mix wet. The bottom of the planter will dry out and its roots will die back, leaving a reduced amount of root volume to support the above-ground growth.

NUTRIENTS

Plants need adequate sunlight and water to survive, and they also require a small amount of nutrients. When "feeding" a plant, it pays to think again about the plant's roots. In a container-grown plant, you need to supply all the necessary nutrients through a reduced root system. However, adding too much fertilizer can "burn" the plant and actually cause the roots to die back. The solution is to add a slow, steady stream of nutrients to the plant and disperse these nutrients, as best as possible, throughout the container. The obvious solution here is a liquid fertilizer. Liquid fertilizers are available almost everywhere garden supplies are sold and these are great for all container-grown plants. Some are sold as liquids, others as powders that are dissolved in water, then applied to the plants. Compost

and manure, while providing excellent nutrition for plants, have poor drainage properties and don't work well when growing hops in containers. Time-release granular fertilizers will also work.

My approach to adding fertilizer is to dilute some liquid fertilizer to one-quarter the recommended strength and soak the planter with this solution. I then strive to add the next feeding right before the plant needs it. Healthy hop leaves look dark green and healthy hop vines will grow steadily throughout the growing season. If your leaves turn yellow or purple or growth slows to a crawl, this is likely a sign that you need to apply some fertilizer. Over the course of a growing season, a typical container-grown hop plant will use somewhere between $\frac{1}{2}$ and 2 cups of powdered fertilizer mix.

A short spell of nutrient deficiency can be corrected quickly by adding fertilizer, whereas over-fertilization can take longer to correct. As such, I try to add just enough nutrients to keep the plants vigorous and healthy and not overdo it. Adding too much fertilizer will simply spur excessive growth, which the plant's root system will then struggle to support.

A balanced fertilizer is your best bet throughout the growing season. Once the plants flower, you may want to consider a one-time addition of a phosphorous-rich fertilizer. (Phosphorus is the "P" in the NPK rating found on fertilizers.) Last year, I added about $\frac{1}{4}$ cup of bone meal to each plant upon flowering.

ADJUSTABLE TRELLIS

If you set up the adjustable trellis as described earlier, the hop vines will soon grow towards the top of the stake. When they are a few inches below the eye, untie the twine from the base of the stake and feed out a few feet of twine, letting the vine droop a bit. You may need to pull the vine gently downward to get the twine to slide through the hook and eye. Then, loosely tie the twine to the stake again.

As the vine grows, you'll need to feed out more twine every time it approaches the top of the stake. In the part of the season when the vines grow the fastest, you may need to adjust it every week. If you keep making this adjustment, the tips of the vines will always be growing upwards, approaching the top of the stake. The bulk of the vine will eventually be coiled on the ground next to the planter. This doesn't seem to bother the plant, but make sure the leaves don't stay wet or get infested with insects. Once the vine touches the ground, I like to tie a loop of regular twine around the vine and the stake. This keeps the vines from getting whipped around too much when it is windy. A nice benefit of the adjustable trellis is that you can harvest the cones progressively, and they'll all be at an easily reachable height. And if they aren't, just adjust the trellis. Containers eliminate many worries about space.

Growing hops is a very rewarding activity, and you don't need to have a green thumb to do it. If you merely keep your container hops adequately watered, they will grow. If you follow the rest of the advice in this article about pruning and nutrient additions, you can grow healthy, productive vines that yield plentiful hop cones for your brewing. So go grow some hops. 

PRO TIPS FOR HOP GROWING

BY BETSY PARKS

Dave Wills, Freshops in Philomath, OR

Hops grow pretty well across most of the United States, but not so well in the south. They prefer to grow above the 35° latitude, and really prefer 45°. That's not to say that they won't grow in other parts of the country and the world, but that's where they're more native. Historically hops were first cultivated in Western European countries like Germany, and those latitudes are where they tend to do really well.

Will hops grow otherwise? Yes and no. I get calls from people in places like southern Florida and where it doesn't freeze in the winter, and the fact is they're probably not going to do well. Hops like to get frozen in the winter. They are also photoperiodic, which means that they need longer days during the growing season in order to flower. In southern locales, closer to the equator, where the days and nights are more equal, the hops won't get enough light long enough to encourage them to flower. You can overcome this by supplementing light with a floodlight to try and match the days in a 45°-like latitude (like ours in Corvallis, Oregon).

If you are planting hops in the right zone and wanted to plant a few rhizomes, I'd say try planting an aroma and a higher alpha hop and see how it goes. For example, an aroma hop like Cascade and a Nugget or Galena for higher alphas. Both of those varieties are fairly vigorous and disease resistant and if you did well you could probably get perhaps a pound or up to two pounds of hops from one plant.

You don't need much land to grow hops — a two-foot by two-foot (0.6-m by 0.6-m) plot will do. The plants grow vertically, so if you have a nice southern location on your house and some support (like a pole or a string) hops should grow fine. I would not recommend using pots, however. These plants grow 18 feet (5.4 m)

vertically in three months so they need more root support than pots provide.

A strong support system is needed for the plant to climb. Look for space along fences, garage or property lines. Plant in early spring once the threat of frost is gone but no later than May. The soil where you plant the hops should be tilled to create a weed free area and be worked into a friable condition. In cold climates you can plant rhizomes in pots and transplant them in June. Hops prefer full sun and rich soil, preferably light textured and well-drained with a pH of 6.5–8.0.

If drainage is a problem, small mounds can be built using surrounding topsoil mixed with organic matter. Plant one rhizome per hill with the buds pointed up and cover with one inch of loose soil. Hills should be spaced at least three feet (0.9 m) apart if the hops are of the same variety and five feet (1.5 m) apart if they are not.

The first year the hop plant has a minimal root system and requires frequent, but light watering — be careful not to drown it with too much water. Mulching the soil surface with some organic matter helps conserve moisture and control weeds.

Each spring apply a hearty dose of manure as a top dressing or fertilize with a balanced chemical fertilizer that is recommended for garden vegetables. Don't expect very much in growth of flowers the first year because the hop is basically establishing its root system. Full growth and a maximum crop of flowers will be achieved during the second year.

When the young vines are about one foot (0.3 m) long, two to six vigorous vines are selected for each hill and the rest removed. One to three vines can be trained clockwise on a string that has been staked to the hill. Hops mainly grow vertically,

but lateral sidearms extend from the main vine and produce flowers. The main concern is to support the vines and prevent sidearms from tangling. Most cones are produced on the upper part of the plant.

In July, the lowest four feet (1.2 m) of foliage and lateral branches can be removed to aid in air circulation and reduce disease development. The removal of lower leaves (stripping) must be done carefully to avoid breaking or kinking the main stem. In August, allow additional bottom growth to remain in order to promote hardiness of the crown and plant vigor for next year.

The problems that come up for home hop growers stem from the thinking that they don't think they need to pay attention to the bines. People think you can plant these things and let them go. They won't water them, the bines get mildew, aphids, Japanese beetles and so on and they don't spray. I don't care where you're growing hops, they can all get pests or disease. Commercial growers have a very vigorous spray program to combat powdery mildew, hop aphids and spider mites, the problems just depend on where you grow. Dry climates can have more problems with spider mites, for instance.

Regardless of where you grow, watch the underside of the leaf — that's where the aphids and the mites like to hang out. Check out my website <http://freshops.com/hop-growing/hop-gardening> for pictures of pests and molds to look out for. If you find yourself with a problem it is better to nip it in the bud early. You can spray your bines with a small backpack blower. I use a that kind of blower sprayer with a tank on it to get the leaves really blowing — whatever you spray it's got to touch the leaves and the insects. You have to decide if you're going to go organic or not, too.

I try and stay as organic as possible, but sometimes I have to break out the big guns.

At the end of the season you can bury healthy bottom vines for propagating new plants the next spring. Simply bury the vines in a shallow trench and mark their location. In spring dig them up and cut them into pieces about four inches (10.2 cm) long. Make sure each new cutting has an eye or bud. The following year, the harvest date will vary with variety and location. At maturity, the hop aroma is at its strongest and is measured by crushing a cone and smelling it. The

yellow lupulin glands in the cone become much more evident and plump looking when magnified. The cone will develop a drier, papery feel as it matures. Some browning of the lower bracts is a good sign of ripeness. Squeeze the cones as they develop and you will notice they become more resilient.

