Hops – a new specialty crop in Connecticut

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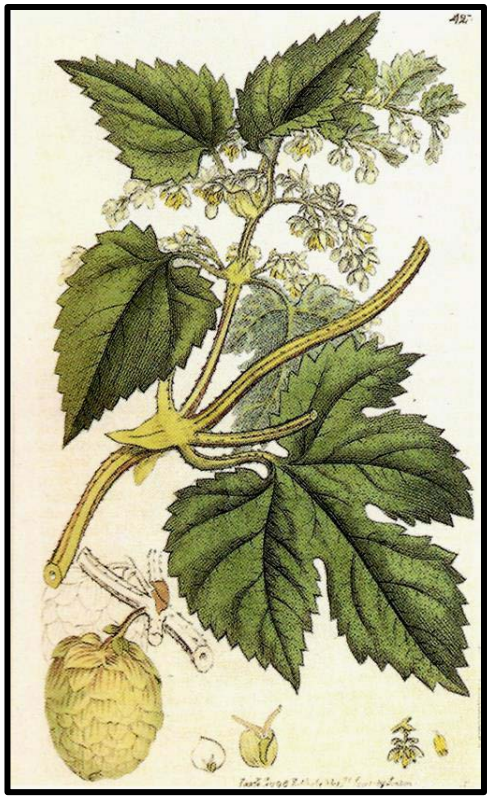
Profile: Hops

- Family: *Cannabaceae*, hemp family
- Species: *Humulus lupulus*, *H. japonicas*, *H. yunnanensis*
- Monoculture
- Perennial climbing plant
- An average growth of 4 inches, up to 12 inches daily
- The height of the trellis system is 16 to 22 feet



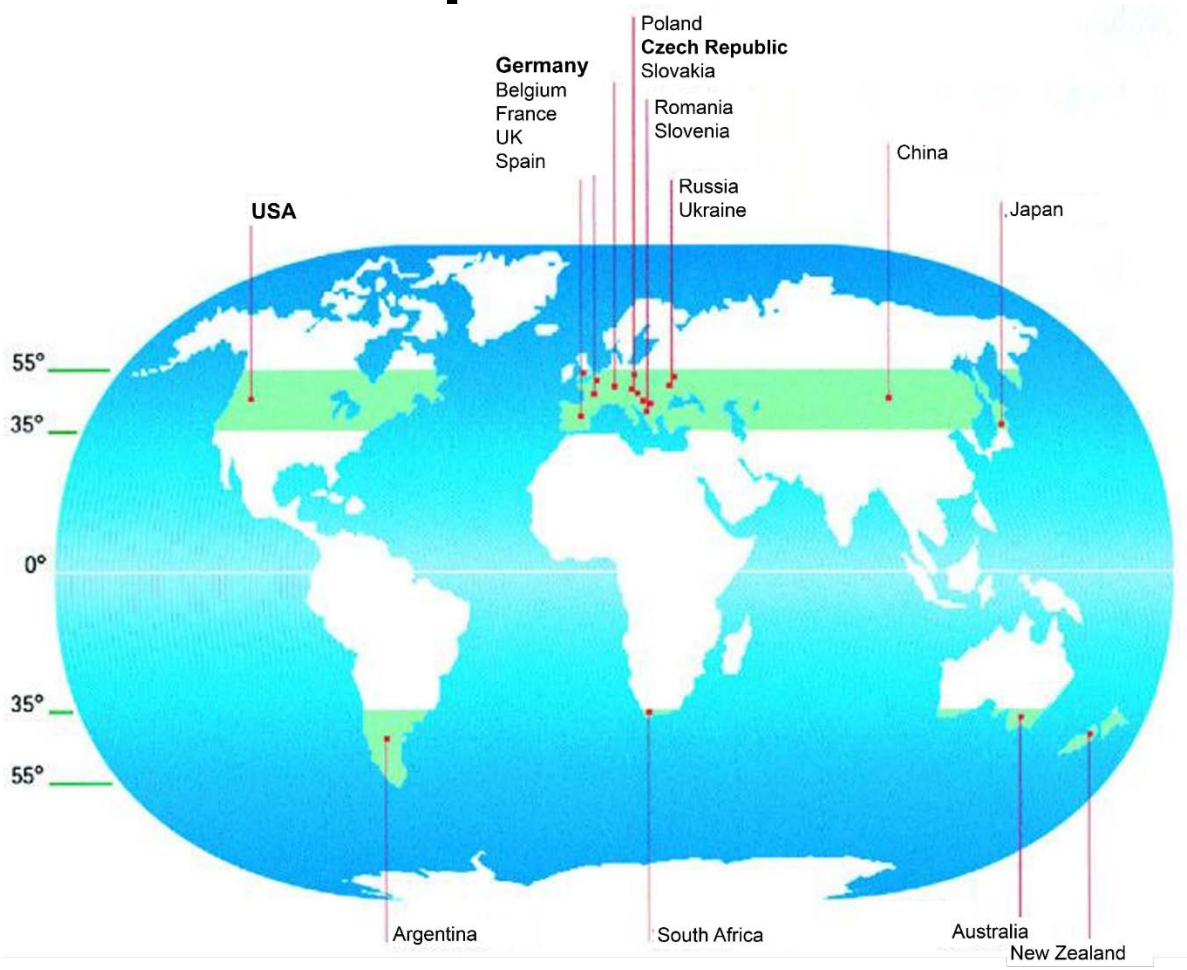
Cooper Engraving of *Humulus lupulus* from 1796 (Barth et al. 1994)

