



# Growing Hops in the South Atlantic: The Basics

Laura Siegle

Agriculture and Natural Resources Extension Agent-Amelia  
County

Virginia Cooperative Extension

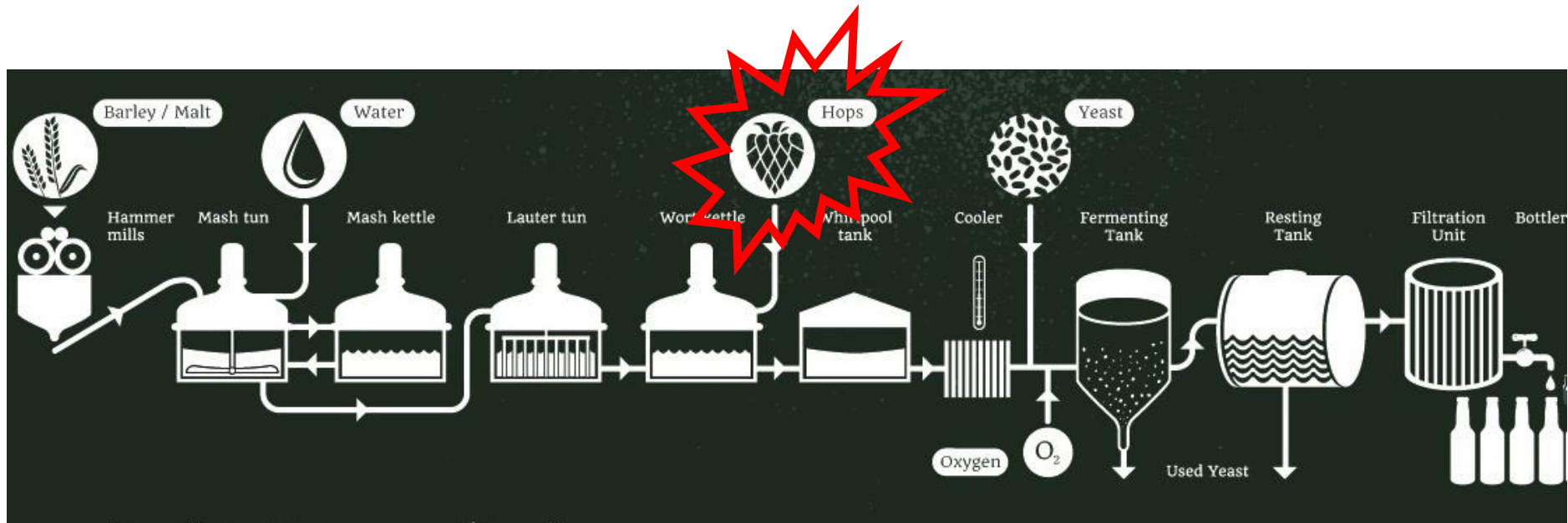
Dr. Holly Scoggins

Associate Professor-Horticulture  
Virginia Tech





# 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!

A wide-angle photograph of a hop field. Rows of hop plants are growing in a field, supported by wooden posts and wires. The plants are lush green and appear to be in the vegetative or reproductive stages. The field extends to the horizon under a clear sky.