After picking the flower cones (without the leaves), drying can be done in a good dehydrator, custom made hop dryer, well-vented oven or you can simply air dry. If you use heat, the temperature should not exceed 140 °F (60 °C). Under dry weather conditions, I suggest taking a screen

off of your house and setting it up in a wind protected area, elevated on each end. Spread the hops as shallow as possible and fluff daily so moist inner cones are brought to the outside of the pile. If weather is dry and the pile is not too thick they will dry in about three days.

A high moisture content in the cones will adversely affect storability and recipe formulation. The hops are dry when the inner stem of the cone (strig) is brittle and breaks rather than bends. The strig takes much longer to dry than the bracts, so be patient. Be sure to store the hops in an airtight container in the freezer until used.

Rick Pedersen, Pedersen Farms in Seneca Castle, NY

Anybody can grow hops on a small scale. They are fairly easy to grow and fairly manageable. In fact some people grow hops just for the look of them — they make patterns on their house — shape of a heart, cross. You don't need a trellis. You can put them on the side of a house, barn, flagpole — anything at least 12 feet high (16 feet is better, but 12 is about the minimum).

After you plant the first year you shouldn't expect anything — you may get a few handfuls of cones. The first year the plant is just trying to get started and healthy. Leave it up after harvest, and harvest by hand. The

second year, if everything goes right, expect about 80% of the crop potential, and third year a full crop.

When planting, mulching doesn't hurt and helps conserve the water. The plants need to be in full sun — anything less and you won't get a full crop. They also need good air movement rather than tucked into a corner or you will have more disease problems. They need well-drained soil as they don't like wet feet — don't plant them in a spot with a lot of clay or place where water stands anytime of the year or they will have a short life.

When you choose what to plant,

do your research. There's plenty of information on the Internet to help you match something to where you live. Oregon State has produced a couple of really good publications for free with charts with varieties, yield and disease resistance. Your choice really depends on the climate. The wetter the location the more you have to worry about the molds, etc.

One of the things to keep in mind is harvesting. Harvesting five or six hills is fun; harvesting 100 hills is not so much fun. It takes about an hour to pick a vine, so keep that in mind when you plan your rhizome purchases.

Diana Puterbaugh, Puterbaugh Farms in Mabton, WA

The "best" conditions for growing hops is a south to southwest facing spot with a structure of some kind on which the hops can grow (e.g. a fence, garage, deck or trellis). Hops need lots of daylight and love the heat of summer.

Good soil comes next. I would first suggest mixing some old mulch and fertilizer into your plot with a shovel. Dig quite deep, approximately two feet (0.6 m) down and roll the soil and additives around to loosen the ground where the new roots will grow.

Give the area a good drink of water and see how well it drains. Improve the planting area if it drains poorly. Hops begin best as a root and like to be planted early in the year (March or April, depending on loca-

tion). Just make sure the topsoil is not frozen.

One hill of 3-4 established hops roots should provide about twenty pounds (9 kg) of fresh hops in the fall. The first year yields are usually a lot less. Baby hops require a bit of attention, but once established, the hop will grow pretty much on its own.

Create your hop hills about five to seven feet apart (2.1 m) (if planting more than one variety or more than one hill). Keep in mind these plants will grow excessively. In the summer, many of our hops will grow a foot in one day. That's no exaggeration!

Also, remember hops need something to climb on. We frequently sell hop twine (jute) to our customers because the hop requires a coarse

string. Basic string or wire is too slick and the plant just will not make it.

Do keep in mind that when the plant reaches about two feet (0.6 m) in height, it will need a little help going in the right direction. They need to be trained around the string in a clockwise direction. Like a sunflower, the head of the hop will follow the sun each day. Just gently wind the young plant shoots (once long enough) around the string to get it well established.

Later in the fall, as the hops reach maturity the flowers will bloom like a rose bud. The cone petals will have a "give" to them when squeezed. Sort of a springy feel and, of course, the aroma will be evident, too. 

PROCESSING HOMEGROWN HOPS

BY JON STIKA

So you planted some hop rhizomes, watered them, trained them up a trellis or twine and now they are sporting an abundance of nice plump, flower-like cones. How and when should you harvest them? Do they need to be processed somehow? How should they be stored? How could they be used in your beer? Growing hops is an exciting addition to any home brewery. Here's how to get a hop crop from the yard to the brew pot.

First a little background. Common Hops (*Humulus lupulus*) are a hardy perennial plant that dies back to the ground each winter then grows up again in the spring. The plant grows as a bine, which will wrap clockwise around anything handy and cling to it with the aid of stiff bristles on the stem. The female fruit are often referred to as cones for their resemblance to spruce cones, only green and leafy. These are the hops that we know and love in our beer. The place where hops are grown is referred to as a yard.

HARVESTING

Knowing when hops are ready to harvest is an art that combines the senses of sight, smell and touch. Hops are ready to harvest when the cones are a deep green color, but before they start to develop any brown color, which usually begins on the very tips of the bracteoles (the little leaves that make up the cone-like flower). The other important visual clue is the development of lupulin, a powdery yellow substance that forms in tiny glands near the base of each bracteole. At first the glands containing lupulin are very pale yellow, but as the cone matures, the gland and lupulin attain a deep yellow color in contrast to the deep green color of the bracteoles. When you suspect your hops are nearing harvest, simply pick a few cones and either pull them apart or split them lengthwise with a sharp knife to get a better look at the lupulin.



While you are manipulating the hops cones to get a look at the lupulin, you should also rub them between your thumb and fingers and smell the resulting aroma. If the hops are ready to be picked the aroma should be quite pronounced. If you pick an immature cone, the aroma of lupulin will be detectable, but faint.

The last clue to the harvest readiness of your hops is to gently squeeze the cones between your fingers. A hop cone ready for harvest will feel papery, rather than succulent. It will spring back when squeezed, rather than remaining squashed, after you release it. The other thing to feel for is the stickiness of the lupulin when rubbed between your fingers. The quality and quantity of lupulin in a ripe cone will leave a resinous sticky yellow residue on your fingers. Your fingers should develop a sticky lupulin glaze on them after several minutes of picking. With experience, you will soon be able to compile all of the sensory indicators to determine when your hops crop is at the peak of har-

vest readiness.

Harvesting hops on a commercial scale involves cutting the bines and feeding them into large specialized machines that strip the cones from the plant. Before the advent of such equipment, hops were harvested by hand by multitudes of seasonal employees. For home hops growers, harvesting hops by hand the “old-fashioned” way is the only practical method to get the job done. I harvest my hops by climbing a ladder to reach the top of the bines and work my way down. I fasten an empty ice cream pail by the bail onto my belt so it hangs at my hip, allowing me to pick with both hands and drop the cones easily into the pail. Some folks use a mesh bag or fruit-harvesting bag slung over their shoulder or fastened about their waist to stuff the cones into as they pick. Another harvesting approach, if you are not comfortable working from a ladder, is to lower the bines to the ground and then pick the cones from them.

In a commercial operation, the

hop harvest is done all at once, which terminates the plants for that growing season. If you choose to cut your bines down to harvest them, rather than climb a ladder, you will reduce the potential quantity of hops you harvest that year, but save yourself trips up and down a ladder.

If you don't mind the climbing, proceed with caution and avoid over-reaching while picking. Picking from a ladder while leaving the bines intact allows you to pick only the cones that are ready at a given time, then come back to pick more later. Also, hop bines will continue to produce some new cones throughout the growing season if left in place to grow. After you pick the first batch of cones from your bines you can return every two to three weeks to pick again until the end of the season. Where I live in western North Dakota (47° North latitude) I pick hop cones from about the middle of August to late September. Places farther south would begin harvest earlier and can continue later into the growing season. Hop cones should always be handled gently during harvest and handling to minimize the loss of lupulin.