Profile: Hops

- <u>Distribution:</u>

temperate climate

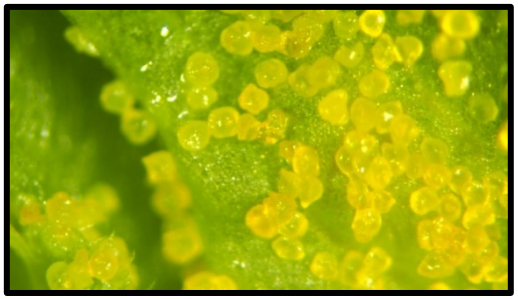
35th – 55th degrees of latitude



Profile: Hops

- Application: beer, calmatives in medicine, cosmetics, additive to liquors

- Brewing: cones of female hops
- α-acids, β-acids, essential oils: produced in lupulin glands
- Bitterness, aroma, foam, flavor, stability, antimicrobial activity



Profile: Hops

Female inflorescence or burr

Mature hop cones

Profile: Hops

Male inflorescence

http://www.aphotoflora.com/d_humulus_lupulus_hop.html

Fertilized cones

http://www.lfl.bayern.de/ipz/hopfen/108626/index.php

Destroy male hops!
Danger of wild hops!

History

Fossilized hops pollen

Paleolithic times:
medicine

5th century:
1st documented hop cultivation in Europe

1880:
peak in NY

1872:
moved to Washington State

1920:
enactment of Prohibition

1950s:
half of the world production in Pacific Northwest

Today:
Germany and US are the biggest producers (ca. 30,800 t)

How to start

- Location
  - Soil quality: soil texture, good drainage, pH 6 – 6.8
  - Sun exposure
  - Wind
- Size of the hop yard
- Design: high, low trellis system or hedgerow
- Choice of varieties:
  - 80 - 120 different varieties
  - Bittering, aroma, dual purpose
- Equipment

Hop yard set up

http://pages.et4.de/de/landkreis-pfaffenhofen/streaming/detail/POI/40245B47209BBEF6364058A705D671EF/hallertauer-lehrpfad

