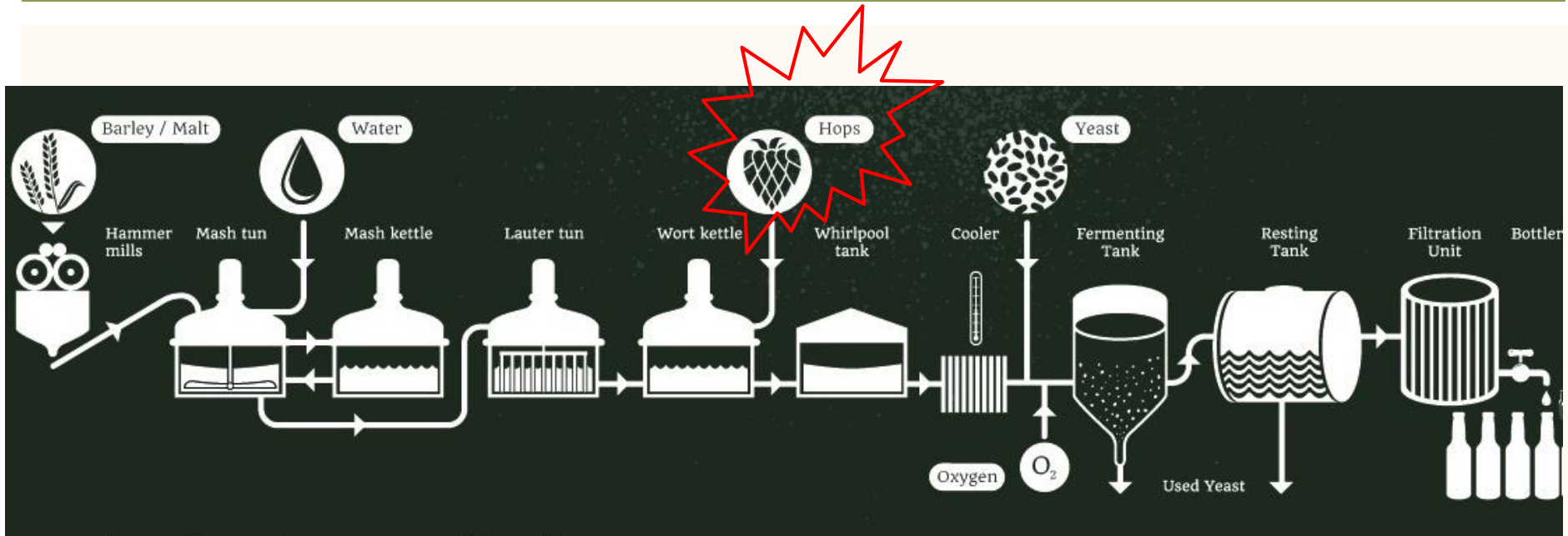


STATUS UPDATE: HOPS IN VA



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!