DRYING

After harvesting hop cones they will need to be dried as soon as possible. Drying hop cones will permit them to be stored for an extended period of time and provide a uniform product that can be weighed to consistently determine quantities for use. Hops can be dried in a variety of ways depending on your climate and facilities at hand. If you have a food dehydrator, spread the hop cones in a single layer on the dehydrator trays and run the dehydrator between 90 °F and 115 °F (32 and 46 °C). Depending on conditions, it may take up to several hours to dry the hop cones sufficiently for storage. The cones are dry (very light and papery) when they have opened up, and make a rustling sound when handled.

If you do not have a food dehydrator, hop cones can be dried by spreading them out on screens or cloth in a place where they are protected from the elements. Before I owned a food dehydrator, I spread my hop cones on old window screens

propped up on wooden blocks in the attic above my garage. I left the access door to the attic open to allow for air flow, and the hops dried nicely in a couple days during the heat of late summer.

STORAGE

Once the hop cones are sufficiently dry, they should be handled carefully and placed in some type of sealed container for storage. Unless the hops will be used shortly after drying, they should be stored in the freezer to prevent deterioration.

A vacuum seal-and-store machine that draws the air out of a plastic pouch then seals it shut is a good way to store your hops. Weigh out either a half or full ounce of hops and place them in a plastic pouch designed for your machine and process them according to the manufacturers' instructions. If you do not have a seal-and-store machine, good quality zip-seal freezer bags also work well. I place my dried hops in a zip-seal bag and press the seal closed until only a small opening remains, then press most of the air out of the bag, and quickly close the remaining seal. Other types of containers that seal tightly, like foil coffee bags (read more about this method at www.byoc.com/mrwizard/923.html), will also work to store hops if you prefer not to use plastic bags. Once your hops are securely stored in the container of your choice, simply keep them in the

freezer until use. If the stored hops lose color or start to look like frozen spinach, you may not want to use them in your brew. I have successfully stored hops in plastic zip-seal bags in the freezer for up to two years before using them in any of my brews.

USING HOMEGROWN HOPS

Homegrown whole hop cones can be used in the same manner as store bought hops by adding them to the boil, placing them in a hopback, or using them to dry hop in the fermenter. I usually place my hops in a cheesecloth bag tied shut with a piece of cotton string, before adding them to the boil. This prevents the hops from clogging the spigot on my brewpot to carboy. I also use homegrown hops to dry hop some of my beers in the secondary fermenter. Homegrown Cascade hops work particularly well for dry hopping pale ales.

Perhaps the biggest challenge in using homegrown hops for bittering is not knowing their alpha acid content. Alpha acid content is not a critical issue when hops are used in a hopback or to dry hop beer because the hops are not boiled to produce bitter isomers of the original alpha acid. However, if the hops are to be added to the boil, the alpha acid content is a significant factor in the resulting bitterness of the finished beer.

While some preliminary experiments have been conducted in an at-



After drying, hops can be stored in a vacuum-sealed bags in the freezer for a year or more.

tempt to link the pH of hop tea to alpha acid content, these experiments have not been sufficiently broad in scope to serve as a reliable indicator of alpha acid content of hops (if this was possible commercial brewers would have done this long, long ago as alpha acid determination is a pain). Another approach that can be used to determine hop bitterness level is to brew some tea by boiling a hop of known alpha acid content and compare it in taste to a tea brewed with the same quantity of unknown alpha acid hops. While this method is also very subjec-

tive, it may provide some insight into your hops' alpha acid content.

Another approach to get an idea of your homegrown hops' alpha acid content is to look at the typical alpha acid content for the varieties of hops that you grow (see the online hop chart at <https://byo.com/resource/hops/>) and use that as a starting point for using your hops in the boil. I used this logic when experimenting with my own homegrown hops. After checking the expected alpha acid content from the chart, I brewed a few batches with my own hops and

found that their apparent alpha acid content seemed quite low (around 2%) compared to the bitterness I achieved with similar hops of known alpha acid content used in the same recipe.

Growing your own hops can be a very rewarding complement to any home brewery. With a little luck and experimentation you can produce, process, store and use your own treasured herb of beer. Then you can also take pride in brewing beer that includes a vital ingredient that you also grew yourself. 

Q *What happens when you freeze freshly harvested hops without drying them first? I have been doing this for the last couple of years with part of my hop harvest and then I use 3.25 times more of the frozen wet hops than calculations tell me to use of dried hops for a certain IBU level. I have been homebrewing for 44 years and taste-wise I can't tell which beer has been made with frozen wet hops. I can understand that frozen wet hops is not a good idea for the industry, but for homebrewers it can make life much easier.*

A This is a really interesting question about hop storage. Brewers can, at times, be skeptical about observations reported by newer brewers, especially when the observations have to do with changes in flavor. Right or wrong, that's just the way it is. After 44 years of homebrewing, you are a bona fide old-timer, and I believe your observation when you state that you are not tasting a difference between beers brewed with dried and frozen hops. Now, the skeptical scientist-side of me could ask if you are basing your conclusions on controlled experiments and proper sensory panels, but you get a pass because you come from Copenhagen, the home of one of the most influential brewing science labs in the history of modern brewing!

Hops are typically kiln-dried after harvest and compressed into bales to extend shelf life, reduce storage volume, decrease shipping weight, and make handling during brewing easier. The primary benefit of the hop bale is the minimization of oxygen. However, drying and compressing hops is only part of the hop storage equation; temperature is the other key storage factor, and the cold storage of hop bales is vital to this whole process. Most brewers these days use hop pellets and/or liquid hop extracts in the brewing process because these preparations are much easier to handle

and have longer shelf lives than hop bales, but both types of hop products begin as bales.

As you point out, storage volume and shipping weight are really non-factors for the homebrewer who grows their own hops. So simply freezing homegrown hops seems like a good choice. I did some research about this topic and could not find anything specifically related to freezing green hops, so I did some reading about freezing vegetables and about hop quality loss during storage. The two stand-out topics to my eye are oxygen and enzymes.

Oxidation is the main enemy of hop quality during storage, so anything that you can do at home to minimize oxygen is a benefit. Vacuum sealers are the obvious choice, but can be a bit pricy. Freezer bags coupled with squeezing and sealing can make a decent substitute for vacuum sealers. But no matter how much hops are compressed, there will always be some amount of oxygen.

The other stand-out topic related to hop storage is enzymatic degradation. Food scientists have extensively studied this topic because of its relevance to all frozen foods. Clarence Birdseye is recognized as the father of commercial food freezing; the first commercially frozen meat, seafood, and vegetable products sold using Birdseye's patented processes were

sold in 1930 and had a quick and profound effect on commercial food processing. One of the interesting things about frozen fruits and vegetables is that enzymatic reactions slowly continue during frozen storage.

The blanching process is often used to denature fruit and vegetable enzymes before canning or freezing to prevent enzymatic browning; in the case of frozen fruits and vegetables, blanching slows or halts (depending on the process) enzymatic activity during frozen storage. Hop kilning reduces the moisture content of hops, and it also denatures enzymes. Based on what is known about enzymatic activity in fresh-frozen fruits and vegetables (no blanching used), it is reasonable to assume that enzymatic reactions occur in fresh-frozen hops.

You have been successfully using fresh frozen hops for the past couple of years, so if you are happy with the results you should continue what you have been doing. Minimizing the oxygen content, reducing the freezer temperature as much as possible, and minimizing storage time are three things that you probably should be mindful of with these hops. Blanching (short exposure to steam) your homegrown hops is something you may want to consider if you are interested in further developing your freezing process.

Sten Regild - Copenhagen, Denmark

BREWING WITH FRESH HOPS

BY LISA MORRISON

When it comes to brewing, which came first — fresh hops or dried? It's a classic chicken or egg conundrum. But we know this: Somewhere in time, in an unknown location, a brewer plucked fresh hops straight off the bines (not vines — there is a difference) and added them to wort to make beer.

Although there is no documentation that proves either way, one could easily assume that fresh hops might have been used in beer before the now-traditional practice of using dried ones.