Hop yard set up

Hedgerow

https://twitter.com/stanhieronymus/status/470550224726155265

http://www.britishhops.org.uk/history-of-hops/

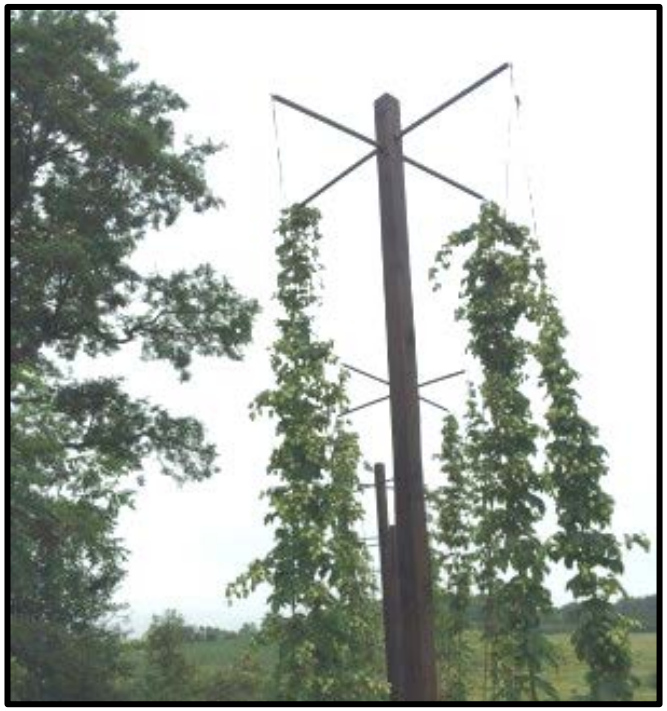
Hop yard set up

Hobby hop yards

http://www.homebrewtalk.com/showthread.php?t=309115

Hop yard set up

Hobby hop yards



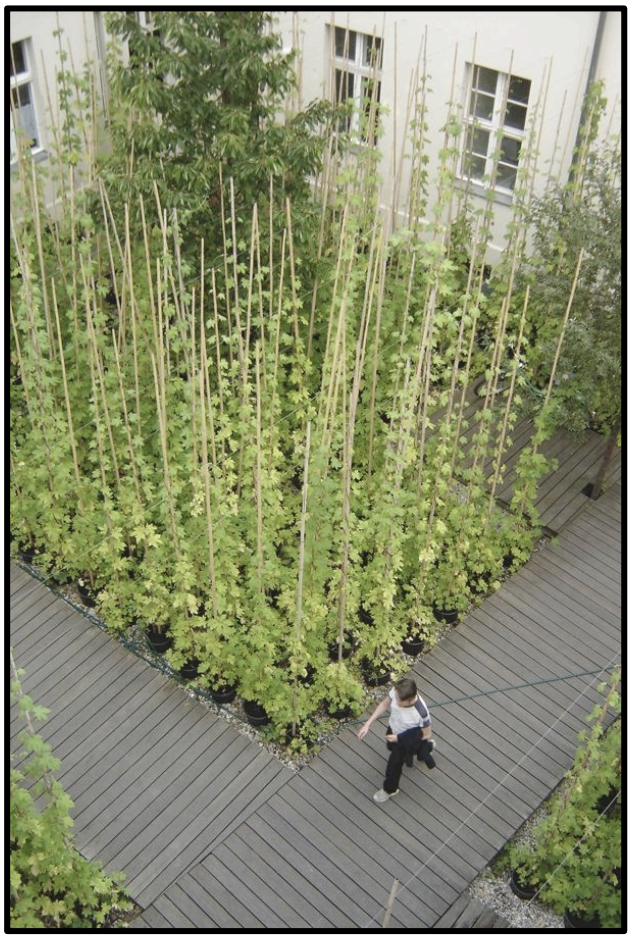
http://www.growinghops.net/how-to-grow-hops/

http://www.hoptomology.com/2011/07/11/brewing-with-the-brewmaster-at-black-creek-historic-brewery/

Hop yard set up

Hobby hop yards

http://bluebellhopyard.com/photos/hopyard-shots/



http://upknorth.com/blog/brew-your-own-beer-grow-your-own-hops

TO DO: Spring

- Prune the crowns (prevention of diseases, rejuvenation of the rootstock)
- Get the trellis system ready
- Train 2-3 bines per twine, 2-4 twine per plant
- Prune redundant shoots
- Re-train
- Fertilize
- Weed control

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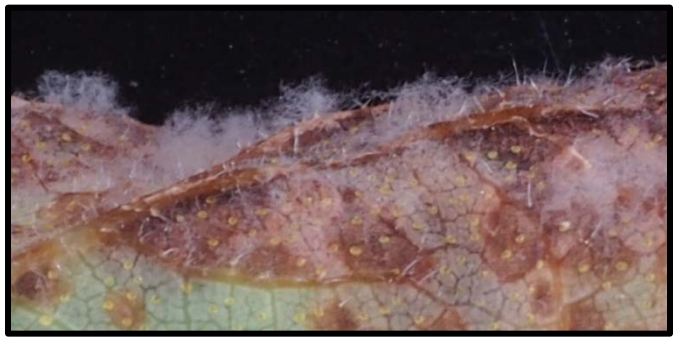
Let it grow