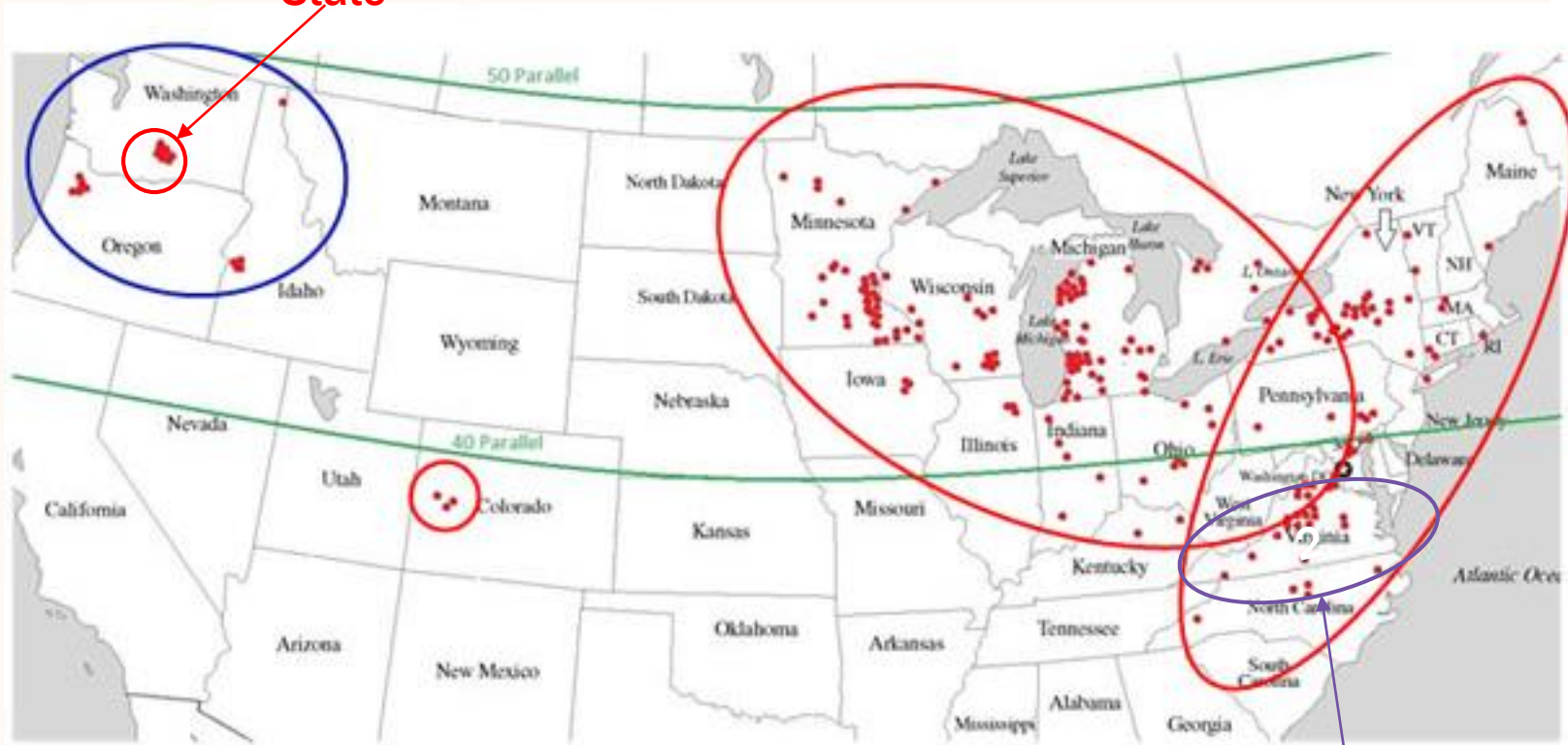
- Winter dormancy (tops die back)
- Spring regrowth
- Vegetative stages (summer)
- Reproductive stages (summer)

HOP PRODUCTION IN U.S.

43,000 ACRES = \$345M

75% in
Washington
State

90+% in
Pacific
Northwest



30 Acres in VA

WHY NOT HERE?