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!*



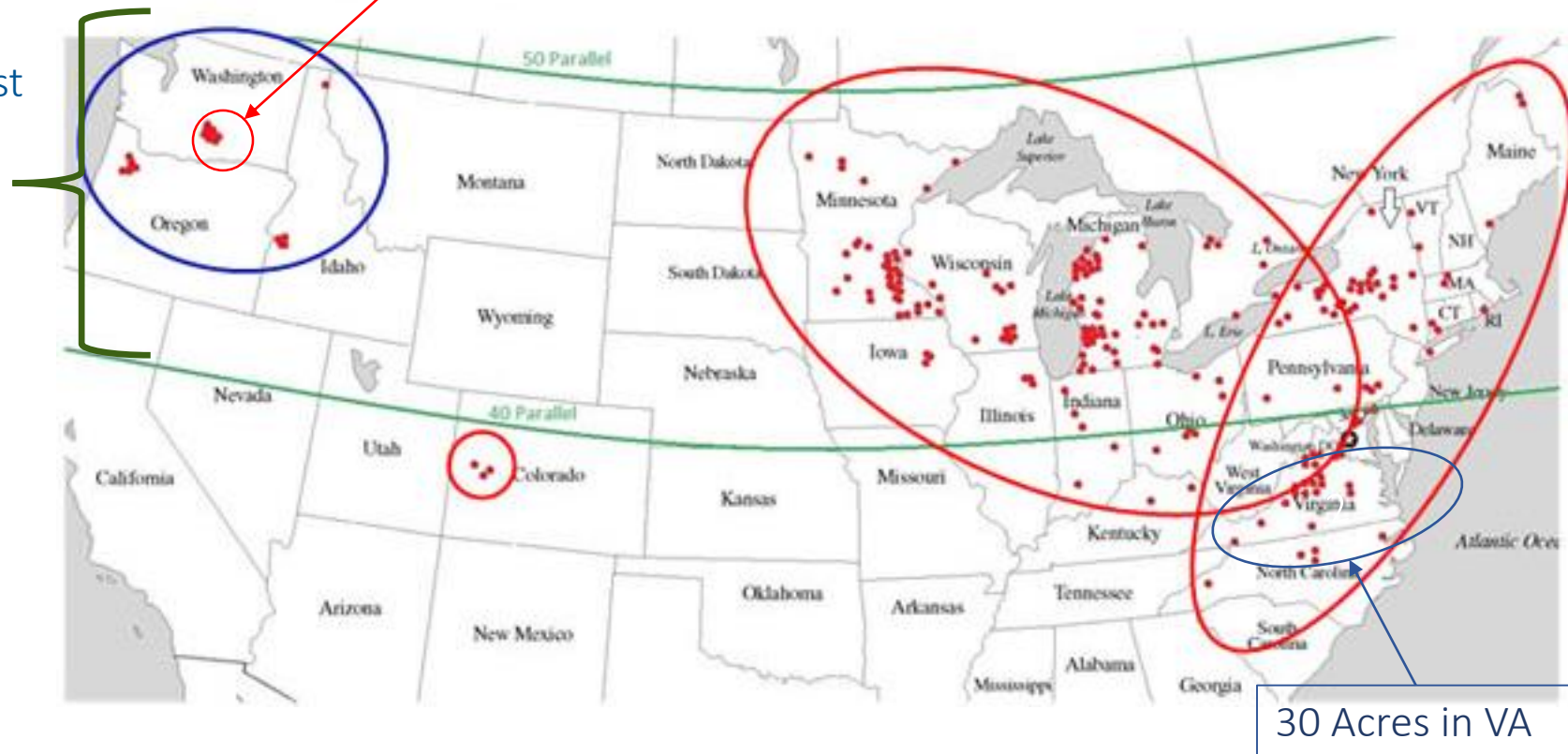


# Challenge: Daylength

## Long days = high yields

90+% in  
Pacific  
Northwest

75% in  
Washington  
State



# Case Study: Production in Virginia- Trending Up?



Year-by-Year Comparison of Plant Totals and Reported Yield			
	2014	2015	2016
Total plants	13,371	13,912	22,959
Total estimated yield, dried basis	1,622	1,102	2,662