- Check the hops weekly
- Scout for diseases and pests weekly
- Check the weather
- Fertilize
- Irrigate
- Weed control
- Strip off the lower leaves (control of diseases and pests)

Diseases and Pests

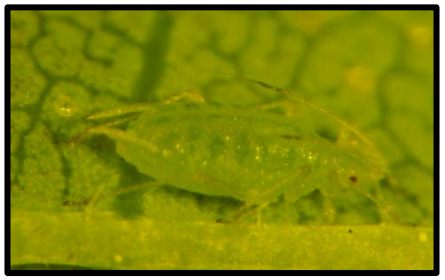
- Diseases caused by fungi and mildews
  - Downy mildew, powdery mildew, Verticillium wilt…



Diseases and Pests

Potato leafhopper

- Arthropod pests
  - damson-hop aphids, two-spotted spider mites, leaf hoppers, Japanese beetles…



Aphids

Spider mites

Diseases and Pests

Hop mosaic virus

Apple mosaic virus

- Viruses and viroids
  - Carlavirus complex, Apple mosaic virus, Hop stunt viroid…

Disease and Pest Management

- Knowledge of the diseases and pests
- Monitoring weekly (economic threshold)
- Biocontrol
- Chemical Application
- Resistant or tolerant cultivars
- Certified rhizomes
- Cultivation (tillage, pruning, stripping of the lower leaves, removing diseased leaves or plants…)
- Disinfection of the equipment
- Weed management
- Irrigation and fertilizer management
- Weather condition

Integrated Pest Management

TO DO: Summer - Fall

- Harvest: cut the bines and separate the cones (21-27% dry matter)
- Mid August to mid September
- Dry the cones, eventually bale or/and vacuum pack, pelletize

Harvest

By hand

- 500 person hours / 1000 plants (1 acre) -> ca. 60 people for 8 hours
- < ¼ acre hop yard

Harvester

- 120 – 1000 bines/hour
- $5,000 – $45,000

Drying

- 8 - 10 % moisture
- 120 - 168°F for 4 - 10 hours

Hop kiln

http://www.washingtonbeerblog.com/2012-hop-harvest-pictures-words/

Storage and Pelletizing

- Compression of hops into bales, pellets or plugs

http://www.fwwarehousing.com/brewery-needed-custom-cold-storage-solution-for-warehousing-hops/

http://djcoregon.com/files/2010/03/0308_indie_hops_hubbard_booco_1.jpg

Quality

- α- and β-acids
- Oil content
- Chem. compounds of volatile oil
- HSI (hop storage index)

Pricing - Marketing - Selling

- ½ acre hops: home brewers or a small brewpub
- At least 1 (-10) acre for achieving profit

- $6 – $12 a pound for pelletized and leaf hops
- $4 - $8 a pound for wet (fresh) hops
  -> $8,000 to $16,200 per acre
- BUT: too early to predict the price for the East

- 10 acres = $400,000 - $500,000 investments
- Min. 5 years to repay the investment

TO DO: Fall - Winter

- Cut the bines back after the first frost in November

What's going on in CT?

- Smokedown Farm, Sharon, 9 acres (9 000 plants)
- Pioneer Hops of CT, South Farms, Morris, 5.5 acres (6 900 plants)
- DeFrancesco Farm, Northford
- CAES: Trial hop yards at the Valley Laboratory in Windsor and Lockwood Farm in Hamden

- Small scales:
  - Two Roads Brewing Co., Stratford
  - Black Hog Brewery, Oxford
  - Kent Falls Brewing Company, Kent

- Connecticut Hop Growers Association

What's going on in CT?

- Pioneer Hops of CT, South Farms, Morris

CAES hops

- Valley Laboratory, Windsor

CAES hops

- Lockwood Farm, Hamden

CAES hops

- 5 varieties: AlphAroma, Cascade, Newport, Perle, Summit
- 10 more varieties at Windsor, ca. 50 varieties at Lockwood Farm
- Low and high trellis systems

CAES hops

- Aim
  - Is it possible to grow hops successfully in CT?
  - Evaluation of yields, growing characteristics, susceptibility to diseases and pests
- Results
  - Best varieties: Cascade (high trellis), Summit (low trellis)
  - High trellis system
  - Perle: smallest growth and lowest yield
  - Diseases: downy mildew (AlphAroma)
  - Pests: potato leafhoppers, spider mites, aphids
- Conclusion
  - We have proven the feasibility of hop production in CT.