It makes sense: We know that hops were relative latecomers to the beer world at a time when a host of different botanicals were utilized in wort to not only produce different flavors, but for medicinal uses as well. The first time someone threw in some hops, which we now know have anti-bacterial properties, the brewer or townspeople might have noticed that particular batch didn't spoil as quickly as some of the other beers. Along the way, hops were undoubtedly dried alongside other botanicals and herbs to be used in beer, medicine and other cooking needs during the months when the ground lay fallow, and it was probably discovered that the hops retained a lot of their potency, once again keeping beer from spoiling. While this is a scenario derived from current knowledge, it is easy to see how hops would begin to rise as a preferred addition to beer in this historic world of no refrigeration.

Whether it was an unknown nod to the original usage or a break from current tradition, over a decade ago, using fresh — or wet — hops in beer started catching the excitement of hobby and craft brewers. A seasonal beer of the most specific kind, beers made from these hops, freshly removed from the bine, are only available during harvest season. And, because of their fragile nature — if hops aren't dried shortly after be-



ing harvested, they can mildew quite quickly — wet hops go straight into wort as soon as possible. So it makes sense that fresh-hop beers originated in locations where hop yards are nearby.

Excitement escalated over using these wet hops as a way to create new seasonal beers — and celebrate the harvest and the agricultural ties to brewing — and a dozen-plus years later, fresh-hop beers are a highly anticipated harbinger of the harvest and of autumn, bringing with them a fresh, bright taste that only newly harvested hops can impart.

“The consumer has embraced them because it's something that happens once a year,” said Cam O'Connor, Brewmaster at Deschutes Brewing in Bend, Oregon. “It's a harvest celebration.”

The good news is, it's easy for homebrewers to add wet hops to their own brews. And the better news is, thanks to increasing demand, it's also easier for brewers across the country to get those fresh hops — no matter how far from a hop yard they are.

SOURCING WET HOPS

Unless you grow your own or know a generous person who does, fresh hops are a little troublesome — and sometimes pricey — to come by, but because of increased interest, the options are getting easier.

Mail-order hops: According to Vaughn Stewart, Project Development Manager for Northern Brewer, Hopunion has been doing a wet hop program for at least the past two years that delivers wet hops straight from the farms to your local homebrew shop.

“The wet hops are harvested, packed in boxes, then shipped via air to participating homebrew retailers, where they are doled out to customers. This is a great way to get commercial-quality fresh hops, including highly-sought-after varieties like Citra® and Simcoe®,” he said.

Steve Bader, owner of Bader Beer & Wine Supply in Vancouver, Washington (and author of the recipes on pages 25–26 of this digital download), added that this year, Hopunion is expected to once again offer some of the most sought-after aroma hops

as wet hops.

“The truly best varieties are your favorite aroma varieties. Amarillo®, Cascade, Centennial, Chinook, Citra®, Simcoe® are currently the most commonly used fresh hops, and Amarillo®, Citra® and Simcoe® are the trendiest hops to be using these days,” Bader said.

It was not known at press time which varieties would be available for the Hopunion program this year, but Duke Geren of FH Steinbart Co. homebrew supply shop in Portland, Oregon, adds one thing to keep in mind when sourcing wet hops is to use varieties that are typically used for aroma hops in the more traditional dry-hop forms.

“Fresh hops tend to have more punch in the flavor and aroma department than dry hops. A fresh-hopped beer just seems to pop with those qualities when used in beer. There are certain melon, citrus and grassy characteristics that are just more intense in fresh-hopped beers,” Geren said.

Hit the farm: If you’re close to an area where hops are grown — and those regions are expanding again across the country after being relegated to the Pacific Northwest for decades — one of the best ways to source fresh hops is to actually visit the hop yards of larger farms or a boutique hop farm that specializes in producing local hops for a growing number of breweries.

“For a more local flavor, many homebrewers have been turning to small farms,” said Stewart. “With enough advance legwork, many of these farms are selling small lots of wet hops to homebrewers at harvest time.”

It’s quite an experience to see those lovely green gems being harvested off the vines with the heady aroma of hops surrounding you. But don’t just think you can show up like you would at a farmer’s market and take your pick from the day’s harvest like you would a bunch of cucumbers or a watermelon. Wet hops are most often claimed far in advance. Many farmers have relationships with the neighboring breweries that have already taken up the current year’s harvest. That being said, it never

hurts to call ahead of time and see if you can still score some stragglers.

Know a pro brewer: If you are buddies with a local brewer, you might be able to ride the coattails of their wet-hop arrangements and pay them to order a little extra for you. Note: this is only applicable if you are really good friends with the brewer.

BREWING WITH WET HOPS

According to Cam O’Connor of Deschutes Brewing, the first step in designing a fresh-hop beer is again all about aroma.

“Consider the hop. Think about what the aroma you will get from that hop will be. Do you really want a garlic-stinky socks aroma from your beer? You might. You might not. But know that what you smell in the hop is definitely what you are going to get in the beer,” he said.

Keep in mind that fresh hops act a lot like fresh herbs in cooking. Just like you do with fresh herbs versus dry herbs in cooking, because there is more moisture in fresh hops, you will need to use more of them to achieve the desired results.

“Depending on who you talk to, fresh hops are used at a ratio of five-to-eight to one versus dry hops,”

Geren says. “So, for example, where a recipe might call for two ounces of late-addition dry hops, you would instead use 10 to 16 ounces (283 to 454 g) of fresh hops.”

And the “late addition” part is key, according to most of the experts polled for this story.

“Part of this is due to unknown alpha acid levels (in the fresh hops), and part is that it better captures and preserves the delicate flavor and aroma elements that make these hops so special,” Stewart said.

O’Connor warns that using fresh hops early in the boil for bittering can impart an undesirable vegetal quality.

“We’ve played around with using fresh hops for bittering,” he says. “But for Hop Trip, for example, we use (dried) Nugget (hops), I believe, for bittering and all fresh hops for aroma.”

Stewart and Geren recommend adding the hops in the last 10 to 20 minutes of the boil for the maximum amount of aroma retention, but neither say it’s wise to dry-hop beers with wet hops because of the risk of contamination.

“Better still, a ‘hot stand’ or ‘hop stand’ can be conducted, where the



heat to the boil kettle is turned off, the fresh hops are added, and the lid is replaced on the kettle,” Stewart said. “The hops stay in the just-below-boiling wort for 30 to 60 minutes. It is believed that this temperature extracts rich volatiles more thoroughly, and may even be used in lieu of dry-hopping.”

That being said, Geren advises to experiment and have fun with those lovely fresh green globes that arrive only once a year.

“Don’t be afraid to color outside the box,” Geren said about taking risks with fresh hops. “There are no hard and fast rules when it comes to homebrewing or using fresh hops. Don’t be afraid to experiment or try something unconventional. You just might stumble upon something extraordinary.”

And one final note: remember to keep good notes when you are brewing with fresh hops, because you won’t be able to tweak your recipe for a whole year until hop harvest comes around again. Also, using a scale to weigh the hops is the best way to record the hop usage. Measuring them by the cup (or other dry measure) is inconsistent depending on the growing season — packed vs fluffy, size of cones changing, etc. Weight, however, is always the same.

GROW YOUR OWN HOPS

If you live in the right climate, the best way to source fresh hops is to grow your own. Hops can grow across at least the northern half of the mainland United States, provided there is ample moisture and sunshine and well-drained soil with a lot of compost — and maybe even deeper south with protection from the heat and sun, as well as a solid green thumb.

Hops require a minimum of six to eight hours of sunshine a day; southern-facing areas often are best. The vines can grow as much as a foot a day and can reach higher than 25 feet (~8 m) and weigh more than 20 pounds (9 kg), so plan for a vertical space and a sturdy trellis. There are several sources for mail-order hop rhizomes.

But even with perfect conditions, don’t expect your rhizomes to produce a lot of hops the first couple of years — so plan your fresh-hop beers

accordingly.

“Hops really start to produce after the third year, so don’t expect much out of the first couple of years,” said Jason Webb of Portland U-Brew and Pub. “And don’t worry, either. You can plan to use your few fresh hops with other hops, but you won’t be able to make a fully fresh hop beer the first year, for sure.”

Hops are ready to be picked when they feel slightly papery on the outside but are still springy when squeezed. When torn apart, they should have a lot of yellow-colored resin inside — that’s the lupulin that imparts the flavor and aroma. Time is of the essence, as you don’t want the hops to get past their prime, so make sure you have plenty of friends, homebrew and gloves (the vines have small yet nasty barbs) ready to join in the picking party. To take full advantage of your harvest, you will want to get your brew kettle going at the same time.