# 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







# Kelly Ridge Cont







# Grid Trellis at Huguenot HoPS, LLC





# TeePee/Maypole at Bracken Brae Farm, NC







# 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 vines 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)







# Popular Cultivars in the South Atlantic

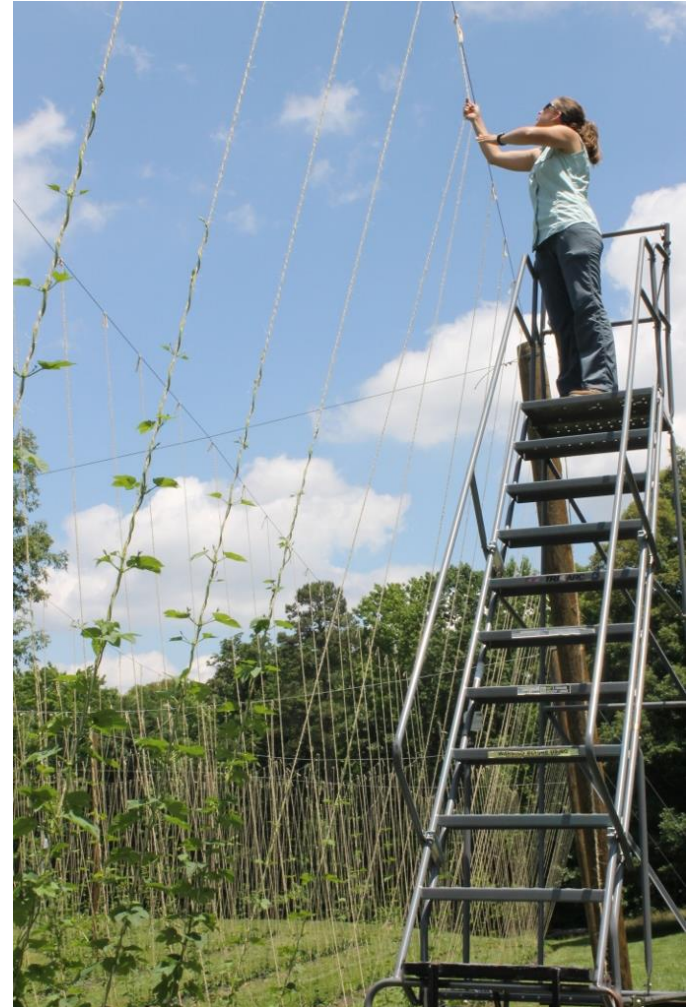