Thanks to:

- Dr. James LaMondia & team
- James Preste & team
- Richard Cecarelli & team
- American Dwarf Hop Association
- The CT Dept. of Agriculture

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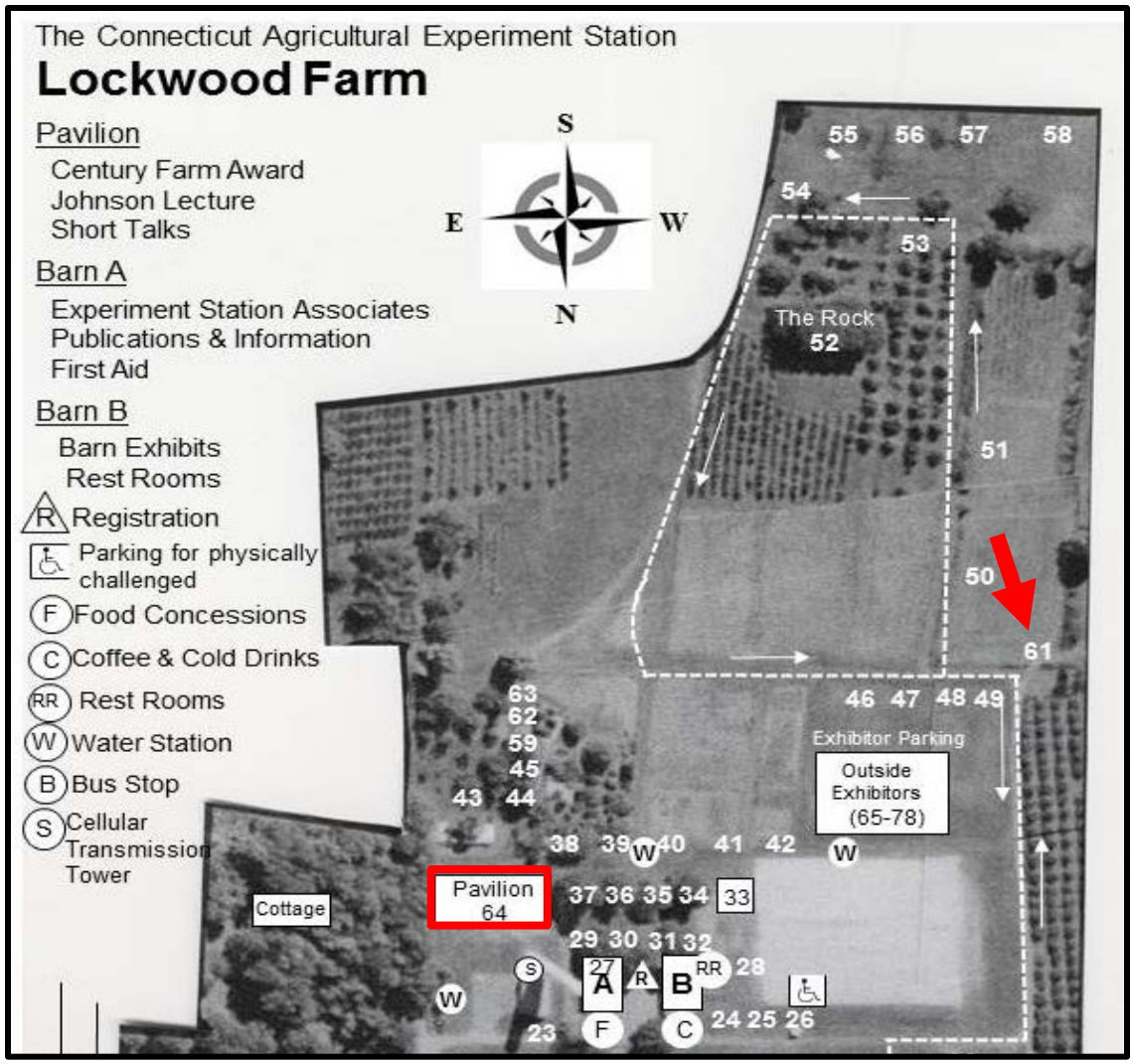
Where do you find our hops?




Questions?





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