“It can’t get any fresher than the day you round up some friends to pick hops,” Steve Bader of Bader Beer and Wine Supply in Vancouver, Washington said of harvest time. “It is a pretty slow and tedious process, so lots of friends are a good thing to have around.” 

PRO TIPS FOR BREWING WITH FRESH (WET) HOPS

BY DAWSON RASPUZZI

Kevin Smith, Bale Breaker Brewing Co. in Yakima, WA

At Bale Breaker Brewing Co., we brew a 100% wet hop beer called Piled High Imperial Fresh Hop Ale. We wet hop the mash, first wort bittering with wet hops, three wet hop kettle additions, a wet hop whirlpool addition, wet hops in the hopback, and we also “wet hop” the beer post-fermentation for seven days. But, you will get the most out of them by using them late in the boil or in a hopback. The biggest nuance to expect with fresh hops is beer loss. Fresh hops soak up a lot of wort, but it will definitely be worth it!

The other downside is their poor shelf life. Since the hops are not dried the flavors and compounds that they create in the beer are very unstable. Fresh hop beers change quick and often. I’ve always believed that fresh hop beers should be made during hop harvest and drank afterward as a celebration that the harvest is over. There isn’t a better way to celebrate the conclusion of harvest than by drinking a few wet hopped IPAs or pale ales.

I typically assume that you will need about 5x the amount of fresh

hops to get the same character as pellets or dry hops. However, I have gone as high as 8x the amount of wet hops and had good results. Just like homebrewers who grow their own, I do not get any information on alpha acids or oils on the fresh hops that I use (its more fun that way!). I just assume a median AA% for the variety. For instance, I’ve seen Simcoe® as low as 10% AA and as high as 16% AA. But for the sake of the brew, I assume that the Simcoe® I use is going to be somewhere between 12–13% AA. Therefore for brewing calculations, I assume that wet Simcoe® hops are ~2.5% AA (or roughly 1/5 the AA% of dried Simcoe®).

My philosophy in the recipe development of fresh hop beers is to create a malt bill that could handle a range of IBUs. Our Piled High Imperial Fresh Hop Ale is 7.2% ABV and I shoot for 70 IBUs. However, if the AA% of the wet hops I am using is higher or lower than expected, I have created the malt bill to be able to drink well at 50 IBUs or 100 IBUs. That philosophy is especially handy when drafting a 100% wet hop beer because bittering with wet

hops can be a shot in the dark.

I have heard people perceiving “grassiness” as an off-flavor of fresh hop beers, but that is the exact flavor I am after. It is the flavor that is true to the fresh hop beer. A fresh hop beer without any grassy character is just an IPA, and, to me, that seems to miss the point. This is a beer that can only be brewed once a year and it should be unique. It should taste different than the other IPAs that you can brew all year round.

Outside of IPAs and pale ales, my favorite style to wet hop is a hop-forward saison. However, in my opinion, fresh hop beers should be all about the hops — and IPAs and pale ales are the best to show off hops. I don’t think it makes sense to make a fresh hop Berliner weisse or fresh hop milk stout.

My other advice is to have fun! Do not strive for perfection with a wet hop beer. The beauty of this beer is in its imperfections and unpredictability. This beer is a celebration of the hop plant. Brew it fresh and drink it fresh!

Tomme Arthur, Port Brewing and The Lost Abbey in San Marcos, CA

With fresh hops we typically only produce our High Tide IPA year after year here at Port Brewing. We have done single batches of pale ale and even a red ale one time. But we prefer IPA to all else.

For the novice, the best way to brew with fresh hops would be to add them as a dry hop to a favorite pale ale and IPA. This is a very simple method. A more advanced starting point would be to use them in the boil for each of the additions. This is much more complex as the alpha acids will be unknown and there is also more moisture in these non kilned hops, which can dilute the gravity of the beer.

I believe the standard substitution

rate for wet hops calls for 5–10 times (in weight) what you would need for kilned hops. In High Tide IPA I think we use three times the amount for our whirlpool addition and twice the amount (per barrel) for the dry hopping. We love the character we get in our beer using that ratio. I do think there can be a “grassiness” attributed from too much new hop content but we don’t allow our beers to go there by purposefully keeping their use to a more moderate level. Some of the greenest fresh hop beers I have tasted are the result of immediately going from field to kettle in super charged times (like under an hour).

The dominant American varieties

have great application in West Coast styled beers. Pretty much anything goes although we love Centennial and Simcoe® for High Tide IPA. Some of the lower alpha and noble type hops have been used but for my preference these tend to express themselves best in fresh hopped lager-styled beers.

These beers are often some of the most rewarding and challenging we make. If there is one thing I know about fresh hop beers, it’s that there is no single way to “best” make them — other than to use the best hops whenever possible. So have fun, remember it can only occur once a year and better luck next year if the Hop Gods don’t shine down on you this year!

Veronica Vega, Deschutes Brewery in Bend, OR

It's easiest to use traditional dried hops in your first and maybe even second additions to get accurate, calculated IBUs. We tend to use fresh hops more as a unique flavor punch than for bitterness. We add large amounts to the back end of the brews so the unknown IBU contribution is negligible.

We love all things fresh hop and are really not averse to trying any variety fresh. Nugget, for example, might not be as hip as Citra®, but fresh they can provide something truly unique and shouldn't be overlooked. We tend to use "softer" varieties such as Hallertau, Tettnang, etc. in beer styles that aren't loaded with hop character.

For IPAs and pales we tend to go with the more traditional varieties that fit with the beers — Cascade, Centennial, Amarillo®, Nugget, Citra®, etc.

We've done a ton of different wet hop styles — Oktoberfest, lagers, reds, Kölsch, golden ales, cream ales, saisons, as well as pales and IPAs each year. We like to release new beers as well as fresh hop versions of our existing brands such as Fresh Hop Cinder Cone in Bend, or Fresh Hop City in Portland. Did I mention we are kind of nuts about fresh hops?

Try to use them as fresh as possible. We work diligently with our hop growers to visit them when they are harvesting the variety we want, and we

divert the just-harvested hops from their path to the kiln and bag them up to put in a brew that is in process back at the brewery. We drive back to the brewery in hoodies with the AC on to keep the hops cool and comfy. Probably a little over the top, but it's all about the hops! We keep in radio contact with each other and the hops go into the brew as soon as they arrive — it's pretty exciting!

At home, try to use them as fresh as possible, and in the later additions. Experiment with both kettle additions as well as conditioning tank additions to see what works for you in the styles you are experimenting with. And have the best time! 



BUILD A HOP TRELLIS

BY ANDY SPARKS

I had been homebrewing for about a year when I first got the bug to try my hand at growing my own hops. A good friend and one of my homebrewing mentors, Dave Justice, was growing a few varieties in his backyard. I loved the bright fresh aroma that came from the fresh picked cones. As he showed off his plants to other homebrewers and aspiring hop growers he would pick a few cones and show us how to rub them in our hands to capture the fresh aroma. I was smitten; I too was going to grow my own hops. I quickly found a mail order supplier for hop rhizomes and had a few on their way.

Something you should consider when designing a hop trellis for your yard is that hops like to grow very tall and straight up. They can be trained to grow on things, but left to their own devices they want to grow up and they do so very quickly.

Commercial hop farms use rows of very tall unfinished poles – sometimes as much as 20 feet (~6 m) tall, with wire cable running along the tops of each. At the end of each row

of poles they use guy wires to keep everything tight and secure. Along the row, at each planting site, they attach a piece of twine for the plant to grow straight up. Since hop trellises are typically tall structures, you should also make sure that the area you are considering for your hop yard is free of any overhead power cables.

I knew there was no point even bringing up the idea of building a commercial-style trellis in our front yard, and our back yard is completely shaded by large walnut trees. I had to come up with something more aesthetically pleasing that would be acceptable to both my wife and my neighbors. I settled on planting my rhizomes in an existing vegetable garden. The space was approximately 12 x 24 feet (3.7 x 7.3 m) on the southeast edge of the property and would have sun almost the whole day.