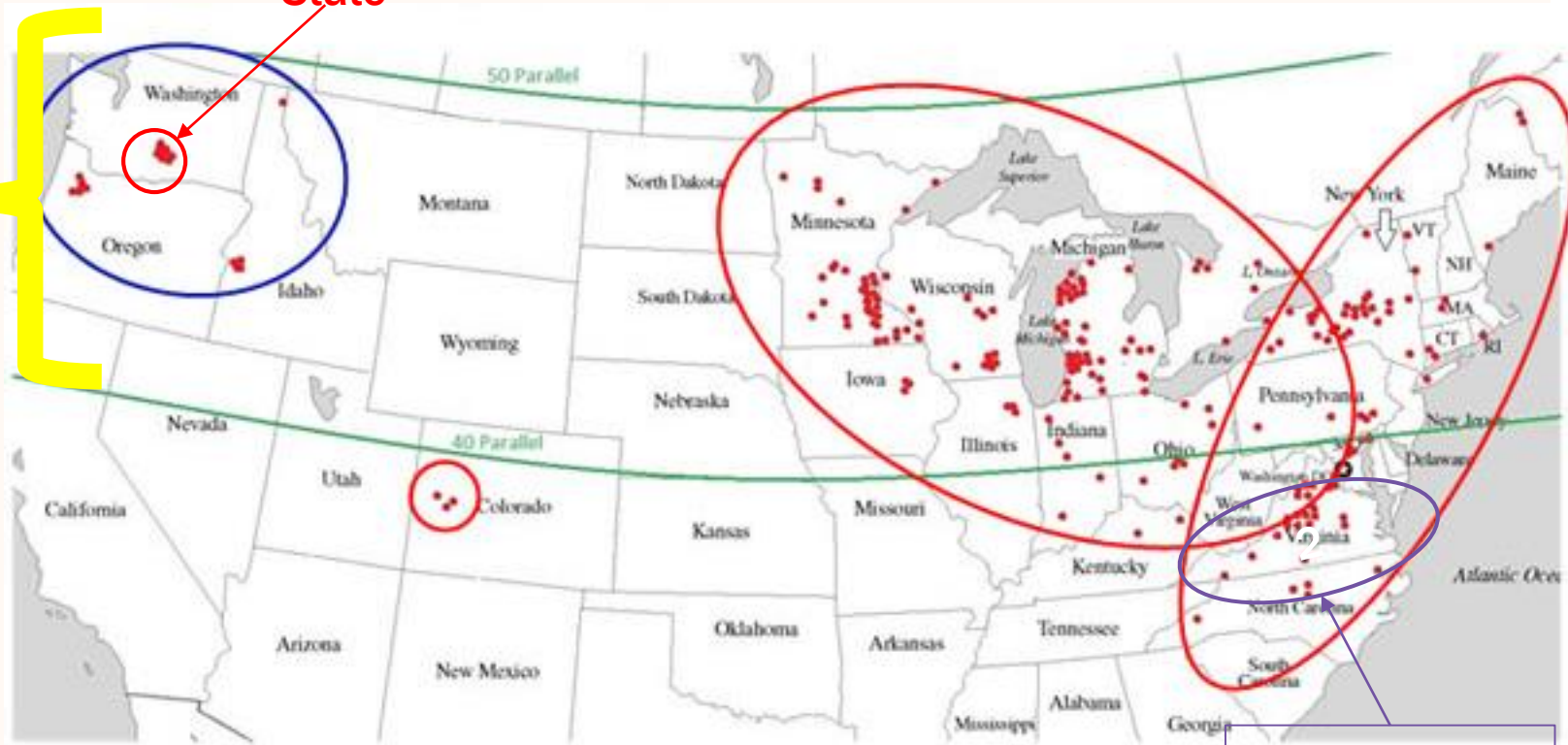
- They've been around for centuries in Virginia and the Mid-Atlantic, but production shifted West...
- Challenges include
 - Daylength
 - Pests and pathogens
 - Available cultivars
 - Costs of establishment and maintenance
 - Few resources for growers
 - *But that's changing!*

CHALLENGE: DAYLENGTH

LONG DAYS = HIGH YIELDS

75% in
Washington
State

90+% in
Pacific
Northwest



30 Acres in VA

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



Cascade - July 20, 2016
VT Hop Yard

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.
- **TeePee-** 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

(TRELLIS SLIDES COURTESY OF DAVID GOODE, PIEDMONT HOPS)



KELLY RIDGE CONT



GRID TRELLIS AT HUGUENOT HOPS, LLC

(TRELLIS SLIDES COURTESY OF DAVID GOODE, PIEDMONT HOPS)



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 very difficult (not impossible)
- See VCE Pest Management Guide: Hops

APPLYING PEST CONTROLS TO HOPS

Spraying method for small growers is challenge #1!