Cascade

Chinook

Nugget

CTZ

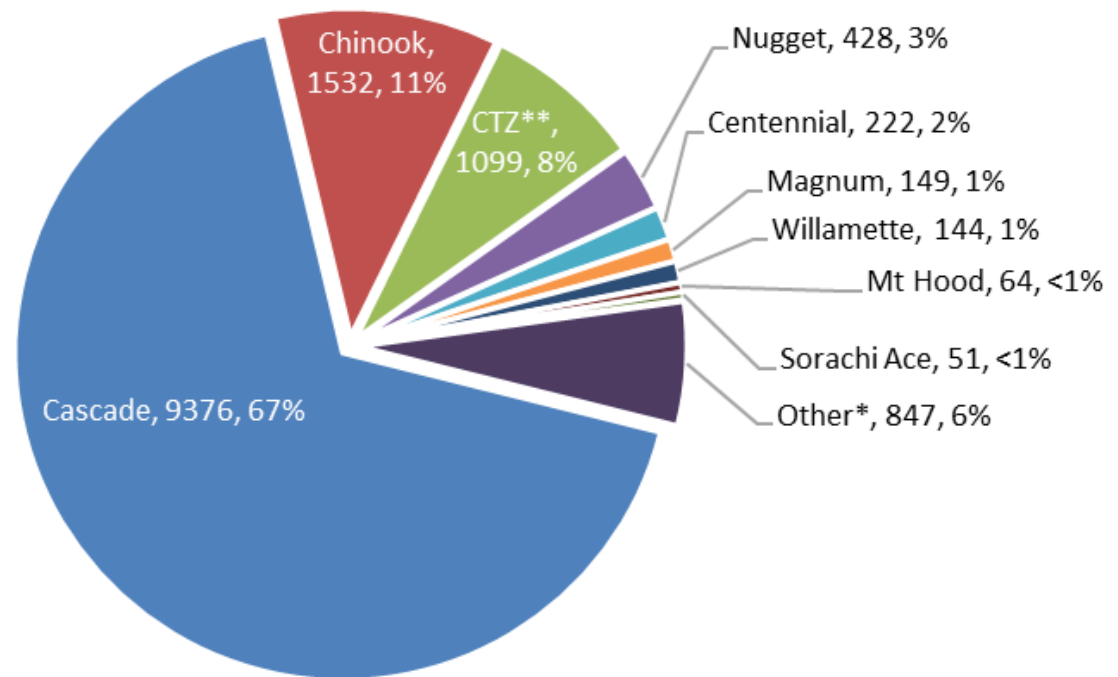
.....and many others





# 2015 Cultivars in Virginia

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

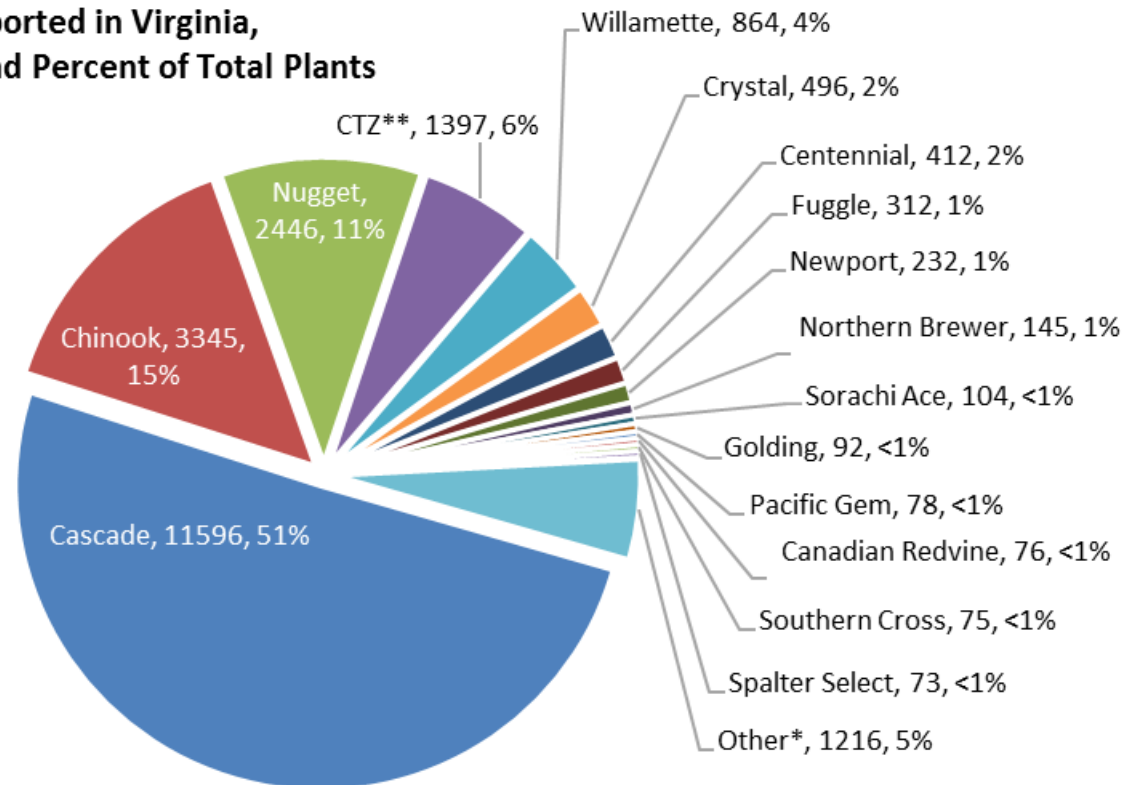






# 2016 cultivars in Virginia

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



\* 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?