I wanted to plant a few different varieties of hops so I could have some fun experimenting with them during each fall harvest. I drew up several different designs trying to come up with a way to maximize the number of plants I could grow and still have a nice looking design. I settled on a pair of hop towers that would support four plants each. I had seen a few other tower-style hop trellis designs on the Web as I did my research, but most of those designs involved placing a tall pole in the ground and planting the hops all around it. All the plants grow up their strings and converge at the top of the support pole. I was planning on growing different varieties and I didn't want them to all grow together at the top of the tower and make separating them at harvest difficult. I figured that I would solve this problem by using arms at the top of each tower to hold the plants away from the main support pole. I considered building this trellis completely out of wood, but I'm not much of a carpenter. I elected to use galvanized pipe for the arms of the structure.

I had to come up with something more aesthetically pleasing that would be acceptable to both my wife and my neighbors.

Parts List

- (1) 16-ft. (~5-m) pressure treated 4X4 post
- (1) 4-foot (1.2-m) PVC 4X4 fence post sleeve
- (4) 2-foot-long (61-cm) ¾-inch galvanized pipes
- (4) ¾-inch galvanized pipe flanges
- (4) ¾-inch galvanized Ts
- (8) 6- to 10-inch-long (15- to 25-cm) galvanized pipe.
- (4) 2-foot-long (61-cm) ½-inch galvanized pipes
- (4) ½-inch galvanized pipe flanges
- (4) ½-inch galvanized Ts
- Solar powered fence post cap
- 1 or 2 sags of concrete
- 100 feet (~30 m) strong twine or thin rope.
- 1 can spray primer for metal
- 1 can hand copper spray paint
- 1 can wood stain



Photos by Andy Sparks

STEP BY STEP

1. SIZING THE METAL ARMS

I used ½-inch pipe and pipe fittings found at a local hardware store. Each of the arms at the top of the post is constructed of a pipe flange that attaches the pipes to the wood, a 2-foot (61 cm) section of pipe, a galvanized T and two 6-inch (15.2 cm) pieces of pipe. The lower arm at the bottom where twine will start from is exactly the same, except that it does not include the additional 6-inch (15.2 cm) sections; it's just an arm with a T at the end. Since these arms only need to be threaded on one end I have found that it is cheaper to buy a pipe 12 to 20 inches (30 to 51 cm) long and cut it in half. My original ones were 6 inches (15 cm) long but I'm making them a little longer, 9 inches (23 cm) as an upgrade this year.

2. CONSIDER THE POTENTIAL WEATHER BEFORE YOU BEGIN!

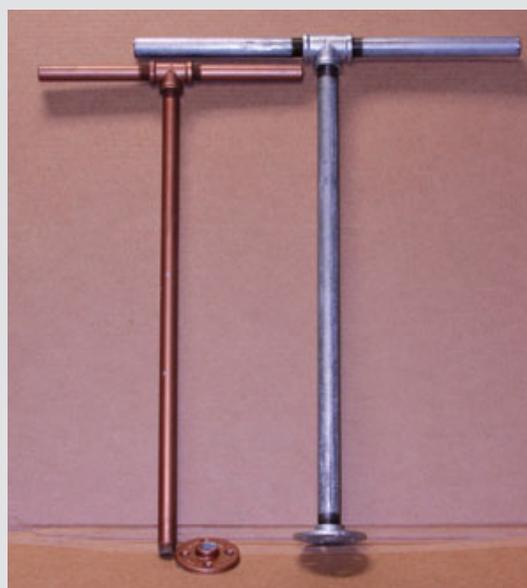
Hurricane Ike stopped by for a visit the summer I made the trellis and showed me that I should have used ¾-inch pipe for the top arms instead. One of the upper ½-inch arms broke where the pipe attaches to the flange during the peak of Ike's wrath. Living in northwestern Arkansas I didn't think I needed to hurricane-proof my design, but this year I'm upgrading to ¾-inch pipe.

I decided to build the main center support from 16-foot-long (~5 m) pressure treated 4×4 posts.

3. INSTALL THE POST SLEEVE FOR ADJUSTING HEIGHT

One of my big considerations was that I wanted a way to raise and lower the towers for maintenance and harvest. Each spring you will need to run new twine for the bines to grow up, and each fall you will need to harvest the hops that will grow to the very top of your twine. I have never enjoyed being up on ladders, and leaning out to grab the last couple of choice hop cones is just asking for a trip to the emergency room.

I found that you can buy something called a "fence post sleeve," which is a PVC square plastic tube that slides right over a 4×4 post. My idea was to sink a couple of these PVC sleeves down in the center of each growing area and secure it with cement, creating a socket in the ground for the post to slide into.



4. MAKING A “HINGE” FOR POST INSTALLATION

I left about 1.5 feet (46 cm) of the sleeve exposed, and then near the top I drilled a hole from one side to the other and notched the other side. I also drilled the same size hole through the base of each 4x4 post. By doing this I was able to create a kind of hinge at the base of each tower. I lay the tower down with its foot lying in the notch on the base and slide a dowel through the holes on the base and the holes at the base of each tower. It's a simple matter of walking the tower up into its vertical position, removing the dowel and letting it slide into its socket.

To lower the towers you just reverse the process. This can be a bit trickier because you must lift the tower straight up and have someone else insert the dowel, but once the dowel is inserted it is easy to walk it back down to a horizontal position. Being able to lower your hop trellis down to waist level really makes harvest super easy and makes restringing your twine each year a snap.

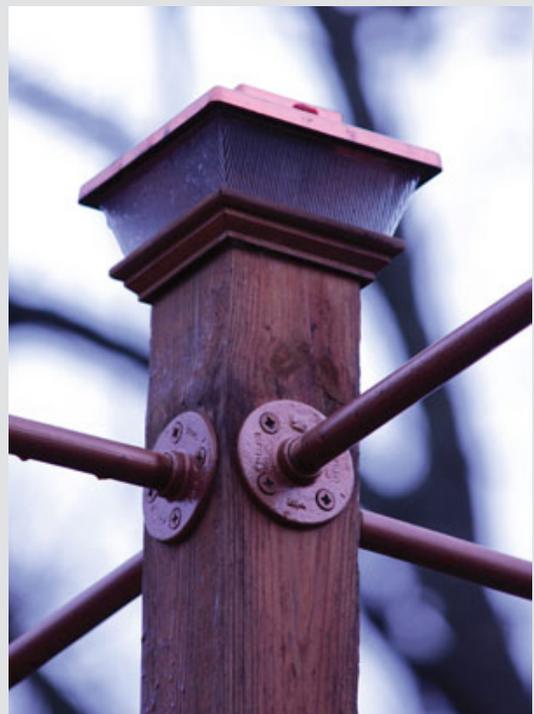
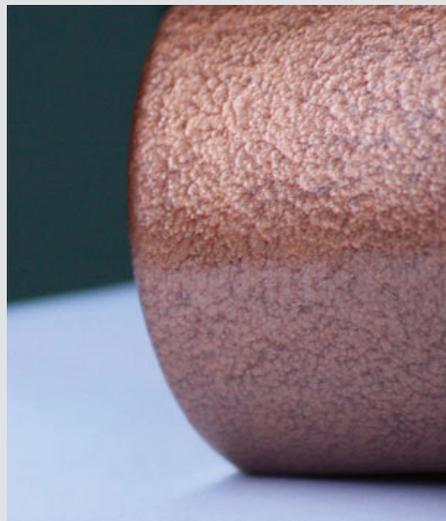
5. IMPROVING THE AESTHETICS

In an effort to make the towers as aesthetically pleasing as possible, I stained the 4x4 posts with a color that matched the color of some of the other wooden structures in the area. For all the galvanized metal parts I found some great paint that leaves the look of hand-hammered copper. I started by thoroughly cleaning each part to remove any grease or grime. Then I primed each one with a primer made for covering bare metal, followed by the copper paint. This really made the galvanized pipes and fittings look nice and added a classy touch.

