



# Hop Growing 101: An Introduction for Everyone, Including Non-Gardeners

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# What are hops?

- Humulus lupulus
- Annual
  - Bines die back in the fall, return in the spring
- Hearty... very hearty
- Varieties: see spreadsheet at [bit.ly/hops101](http://bit.ly/hops101)
  - Talk to other local growers
  - Suggestion: Cascade, Nugget, Columbus, Newport
  - Where are Amarillo, Citra, Simcoe, etc?

# Hop's evil cousin\* ...

	Hops	Marijuana
Kingdom	Plantae	
Order	Rosales	
Family	Cannabaceae	
Genus	Humulus	Cannabis
Species	<i>H. lupulus</i>	<i>C. sativa</i> , <i>C. indica</i>

Note the family  
resemblance:



\* With apologies to Heretic Brewing

# Growing hops: what you need

1. Location
2. Hop plant
3. Soil
4. Climbing structure



# 1. Location: where to grow hops

- Grow best between 30<sup>th</sup> and 52<sup>nd</sup> latitudes
  - Need lengthening and shortening days & cold period
- 6+ hours of sun
- Plant in the ground
  - Preferable to pots
  - Roots will spread, may need to be managed after a few years
- Plant in pot or other container
  - Use biggest pot you can, half barrel if possible
  - Roots will be constrained
  - Soil can get hot, may kill the hop in very extreme cases
  - Water must be able to drain out the bottom (holes + free space)



# Location: my solution

- A 2' x 2' in-ground "box" using 2x12 boards



## 2. Hop plant: rhizome

- A root cutting from a hop plant
- Hop varieties are clones
  - All Cascades are not only descendents of a single plant, they ARE that plant (genetically identical).
- Plant with white nodes facing up



## 2. Hop plant: crowns or starts

- Hop crowns or field-ready starts
  - Nursery has completed the first year of growth for you





# 3. Soil

- Hops prefer a loose, well-draining soil with high organic content, slightly acidic
- Suggested mix:
  - 2 parts (50%) potting soil with vermiculite or perlite
  - 1 parts (25%) compost/humus/manure
  - 1 part (25%) native soil
  - Add 1 part sand if native soil does not drain well



### 3. Soil: putting your hops in the ground

- Create a mound 6 to 12 inches tall
- Rhizome: place in 3-inch deep trench, white buds facing up, cover with soil
- Crown/start: line up crown's soil surface with top of the mound
- Pack down *very lightly* – you want contact with soil but without compacting it
- Cover with mulch: Keep roots cool & helps control weeds
- Do not over-water your new plants: moist, not flooded!

## 4. Structure

- Hops need something to climb, typically string
- 2 strings per plant is typical
- Ideal height: 20+ feet
  - Not always practical: you need to get up there to harvest!
  - Most hop cone production is at the top of the plant, so don't provide a climbing structure higher than your ladder.

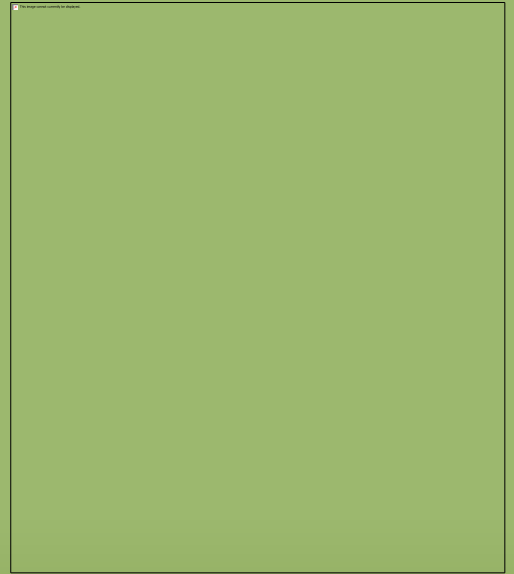
## 4. Structure: straight ropes

- Hang a rope from your roof's edge, balcony, etc.
- Plus: Inexpensive or free
- Minus (potential): need to climb up there at harvest



## 4. Structure: flag pole

- Plus: can lower the strings for harvest
- Minus: plant tops converge
  - “Rat’s nest”: picking different varieties apart will be difficult
  - Solution: single variety, or compatible varieties. Ex: Cascade + Centennial



## 4. Structure: horizontal cable

- String a solid cable horizontally between poles or trees, tie climbing strings to it
  - Similar to commercial growers
- Must be well engineered



## 4. Structure: horizontal cable (cont.)



## 4. Structure: pergola & other structures

- Any structure to hold up the climbing strings will work
- There are many, many solutions... the only limit is creativity





## 4. Structure: pergola & other structures



## 4. Structure for apartment dwellers

- Problem: hops want to climb straight up



# 4. Structure for apartment dwellers

- Solution: Go diagonal or even horizontal
  - Must be manually trained every few days



## 4. Structure for apartment dwellers

- Can be applied to fences



## 4. Structure for apartment dwellers

- Can be applied to fences (cont.)