# Challenges: Market for product

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)





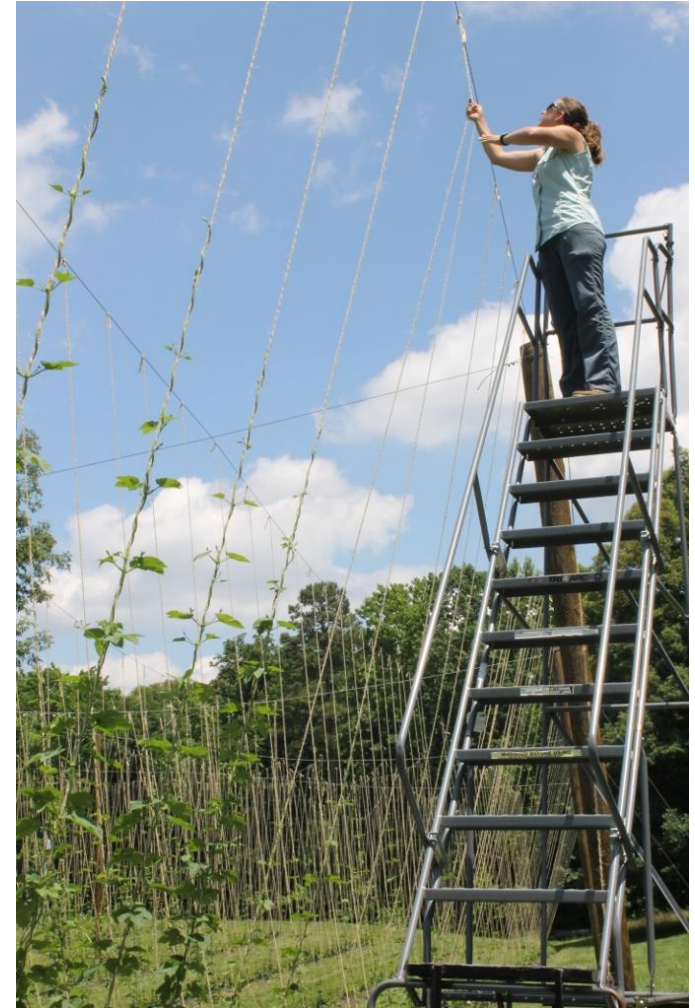
# Marketing options for Hops

Craft brewers

Home brewers

Herbal Products

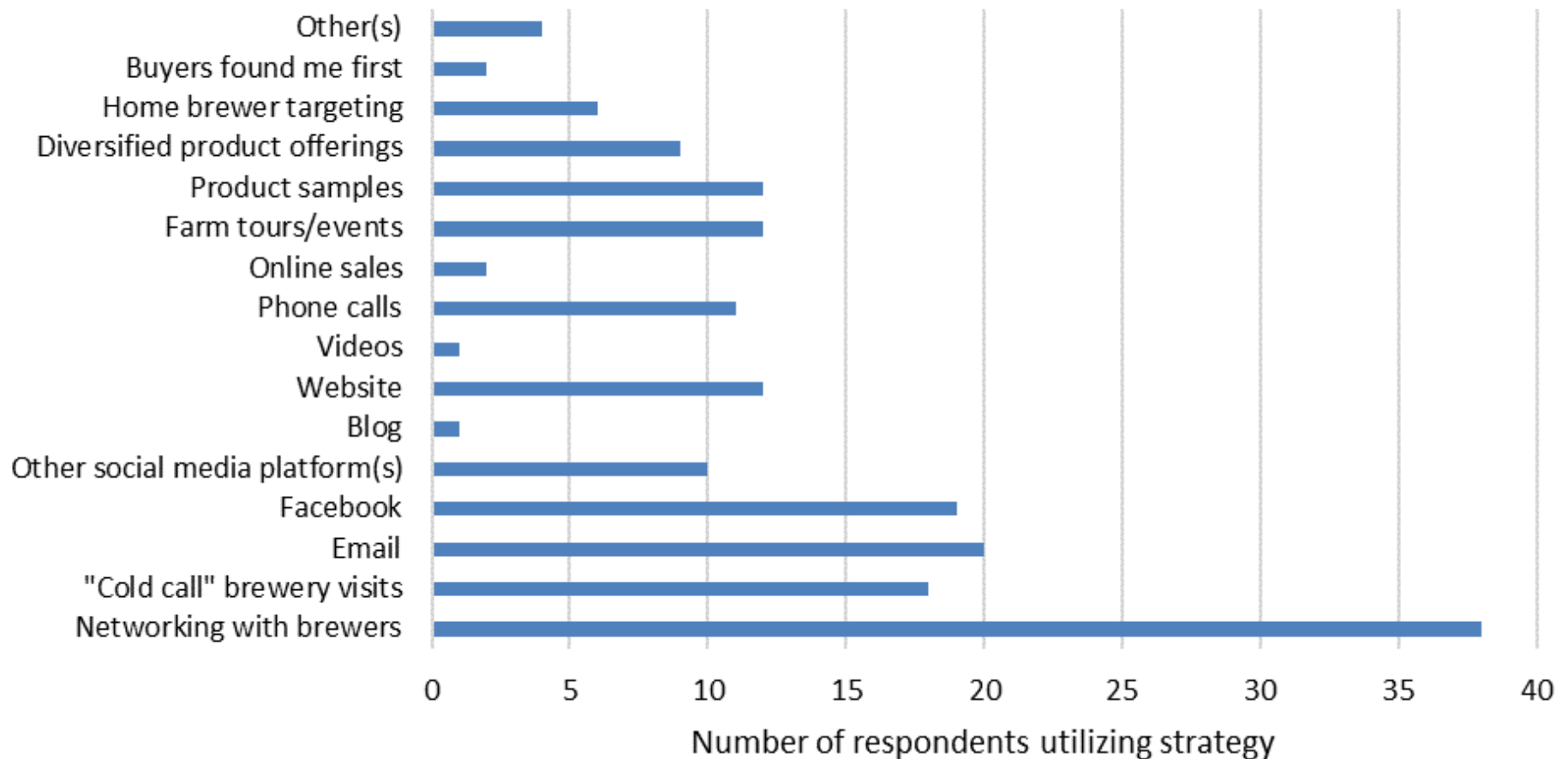
Sell wet, dried (whole leaf), or  
Milled and pelletized