6. SOLAR LIGHT INSTALATION/IRRIGATION

One of my neighbors had installed solar-powered fence post caps on the stairs leading to his deck, and I thought these would look good at the top of each tower. It would also further tie my design in with the rest of the neighborhood. The lights are copper on top with a little solar panel to keep their batteries charged, and they glow with a gentle white light every night after sunset. My wife jokes that the FAA requires the lights on the towers to keep low flying aircraft from hitting them.

The last piece of the puzzle was the installation of a drip irrigation system to keep the hops from getting thirsty during the long hot summer months. Each plant has a pair of drippers for redundancy, and the whole system is on a timer that keeps my plants watered – even if I forget. 



BUILD A HOP OAST

BY TYLER HAYMOND

If you have a green thumb, want the freshest hops, and want to know where the hops came from, the best thing you can do is grow your own. Having your own hopyard adds another element of control within your brewing process and adds even more personality and uniqueness to your homebrewed concoctions.

Unless you plan to use all of your harvested hops in a wet hop beer, then after harvest you need to dry the hops before packaging and freezing them. The best way to dry your freshly picked hops in order to preserve all of those wonderful flavor-boosting oils, acids, and compounds is with a hop oast.

My drying method when I first began growing hops was removing and laying my screen door flat on sawhorses, dumping the whole batch on it, and letting them sit in the warm garage with a box fan blowing over the top of the hops. I was limited by the use of the screen door, and often had more hops than screen, which led me to search for and borrow other screens from around the house. In 2014, August temperatures were pleasant and the family was enjoying cross ventilation through the house

Parts & Tools List

- ½-inch sanded plywood panel cut in half width-wise
- 2x6 board (8 feet/2.4 m long)
- 4-foot (1.2 m) wide aluminum re-inforced screen (25 ft/7.5 m long)
- 3-inch wood screws
- (2) 1-ft x 1-ft furring strips (8 inches/20 cm long)
- Brad nailer and 1¼-inch brad nails
- Staple gun and staples
- Hole saw
- Box fan (square 20-inch/51-cm)

with the windows open. Of course, this required screens in the windows and limited my drying capacity. I used this as my reasoning to build yet another piece of brewing equipment

When designing the oast, I wanted to limit the amount of heat that was applied to dry the hops since certain oils begin to evaporate at higher temperatures, changing the flavors that are imparted in the beer. The intent was to keep as many of the oils as possible intact to maximize the flavors in my beers. I needed a lot of drying space as I was anticipating several pounds of dried hops at harvest time. I also did not want this to take up a lot of real estate, as it was going to be a part of my limited garage brewing space. I drew inspiration from a box design that fit all of my needs on Instructables.com, which was adapted from *The Homebrewer's Garden: How to Easily Grow, Prepare, and Use Your Own Hops, Malts, Brewing Herbs* by Dennis and Joe Fisher.

This project took roughly four hours to complete. However, the benefit of this build allows me to get nearly 20 pounds (9 kg) of wet hops to their dry storage weight in little time without using heat to potentially drive off those wonderful aroma and flavor compounds that make hops the earmark of certain brewing styles.

I had to come up with something more aesthetically pleasing that would be acceptable to both my wife and my neighbors.

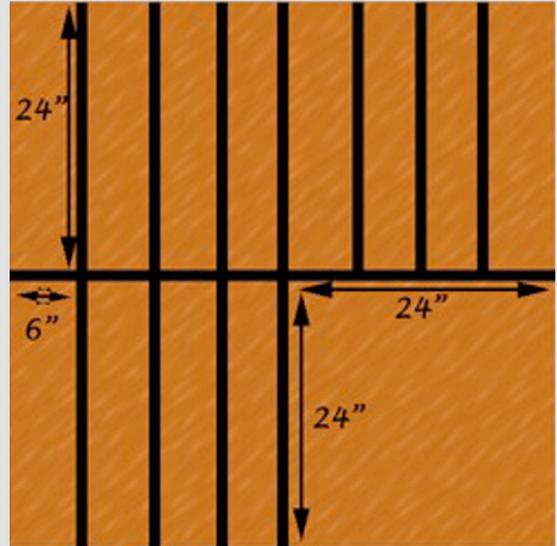


Photos by Tyler Haymond

STEP BY STEP

1. MEASURE AND CUT THE SIDES OF EACH TRAY

Measure the lengths for the sidewalls of the trays and mark your cuts on the plywood. I made my oast six levels (one of which holds the box fan), so I measured 24 sidewalls that are 24 inches long by 6 inches tall (61 cm long by 15 cm tall). I found the most efficient use of the plywood was to cut it in half and cut 12 sidewalls as shown in this figure. The leftover 24-inch by 24-inch squares (61-cm by 61 cm) will be the base that holds the box fan and the top lid of the oast. Once measured, make your cuts.



2. CUT AND ASSEMBLE THE BASE

Measure out 24 5-inch (13-cm) segments on the furring strips. These strips will help to strengthen each of the trays in the corners. Measure out four 22½-inch (57-cm) sections on the 2x6 board. This will become the sturdy base of the oast. Now assemble the base by taking the four 22½-inch (57-cm) planks and screwing them together as a box using 3-inch (8-cm) screws. This should make a perfect 24-inch (61-cm) square for your base panel and will be a solid foundation for all of the trays to rest on top of. I nailed the base panel to the 2x6 base using brads, and drilled nine 2-inch (5-cm) holes on the plywood base panel and one in the back. This is to allow air into the oast to be circulated by the fan.



3. ASSEMBLE THE WALLS

Using the brad nailer (or 1½-inch/4-cm wood screws if you don't have one) fit the oast walls together with the 24-inch by 6-inch (61- by 15-cm) tray walls, 5-inch (13-cm) shanks, and the right angle. If you are using screws, you can screw three screws into each end of the tray walls and the 5-inch shank (13-cm). This will make six oast sections, but one will house the box fan. If you choose, you can forego the box fan housing and make a sixth tray.



4. INSTALL BOX FAN AND ADD SCREENS

The box fan will fit snugly onto the base. Alternatively, an option is to place the housing with the box fan at the top of the oast and blow the air down through the hops. Then cut 2-foot (61-cm) square sections of the screen and staple the screen to the bottom of each oast tray. Take a hammer and tap in all of the staples so that they are nice and even.



5. FINISH ASSEMBLING OAST STRUCTURE

Stack each of the oast sections on top of the base. I used some leftover scrap wood to create guides for the trays and affixed them using the brad nailer. This will hold them in place as I adjust the trays. Lastly, put the 24-inch (61-cm) square lid over the top oast section.



6. REAP THE REWARDS

I harvested in two rounds based on my feel of the Zeus and Nugget cones. This oast dried over 17 lbs. (8.6 kg) of wet Chinook, Cascade, Nugget, and Zeus to just over four dry lbs. (1.8 kg) of hops. Without using any heat, my first round of hops – about 5 wet lbs. (2.3 kg) – were in the dry range (20-25% of the original weight) in two days. The second round of hops – about 12 wet lbs. (5.4 kg) – were in the dry range in three days. For this drying, I reversed the draft to pull air through the hops from top to bottom by flipping my box fan over, as opposed to pushing air up through the bottom layers of hops. Both ways worked well. One suggestion I have is rotating the drying racks to minimize a gradient from bottom to top, or top to bottom, depending on the fan location and orientation. Now I have a freezer full of hops that I have to begin brewing with! 



WET HOP HOMEBREW RECIPES

BY STEVE BADER

PORTLAND U-BREW AND PUB FRESH HOP IPA

(5 gallons/19 L, extract with grains)
OG=1.061 FG=1.014
IBU=70 SRM=12.6 ABV=6.2%

Brewers Note: For fresh hops, we estimate the alpha acids to be 1/5 of the average acids typically associated with that hop after it is dried. This helps us to better calculate IBUs in a fresh hop beer.