Air blast sprayer/orchard sprayer=ideal for coverage

CHALLENGE: MAINTENANCE (TIME + \$\$\$)

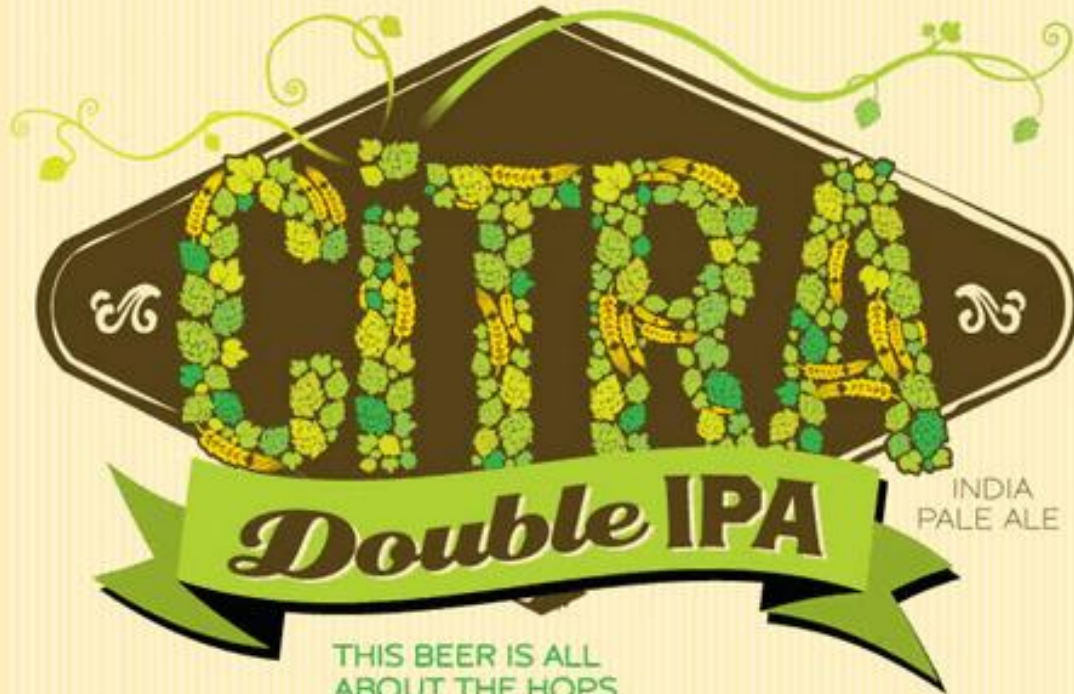
- Planting
- Pruning shoots
- Training vines up twine-clockwise, ~3 shoots per string
- Weed control
- Stripping lower leaves for disease control
- Disease monitoring
- Spray, spray, spray
- Irrigation (drip) and fertilization (lots)

CHALLENGE: CULTIVARS BREWERS WANT

HI·MA·VT·ME·CT·NY·DE·OR 5¢·MI 10¢ CA CASH REFUND
WWW.KERNRIVERBREWING.COM
GOVERNMENT WARNING: (1) ACCORDING TO THE SURGEON
GENERAL, WOMEN SHOULD NOT DRINK ALCOHOLIC BEVERAGES DURING
PREGNANCY BECAUSE OF THE RISK OF BIRTH DEFECTS. (2) CONSUMPTION
OF ALCOHOLIC BEVERAGES IMPAIRS YOUR ABILITY TO DRIVE A CAR
OR OPERATE MACHINERY, AND MAY CAUSE HEALTH PROBLEMS.

UPC

1 PINT 6 FLUID OUNCES
KEEP REFRIGERATED



**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
regimine 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!

**KERN RIVER
BREWING
COMPANY**
BREWED IN  KERNVILLE, CA

POPULAR CULTIVARS IN VIRGINIA

- **Cascade**
 - **Chinook**
 - **Nugget**
 - **CTZ**
-many others



PLANTING OPTIONS

Start with....