# How Are We Marketing?

**Hop Marketing Strategies**





# Grower Classification

Grower Classification	Percentage of Respondents Matching Criteria		
	2015	2015	2016*
I am growing hops commercially/ I intend to sell my hops	48%	52%	78%
I am currently growing hops for my personal use/ for non-commercial purposes	24%	33%	24%
I am not yet growing hops, but planning on it	9%	9%	4%
Other	8%	8%	4%

\*If applicable, grower could choose more than one personal classification on the 2016 survey; 51 respondents provided 56 reactions to the grower classification chart.





# Hop Sales

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

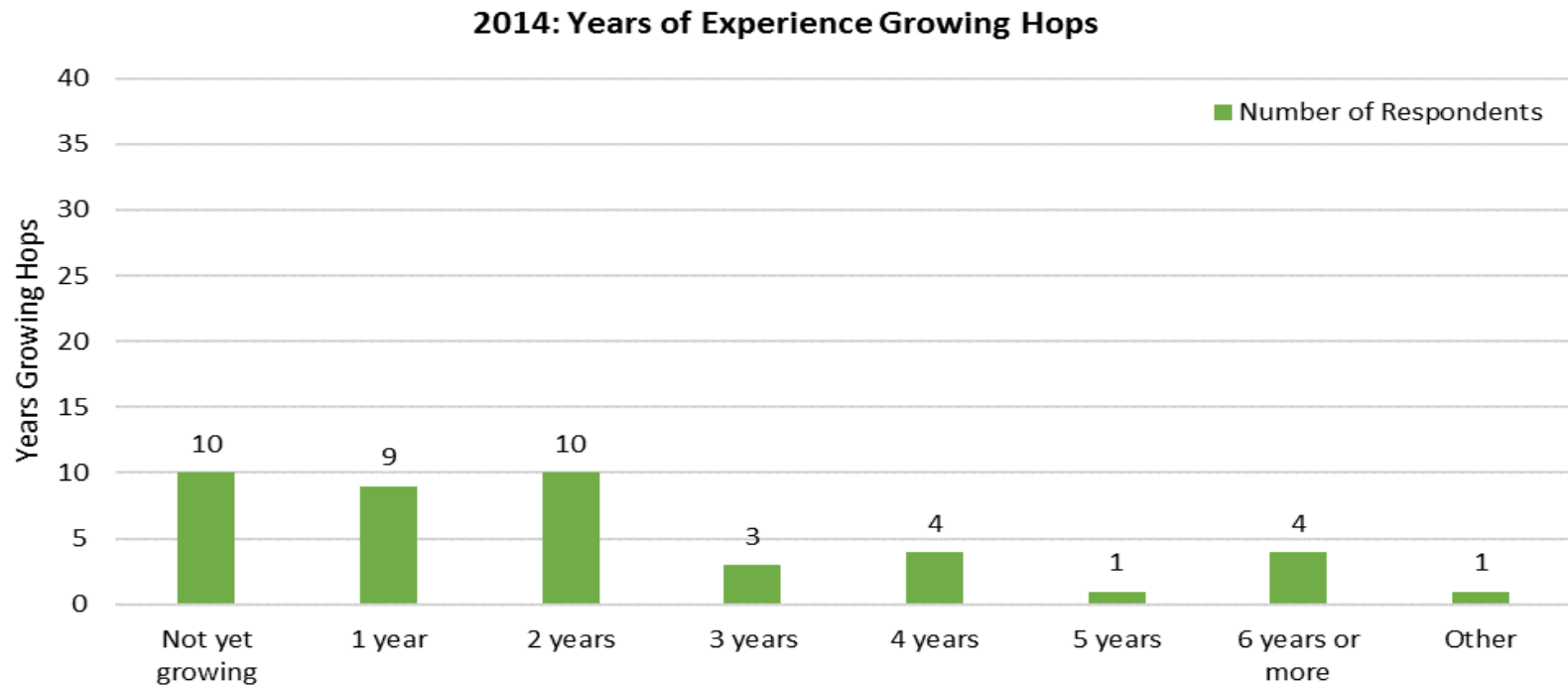
Start small, consider market first.

