Growing Hops in the South Atlantic: The Basics

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Hops in the Brewing Process

Hop cones are used for **bittering** and **aroma**
Hop BASICS

A “hop” is the cone (flower) produced on the female plant
Hop “bines” climb clockwise up coir string, ~15-20’ tall
Only female plants are used for production
Hops can live for 10+ years
Lupulin Glands: Acids, Resins, Oils!
Lots of biomass = Big trellis

In-Line Trellis at Kelly Ridge Farm (courtesy of David Goode, Piedmont Hops)
Hops are Hardy Herbaceous Perennials!

Winter dormancy (tops die back)
Spring regrowth
Vegetative stages (summer)
Reproductive stages (summer)
Hop Production in U.S.
43,000 Acres = $345m

75% in Washington State

90+% in Pacific Northwest

30 Acres in VA
Why not here?

They’ve been around for centuries in Mid-Atlantic, but production shifted West...

Challenges include:

- Daylength
- Pests and pathogens
- Available cultivars
- Costs of establishment and maintenance
- Few resources for growers

*But that’s changing!*
Challenge: Daylength
Long days = high yields

90+% in Pacific Northwest
75% in Washington State

30 Acres in VA
# Case Study: Production in Virginia - Trending Up?

<table>
<thead>
<tr>
<th></th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
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<tbody>
<tr>
<td>Total plants</td>
<td>13,371</td>
<td>13,912</td>
<td>22,959</td>
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<tr>
<td>Total estimated yield, dried basis</td>
<td>1,622</td>
<td>1,102</td>
<td>2,662</td>
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Site Selection Considerations

Full Sun
Well-Drained Soil
Good Air Flow
pH 6.2

Soil test:
  High N, P, and K needs
  “75” hops crop code for VT soil test

Amend soil early
Irrigation: a must!
Challenge: Cost of hop yard establishment

- $8,000 to $15,000 per acre
- Economies of scale
- Land prep
- Posts (20’-24’ tall) and wire
- Installation
- Plants
- Drip irrigation system
3 Types of Trellis Systems
(Trellis slides courtesy of David Goode, Piedmont Hops)

InLine- Row of poles with a row of cable for each row of hops.

Grid- A field of poles with interconnecting cables to support multiple rows of hops. Some rows of hops have no poles.

Tepee - Single pole with a ring of hops crowns around it, each strung to the top of the pole.
Which is right for you?

Things to consider.

Financial capabilities
Amount of land dedicated to hops
Business Plan
Equipment on hand
Own personal comfort levels
In Line Trellis
In-Line Trellis at Kelly Ridge Farm
Grid Trellis at Huguenot HoPS, LLC
TeePee/Maypole at Bracken Brae Farm, NC

(Trellis slides courtesy of David Goode, Piedmont Hops)
Challenge: Pests and Pathogens

Mid-Atlantic: hot, humid, lots of pests
- Hops downy mildew
- Powdery mildew
- Numerous other fungal diseases
- Virus/viroids
- Japanese beetles, spider mites, potato leafhoppers, aphids, stink bugs and much, much more
Challenge: Pests and Pathogens

Preventative spray program, esp. for fungal diseases
   Every 7-10 days
Pay attention to pre-harvest intervals
Organic production – difficult but not impossible

Help with product selection: VCE Pest Management Guide: Hops and North Carolina Extension resources
Pest and pathogen control

Spraying method for small growers is challenge #1!

Air blast sprayer/orchard sprayer=ideal for coverage
Challenge: Maintenance (time + $$$)

Planting
Pruning shoots
Training bines up twine-clockwise, ~3 shoots per string
Weed control
Stripping lower leaves for disease control
Monitoring and treating for pests and pathogens
Irrigation (drip) and fertilization (lots)
Challenge:
Cultivars Brewers Want

Citra
Double IPA
INDIA PALE ALE

THIS BEER IS ALL ABOUT THE HOPS.
Citrus, Mango and Pineapple aromas abound; but make no mistake, there is no fruit here, just a serious dry-hop regimen of Citra and Amarillo hops. We put in just enough malt backing to balance out the flavor, but Citra Double IPA is as close as it gets to chewing on a hop vine. Enjoy this one fresh — at least while you can get your hands on it!
Popular Cultivars in the South Atlantic

Cascade
Chinook
Nugget
CTZ
.....and many others
2015 Cultivars in Virginia

2015 Hop Cultivars Reported in Virginia, Shown by Number of Plants and Percent of Total Plants

- Cascade, 9376, 67%
- Chinook, 1532, 11%
- CTZ**, 1099, 8%
- Nugget, 428, 3%
- Centennial, 222, 2%
- Magnum, 149, 1%
- Willamette, 144, 1%
- Mt Hood, 64, <1%
- Sorachi Ace, 51, <1%
- Other*, 847, 6%
2016 cultivars in Virginia