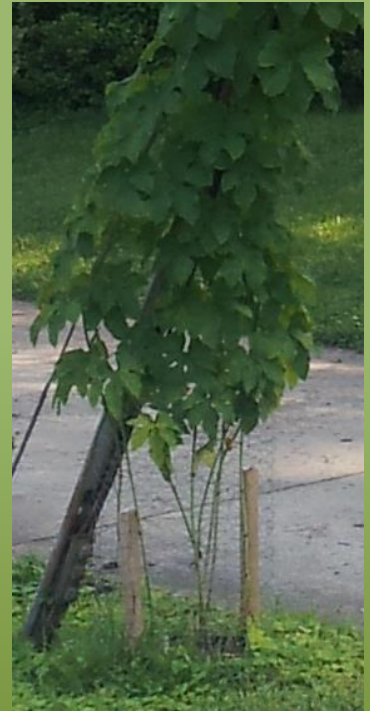


## 4. Structure: what ropes to use

- Traditional: Coir, made from coconut hair
- Rolled paper twine is quite popular
- Thick jute twine
- Avoid slick synthetic ropes that are perfectly smooth
  - The bines' hairs won't be able to grip

# Maintenance during the growing season

- Weeding
- Watering
  - Need for water will increase
- As the plant grows prune leaves from bottom of the plant
  - Clear the bottom 2-3 feet of leaves
  - Lower leaves will naturally yellow and fall off
- First year: do not cut any of the bines, let them all grow
  - Second year and on: 2 strings per plant, 2-3 bines per string





# Maintenance during the growing season

- Fertilizing: hops are rapid growing plants, need a lot of nutrition
  - Basic: apply an even-numbered fertilizer (6-6-6, 11-10-10, etc.) every 3 or 4 weeks throughout the growing season
  - Advanced: Emphasize the N in NPK early in the season (12-5-5), more P & K during later half for cone development (5-12-12).
  - Follow dilution instructions... in fact, better to slightly over-dilute



# Pests & Diseases

- Most common pests: aphids and spider mites
  - Combat with: spray underside of leaves with water to knock off bugs, spray soapy water or neem solution on leaves... or chemicals
- Most common diseases: downy mildew and powdery mildew:
  - Combat with more sun, keeping leaves dry, removing sick leaves... or chemicals
  - Spots on leaves may also be from nutritional deficiencies – very confusing!



# When are my hops ready to harvest?

- Cones produced on side-arms
- Cones ready for harvest when:
  - Feels papery
  - Crunch test:
    - Squeeze and it bounces back immediately
    - Hold up to ear: Sound crinkly when squeeze, like scrunched paper
  - Cone has “opened up,” is not tightly closed
  - Some tips of the cone’s bracts (“petals”) just started to turn brown
  - Lupulin glands are abundant and dark yellow
- Cones will not mature evenly: cones at the top will be ready before the lower ones
- First year harvest typically smaller than subsequent years





# Drying the hops

- If not used immediately, hops must be dried to prevent mold and to ensure that they freeze without damage
- USE AIR MOVEMENT, NOT HEAT, TO DRY THE CONES
  - Ideally, keep temps under 100°F
- Keep away from direct sun
- An air-conditioned room is ideal
- Goal: reduce weight by 75-80%
  - 1 pound fresh → 3¼ - 4 oz dried

# Drying the hops: window screen

- Spread out the cones on a window/patio door screen
  - Single layer of cones, do not stack
- Set up a fan to gently blow over or across them
  - As the cones dry they will become lighter: too much wind will blow them away
- Turn over at least once a day
- Should be dry in about 3 days



# Drying the hops: furnace filters

- Spread out the cones on a furnace filter
  - Single layer of cones, do not stack
- Stack another filter on top, repeat
  - Lid: use a filter to seal in the last layer
- Use tape to hold filters together
- Set on a box fan and force air through the filters
- Optional: turn over, to blow air in opposite direction
- Should be dry in about 3 days





# Getting ready for next year

- Ideal: harvest without cutting down the bines
    - If you do cut them, try to leave as much of the bottom as you can (most of the hops will be at the top)
- Why? After harvest, the hop plant will build up its energy reserves for next year. More leaves = more energy = healthier start
- After bines die and wither, cut to within 2” of soil
  - Cover with a little additional mulch (optional)
  - Wish them a pleasant and well-deserved rest

# Using fresh hops: harvest ale

- Using hops with uncertain AA% = late additions
  - Last 10 minutes of the boil
- Use 5x the weight you normally would
  - Remember: 1 pound fresh → 3¼ - 4 oz dried
- Go fresh: straight from bine to kettle!
- Recipe ideas:
  - Use a simple grain bill
    - Ex: 80% 2-row, 10-15% Vienna/Munich/Wheat, & Crystal
    - Use commercial hops for bittering addition
  - Do not dry-hop with wet hops





# Never buy hops again?!?

Hop independence? In my opinion: *No*

- Unknown AA% for bittering
  - But testing for growers is starting
  - Could do trial an error: make many batches, estimate IBUs
- Proprietary varieties not available
  - Amarillo, Citra, Simcoe, Athanum, Mosaic, etc.
- “Terroire”: origin affects flavor
  - Today’s standard of American hops: West Coast
  - Your Cascades may not align exactly with your expectation of Cascade, your Saaz will be slightly different than commercial Saaz





# Additional resources

- Local growers
  - Ask your homebrew club
- For the Love of Hops, by Stan Hieronymus
- Online forums
  - <http://www.homebrewtalk.com/f92/>
  - <http://www.homebrewersassociation.org/forum/index.php?board=192.0>
  - <http://forums.morebeer.com/viewforum.php?f=16> (*look for hop threads*)
  - [http:// www.thebrewingnetwork.com/forum/viewforum.php?f=21](http://www.thebrewingnetwork.com/forum/viewforum.php?f=21)
  - Etc...

# Questions?