INGREDIENTS

6.6 lbs. (3 kg) light liquid malt extract syrup
1 lb. (0.45 kg) rye malt
2 lbs. 5 ounces (1.05 kg) Victory® malt
5 oz. (0.14 kg) 80 °L crystal malt
9.75 AAU Citra® hop pellets (0.75 oz./21 g at 13% alpha acids) (60 min.)
15 AAU Citra® fresh hops (6 oz./170 g at approximately 2.5% alpha acids) (15 min.)
12.5 AAU Citra® fresh hops (5 oz./141 g at approximately 2.5% alpha acids) (5 min.)
5 oz. (141 g) Citra® fresh hops (0 min.)
Wyeast 1056 (American Ale), White Labs WLP001 (California Ale) or Safale US-05 dry yeast
0.75 cup (150 g) corn sugar if priming

STEP BY STEP

Steep the crushed grains in approximately 2 gallons (7.6 L) of water at 150 °F (66 °C) for 30 minutes. Remove the grains from the wort and wash the grains with 2 qts (2 L) hot water. Bring the wort up to a boil, and add 1 lb. (0.45 kg) of the light malt syrup. Add your Citra® hop pellets and boil for 60 minutes. With 15 minutes left in the boil, add the first addition of Citra® fresh hops. Add the remainder of the 5.6 lbs. (2.54 kg) of liquid malt extract for the last 5 minutes of the boil and stir to thoroughly mix into the beer and avoid scorching the malt extract. When you get the malt extract mixed in, add your second addition of Citra® fresh hops and boil for 5 minutes. At the end of your 60-minute boil turn your heat off, and add your last addition of Citra® fresh hops. Steep the fresh hops in the beer for 5 minutes. Now add the wort to 2 gallons (9 L) of

cold water in a sanitized fermenter and top up to 5.25 gallons (19.75 L). Cool the wort to 65 °F (18 °C) and add your yeast. Aerate your wort, and ferment at 68 °F (20 °C) until fermentation is complete.

ALL-GRAIN OPTION:

Replace the liquid malt extract with 9.5 lbs. (4.31 kg) of 2-row pale malt. Mash at 150 °F (66 °C) for 60 minutes, and mash out at 168 °F (75 °C) for an additional 5 minutes, then collect about 6.5 gallons (24.5 L) of wort. Boil for 30 minutes without any hop additions, then boil 60 minutes with your first additions of Citra® hop pellets. Add the first addition of Citra® fresh hops with 15 minutes left in the boil. Add your second addition of Citra® fresh hops for the last 5 minutes of the boil. Turn off your burner, and now steep your last addition of fresh hops for 5 minutes, then cool your wort, fill your fermenter and ferment at 68 °F (20 °C) until fermentation is complete.

FRESH HOP BLACK IPA

(5 gallons/19 L, extract with grains)
OG=1.064 FG=1.016
IBU=60 SRM=33 ABV=6.3%

This beer is malty, smooth, with strong hop bitterness, and a wonderful fresh hop aroma to round it out. The use of Midnight Wheat (a dark grain without the harsh bitterness of many dark malts) gives this beer a lack of astringency common in dark beers. Then kick the hop aroma up a notch with the fresh hops and you will love this beer!

INGREDIENTS

6.6 lbs. (3 kg) light liquid malt extract syrup
1 lb. (0.45 kg) light dried malt extract
10 oz. (0.28 kg) Special Roast malt
0.5 lb. (0.22 kg) 10 °L crystal malt
0.75 lb. (0.34 kg) Briess Midnight Wheat malt
0.25 lb. (0.11 kg) wheat malt
6.5 AAU Warrior® hops (0.5 oz./14 g of 13% alpha acids) (60 min.)
8 AAU Cascade Hops (1 oz./28 g at 8% alpha acids) (60 min.)
1 tsp. Irish moss
8 AAU fresh Cascade Hops (5 oz./141 g

at 1.6% alpha acids) (0 min.)
White Labs WLP001 (California Ale)
WLP001 or Wyeast 1056 (American Ale) or Safale US-05 yeast
0.75 cup (150 g) corn sugar if priming

STEP BY STEP

Steep the crushed grains in approximately 2.5 gallons (9.5 L) of water at 155 °F (68 °C) for 30 minutes. Remove the grains from the wort. Bring the wort up to a boil, and add 1.0 lbs (0.45 kg) of the light dried malt extract. Now add the Warrior® hops, first addition of Cascade hops, Irish moss and boil for 60 minutes. Add the 6.6 pounds (3 kg) of liquid malt extract for the last 5 minutes of the boil and stir to thoroughly mix the wort and avoid scorching the malt extract to the bottom of your kettle. At the end of your 60-minute boil turn your heat off, and add the fresh Cascade hops. Stir the fresh hops into the beer for 5 minutes. Add the wort to about 2 gallons (7.5 L) of cold water in your sanitized fermenter, and top up to 5.25 (19.75 L) gallons. Cool the wort to 65 °F (18 °C) and add your yeast. Aerate your wort, and ferment at 68 °F (20 °C) until fermentation is complete.

ALL-GRAIN OPTION:

Replace the liquid and dried malt extracts with 11.5 lbs (5.2 kg) of 2-row pale malt. Mash at 155 °F (68 °C) for 60 minutes, then mash off at 168 °F (75 °C) for an additional 5 minutes and collect about 6.5 gallons (24.5 L) of wort. Boil for 30 minutes without any hop additions, then boil 60 minutes with the Warrior® and first addition of Cascade hops and Irish moss. Turn off your burner, and now steep the fresh Cascade hops for 5 minutes. Cool your wort, fill your fermenter and ferment at 68 °F (20 °C) until fermentation is complete. Bottle or keg as usual.

DESCHUTES BREWING CO.'S HOP TRIP FRESH HOP CLONE

(5 gallons/19 L, extract with grains)
OG=1.059 FG=1.017
IBU=42 SRM=14 ABV=5.4%

INGREDIENTS

6.6 lbs. (3 kg) light liquid malt extract
0.5 lb. (0.22 kg) light dried malt extract
14 oz. (0.39 kg) Caramunich® 60 °L
malt
11 oz. (0.31 kg) Dextrin malt
4 oz. (0.11 kg) Briess Extra Special malt
1 tsp. Irish moss
3.3 AAU Nugget hops (0.25 oz./7 g at
13% alpha acids) (60 min.)
2.6 AAU Centennial hops (0.25 oz./7 g
at 10.5% alpha acids) (60 min.)
5.25 AAU Centennial hops (0.5 oz./
14 g) at 10.5% alpha acids) (30 min.)
1 lb. (0.45 kg) fresh Crystal hops
(steeped 5 min.)
Wyeast 1187 (Ringwood Ale),
White Labs WLP005 (British Ale) or
Windsor dry yeast
0.75 cup (150 g) corn sugar if priming

STEP BY STEP

Steep the crushed grains in approximately 2 gallons (7.6 L) of water at 150 °F (66 °C) for 30 minutes. Remove the grains from the wort and wash the grains with 2 qts. (2 L) hot water. Bring the wort up to a boil, and add 0.5 lbs (0.22 kg) of the light dried malt extract. Now add your Nugget hops and first addition of Centennial hops and boil these hops for 60 minutes. 30 minutes into the boil, add your second addition of Centennial hops and Irish moss. Add the 6.6 pounds (3 kg) of liquid malt extract for the last 5 minutes of the boil and stir to thoroughly mix in the beer and avoid scorching the malt extract to the bottom of your kettle. At the end of your 60-minute boil turn your heat off, and add your 1 pound (0.45 kg) of fresh hops.

Stir the fresh hops into the beer for 5 minutes. Add the wort to about 2 gallons (9 L) of cold water in your sanitized fermenter, and top up to 5.25 (19.75 L) gallons. Cool the wort to 65 °F (18 °C) and add your yeast. Aerate your beer, and ferment the beer at 68 °F (20 °C) until fermentation is complete.

ALL-GRAIN OPTION:

Replace the liquid and dried malt extract with 11 lbs. (5 kg) of 2-row pale malt. Mash at 157 °F (69 °C) for 30 minutes, and mash off at 168 °F (75 °C) for an additional 5 minutes, then collect about 6.5 gallons (24.5 L) of wort. Boil for 30 minutes without any hop additions, then boil 60 minutes with your Nugget and first

addition of Centennial hops. Add the second addition of Centennial hops and Irish moss for the last 30 minutes of the boil. Turn off your burner, and now steep your 1 lb. (0.45 kg) of fresh hops for 5 minutes, then cool your wort, fill your fermenter and ferment at 68 °F (20 °C) until fermentation is complete. **BYO**