- Shareable pickers and regional processing equipment: future opportunities?





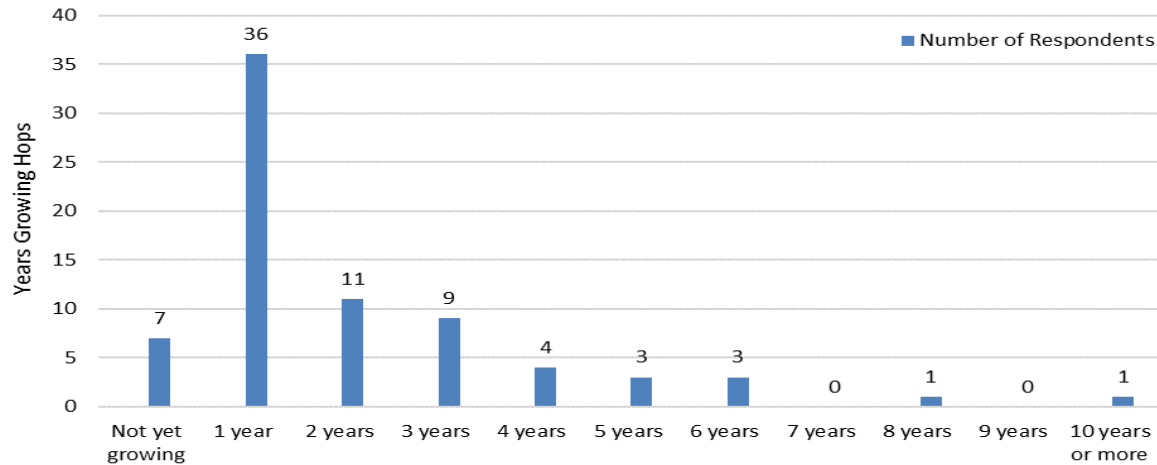
# Grower Experience: 2014



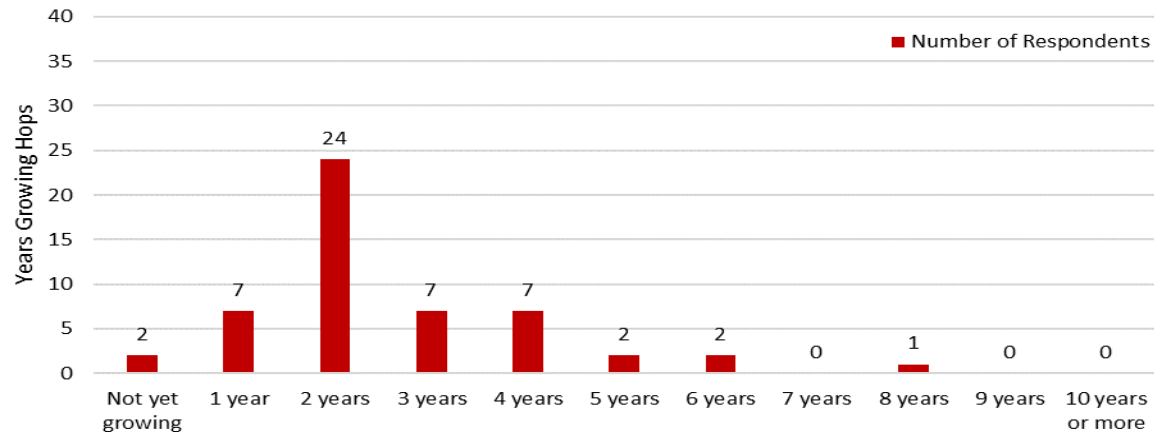


# Grower Experience: 2015 and 2016

2015: Years of Experience Growing Hops



2016: Years of Experience Growing Hops





## More LESSONS LEARNED

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

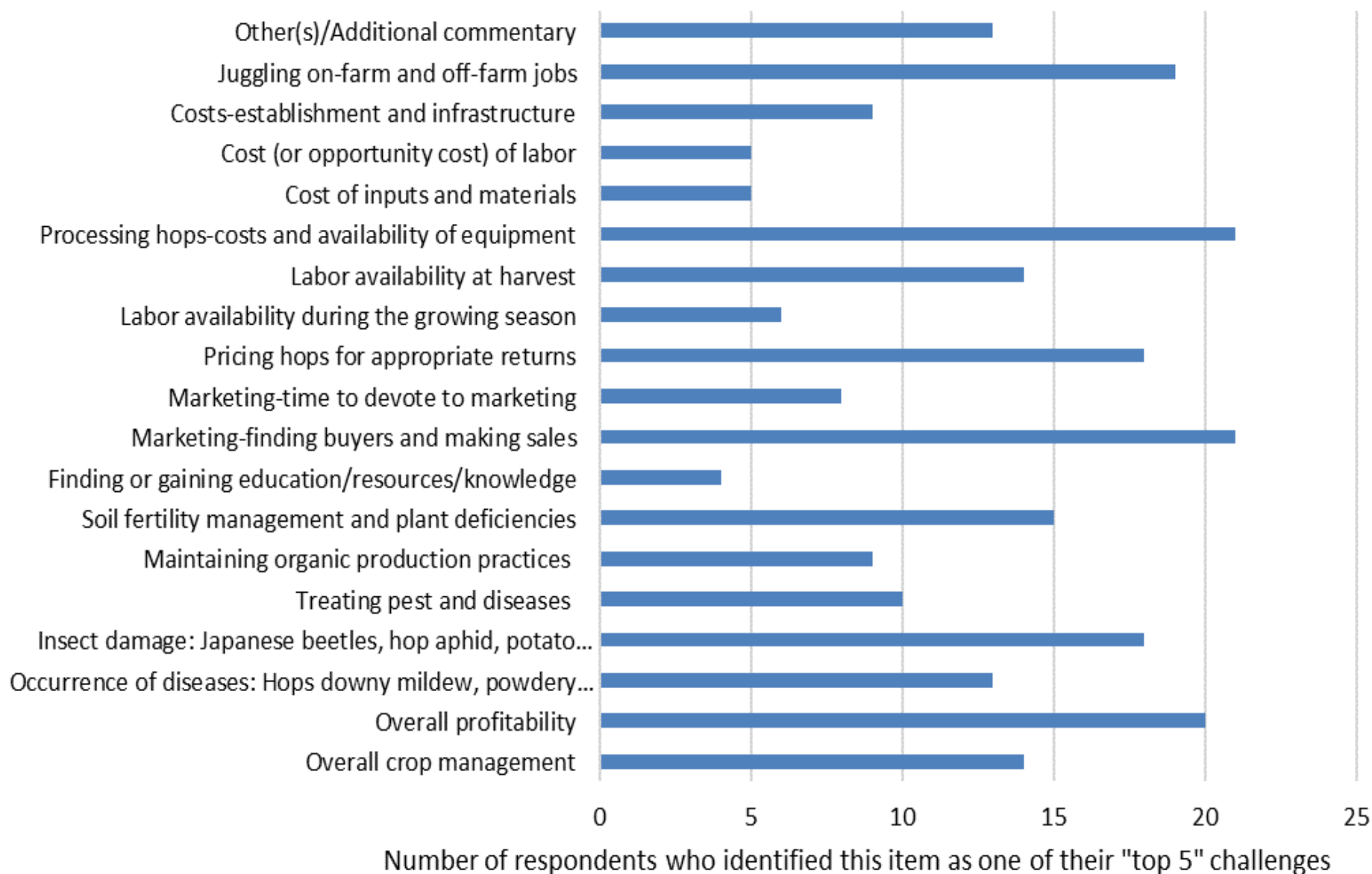
- Restaurants, hop smashes, and non-traditional outlets

Growing organically-feasible?