- Rhizomes: 2-3 per hill

OR

- Field-grade plants



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 (tourist rate!)
- 1 lb of VA wet hops ~\$12-20?

(For comparison, you need ~4x the number 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+ (small and large pickers)**
- **Some growers have harvesters available for sharing.**



MECHANIZATION: BIG WOLF MACHINE AND SMALL MACHINES



HAND LABOR: AGRITOURISM?



CHALLENGES: MARKET FOR PRODUCT

Raw, 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
- Restaurants
- Farm breweries
- Agritourism-picking parties
- Sell wet, dried, or pelletized



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?

MORE LESSONS LEARNED

- Matching yields/prices from PNW is challenge, BUT, VA 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

2016 HOPS SURVEY RESULTS

A close-up photograph of two green hop cones (strobili) hanging from a vine. The cones are covered in small, pointed bracts and are surrounded by large, serrated green leaves. The background is a soft-focus green, suggesting a hop field.

Laura Siegle
Agriculture and Natural Resources Extension Agent-Amelia County
Virginia Cooperative Extension

Dr. Holly Scoggins
Associate Professor-Horticulture
Virginia Tech

WHY SURVEY?

- Evaluate the status of the industry
- Draw comparisons to the 2014 and 2015 surveys
- Develop benchmarks for future growth assessments
- Report to stakeholders

Ex: Just sent to joint legislative analyst!

SURVEY PROCESS AND CONSIDERATIONS

- Developed Qualtrics online survey software and administered by Virginia Cooperative Extension, Oct-Nov 2016
- Distributed as widely as possible through email lists, grower groups, Extension agents, and social media. As a result, exact survey distribution and the resulting response rate are not known.
- Actual statewide yield and total plant numbers may differ from those shown in this survey because it is possible that some growers chose not to complete the survey or that some growers were not reached by the survey. Furthermore, growers had the option to omit questions as desired, so not all respondents chose to report yield and other specific information.
- For our yield report, we asked growers were to distinguish between pounds of wet hops harvested and pounds of dried hops harvested since some growers choose to weigh their hops at harvest while others choose to weigh them after processing

SURVEY PARTICIPATION

Survey Year	Number of Survey Participants
2014	46
2015	78
2016	52

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.

WHERE ARE THE GROWERS?