2016 Hop Cultivars Reported in Virginia,
Shown by Number of Plants and Percent of Total Plants

- **Cascade**, 11596, 51%
- **Chinook**, 3345, 15%
- **Nugget**, 2446, 11%
- **CTZ**, 1397, 6%
- **Willamette**, 864, 4%
- **Crystal**, 496, 2%
- **Centennial**, 412, 2%
- **Fuggle**, 312, 1%
- **Newport**, 232, 1%
- **Northern Brewer**, 145, 1%
- **Sorachi Ace**, 104, <1%
- **Golding**, 92, <1%
- **Pacific Gem**, 78, <1%
- **Canadian Redwine**, 76, <1%
- **Southern Cross**, 75, <1%
- **Spalter Select**, 73, <1%
- **Other**, 1216, 5%

*To protect the confidentiality of grower data, the “other” designation was utilized for any cultivars with fewer than 50 reported plants in the state OR any cultivars grown by only one respondent. The “other” category also includes data from growers who reported plants but did not specify cultivars or provide data by cultivar.

**Totals for plants reported as “CTZ,” “Columbus,” and “Zeus” were combined and reported as “CTZ.”**
Planting options

Start with....
Field-grade plants
Clean rhizomes

Space plants 3-7 feet apart

Buy clean plant material from an inspected nursery!
Challenge: Harvesting

Pick by hand

1 hour to pick ~1 lb
1 lb of wet hops ~$12-20

(For comparison, you need ~4x the volume of hops to make 1 lb dried hops. 1 lb dried hops can sell for similar price range or even less)

Picking machines: $10,000+

Some growers have harvesters available for sharing.
Mechanization: Big Wolf Machine and Small Machines
Hand Labor = Agritourism?
Fresh, green hops (picked at the right time, not just any time!) = WET hops.

Hops dried to low moisture level and ready for longer-term storage = DRIED hops (may be whole-cone or “leaf”)

Hops dried + processed with equipment = PELLETIZED hops...WHAT BREWERS WANT
(also consistent and uniform supply)
Marketing options for Hops

Craft brewers
Home brewers
Herbal Products

Sell wet, dried (whole leaf), or Milled and pelletized
How Are We Marketing?

Hop Marketing Strategies

- Other(s)
- Buyers found me first
- Home brewer targeting
- Diversified product offerings
- Product samples
- Farm tours/events
- Online sales
- Phone calls
- Videos
- Website
- Blog
- Other social media platform(s)
- Facebook
- Email
- "Cold call" brewery visits
- Networking with brewers

Number of respondents utilizing strategy
# Grower Classification

<table>
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<tr>
<th>Grower Classification</th>
<th>Percentage of Respondents Matching Criteria</th>
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<tr>
<td></td>
<td>2015</td>
</tr>
<tr>
<td>I am growing hops commercially/ I intend to sell my hops</td>
<td>48%</td>
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<tr>
<td>I am currently growing hops for my personal use/ for non-commercial purposes</td>
<td>24%</td>
</tr>
<tr>
<td>I am not yet growing hops, but planning on it</td>
<td>9%</td>
</tr>
<tr>
<td>Other</td>
<td>8%</td>
</tr>
</tbody>
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*If applicable, grower could choose more than one personal classification on the 2016 survey; 51 respondents provided 56 reactions to the grower classification chart.
46 people participated in the survey question assessing the form in which hops were sold:
54.4% reported selling hops “wet/fresh/green”
35.8% reported selling hops dried, but not pelletized
6.5% reported selling pelletized hops
28.3% indicated that they did not sell their hops or that this question was not applicable for their situation. Some survey participants noted that they grew hops for their own use.

20 people reported that they were able to sell their entire 2016 harvest.
21 people reported that they did not sell their entire 2016 harvest
Why not?
Grower did not possess, or could not access, processing infrastructure
Grower experienced quality issues related to weather and pests
Grower could not secure interest from local brewer
Grower had insufficient yield due to plant maturity, pest pressure, and/or other variables
Grower was unable to preplan a wet hop sale to a brewer
I’m interested in hops! Hops are COOL!

“I’m looking for some income after I retire.”
“I have [X] acres I’m not using.”
“My yard is next to the woods in the shade.”
“I’m looking for an easy crop to try.”
“...but I don’t use email or the internet.”
“Who will buy my hops if I sell them?”
“I like craft beer.”

Needed: reasonable expectations plus lots of research, time, and money
Small Growers: know what You are getting into

Hops in this region are:
A “market your own crop” crop, for now
Labor-intensive
Not a get-rich-quick crop (it’s farming!)

Labor: For now, growers use agritourism, extended family, people off the street.....

Income is delayed—plants take 3 years to mature
Start small, consider market first.