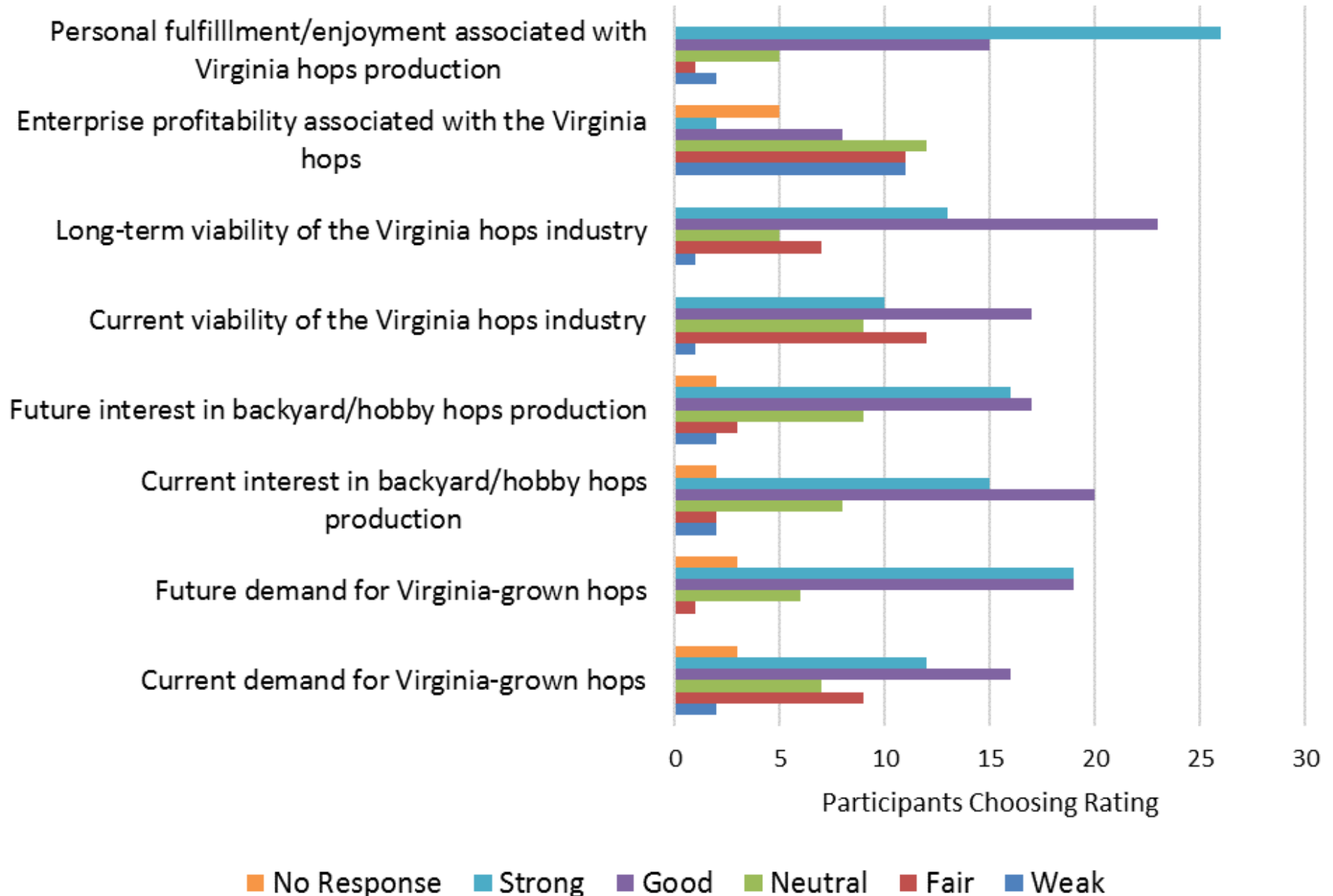
Hop growing crowd is diverse: some do it for fun; some are striving for return on investment



## Challenges Associated with Growing Hops



## Perceptions and Outlooks Associated with Virginia Hops





<http://www.ext.vt.edu/topics/agriculture/commercial-horticulture/hops/index.html>

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### Hops

The Virginia craft brewing industry is growing rapidly and demand for locally-grown hops has increased due to shortages, value systems favoring locally-grown materials, and increased interest in the use of fresh hops. This site provides information to those currently growing hops as well as those interested in this specialty horticultural crop.

<b>Presentations</b>	<b>Services</b>	<b>What's New</b>
<b>Agencies and Organizations</b>	<b>Websites</b>	

- » [Hops Cost Considerations + Marketing Hops](#) by Devon Kistler, chairman of the Old Dominion Hops Cooperative. Presented at VCE workshop at W.E. Skelton 4-H Center, April 25, 2015.
- » [Pests of Hops](#). Presented by T. Michael Lukins.
- » [Trellis Considerations](#) by David Goode. Piedmont Hops, presented at Dinwiddie Hops Workshop, September 2015.
- » [Growing Hops in the Southeast](#) by Jeanine Davis, presented to Virginia growers at VSU, March 2014.
- » [Basics of Growing Hops in Virginia](#) by Laura Siegle, presented at Dinwiddie Hops Workshop, September 2015.
- » [2014 Hops Industry Update and Grower Survey Overview](#) by Laura Siegle, presented at Extension Hops Workshop at Hardywood Park, April 2015.
- » [2015 Extension Resource for Hop Growers](#) by Laura Siegle

#### Featured Publications

- » [Soil Sample Information Sheet for Commercial Crop Production](#)
- » [Hop Growers Survey](#)
- » [Pest Management Guide: Hops](#)
- » [Weed Control in Hops fact sheet](#)
- » [Hops Budget Tool](#)
- » [Hops in Virginia Need-to-Know Information about Extension Resources](#)
- » [Hops in Virginia Need-to-Know Information about the Industry](#)

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- » [Commercial Horticulture](#)

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**Hops in the Park**

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# Resources...

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

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


Research Sponsored through:  
**Golden LEAF FOUNDATION** 

**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!



**Thank you!**







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