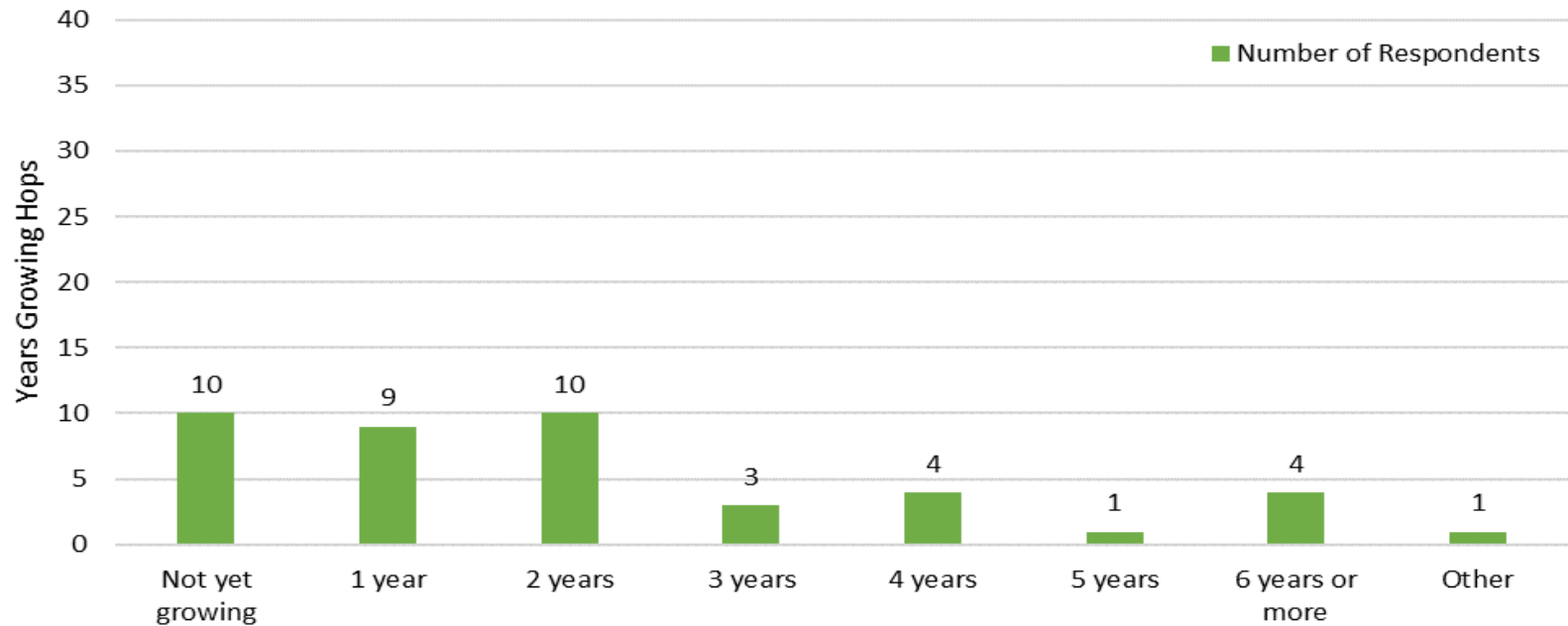
Growing Region

Southwest	9.62%
Central	23.08%
Northern	53.85%
Southeast	15.38%



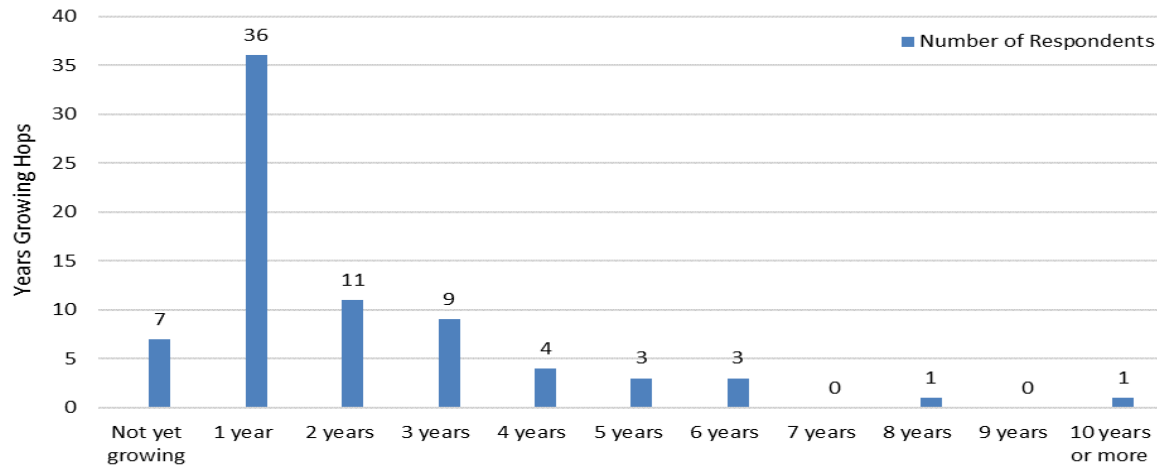
GROWER EXPERIENCE: 2014

2014: Years of Experience Growing Hops