- Shareable pickers and regional processing equipment: future opportunities?
Grower Experience: 2014

2014: Years of Experience Growing Hops

- Not yet growing: 10
- 1 year: 9
- 2 years: 10
- 3 years: 3
- 4 years: 4
- 5 years: 1
- 6 years or more: 4
- Other: 1

Number of Respondents
Grower Experience: 2015 and 2016

2015: Years of Experience Growing Hops

2016: Years of Experience Growing Hops
Matching yields/prices from PNW is challenge, BUT, South Atlantic growers have unique opportunities:

- Wet hops
- Local premium/local value system
- Dried/pelletized hops: profitable? Still experimenting
- Agritourism-hop picking events solve some labor problems
- Restaurants, hop smashes, and non-traditional outlets

Growing organically-feasible?

Hop growing crowd is diverse: some do it for fun; some are striving for return on investment
Challenges Associated with Growing Hops

- Other(s)/Additional commentary
- Juggling on-farm and off-farm jobs
- Costs-establishment and infrastructure
- Cost (or opportunity cost) of labor
- Cost of inputs and materials
- Processing hops-costs and availability of equipment
- Labor availability at harvest
- Labor availability during the growing season
- Pricing hops for appropriate returns
- Marketing-time to devote to marketing
- Marketing-finding buyers and making sales
- Finding or gaining education/resources/knowledge
- Soil fertility management and plant deficiencies
- Maintaining organic production practices
- Treating pest and diseases
- Insect damage: Japanese beetles, hop aphid, potato...
- Occurrence of diseases: Hops downy mildew, powdery...
- Overall profitability
- Overall crop management

Number of respondents who identified this item as one of their "top 5" challenges
Perceptions and Outlooks Associated with Virginia Hops

- Personal fulfillment/enjoyment associated with Virginia hops production
- Enterprise profitability associated with the Virginia hops
- Long-term viability of the Virginia hops industry
- Current viability of the Virginia hops industry
- Future interest in backyard/hobby hops production
- Current interest in backyard/hobby hops production
- Future demand for Virginia-grown hops
- Current demand for Virginia-grown hops

Participants Choosing Rating

- No Response
- Strong
- Good
- Neutral
- Fair
- Weak
http://www.ext.vt.edu/topics/agriculture/commercial-horticulture/hops/index.html
Resources...

https://www.ces.ncsu.edu/fletcher/programs/nchops/

NORTH CAROLINA HOPS PROJECT
NC STATE UNIVERSITY HOPS RESEARCH AND VARIETY TRIAL

PROJECT

- INTRODUCTION
- METHODS
- VARIETIES
- RESEARCH (2010-2011)
- CONTINUING RESEARCH (2012-2014)
- STATE OF INDUSTRY
- ENTERPRISE BUDGET
- ABOUT US

ADDITIONAL

- CONTRIBUTING FARMS
- RESOURCES
- PHOTO GALLERY - 2010
- PHOTO GALLERY - 2011
- PHOTO GALLERY - 2012
- PHOTO GALLERY - 2013
- PHOTO GALLERY - 2014

PROJECT INTRODUCTION

Spurred on by the demands of a burgeoning craft brewing industry and a strong public interest in locally grown ingredients, farmers are experimenting with hops (Humulus lupulus) as an alternative income source. Over the past seven years, an increasing community of growers across North Carolina have established hop yards and sold their product to local craft breweries and home brewers. The majority of information and figures regarding hops production in the U.S. is developed for the Pacific Northwest hops industry and is not intended for the unique agronomic, economic, and environmental conditions found in North Carolina. The objective of this project is to help identify the best performing hop cultivars, promising geographic areas for hops production, and the key issues related to nutrition, disease, and pest control.

In addition, local market conditions and production costs will also be addressed.

In 2010, with support from the Golden Leaf Foundation, an experimental hop yard was established at the Lake Wheeler Road Field Laboratory in Raleigh, North Carolina. The experimental hop yard includes 200 total hops plants on 1/4 of an acre. The hop yard contains 10 different U.S. hops varieties planted randomly throughout the experimental site. The varieties were selected based on their range of alpha acid content (bitterness), yield potential, disease and pest resistance, total U.S. production, and demand by local craft breweries. The site is designed to test which hop varieties are best suited for North Carolina's unique growing conditions and which varieties offer the greatest potential for commercial production. After two growing seasons, the varieties planted show significant variation in their vigor, height, yield, maturity times, pest and disease resistance, and overall agronomic health. For example, while 7 of the 20 plants of the variety 'Zeus' are at the top of the 12 foot trellis and producing cones,
Industry Organizations

Old Dominion Hops Cooperative
Southern Appalachian Hops Guild
Northeast Hop Alliance
Hop Growers of America

....and others!
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