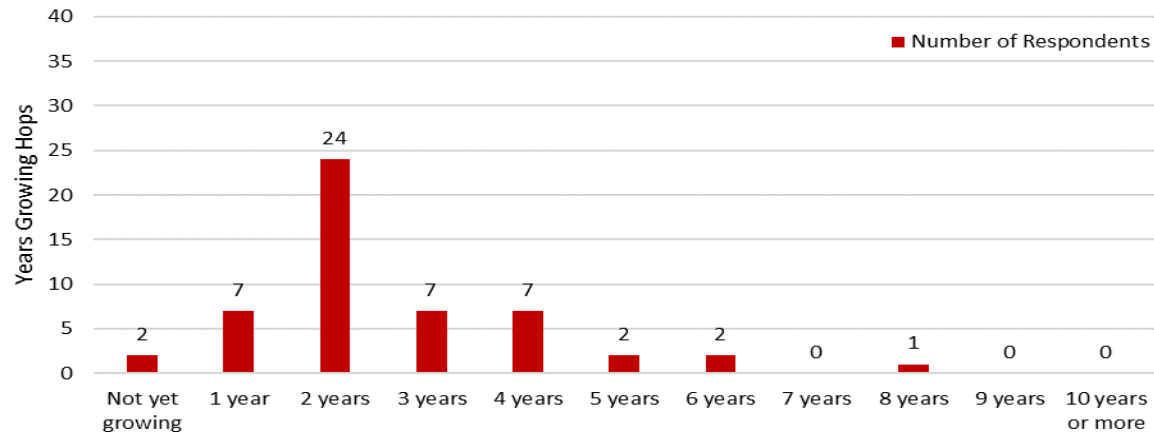


GROWER EXPERIENCE: 2015 AND 2016

2015: Years of Experience Growing Hops

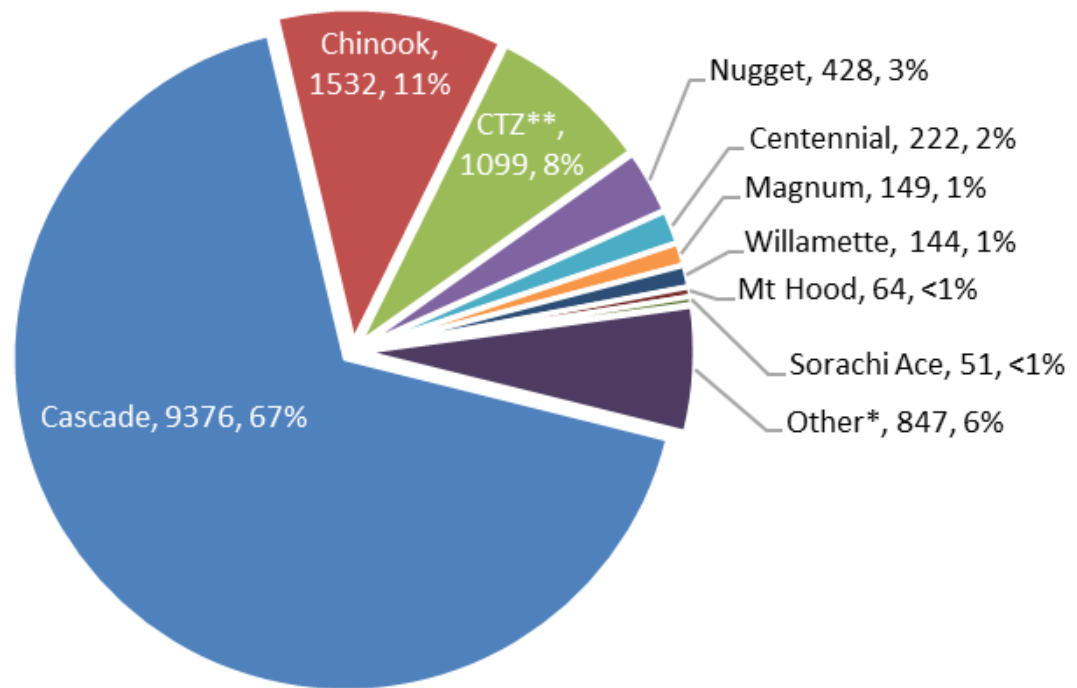


2016: Years of Experience Growing Hops



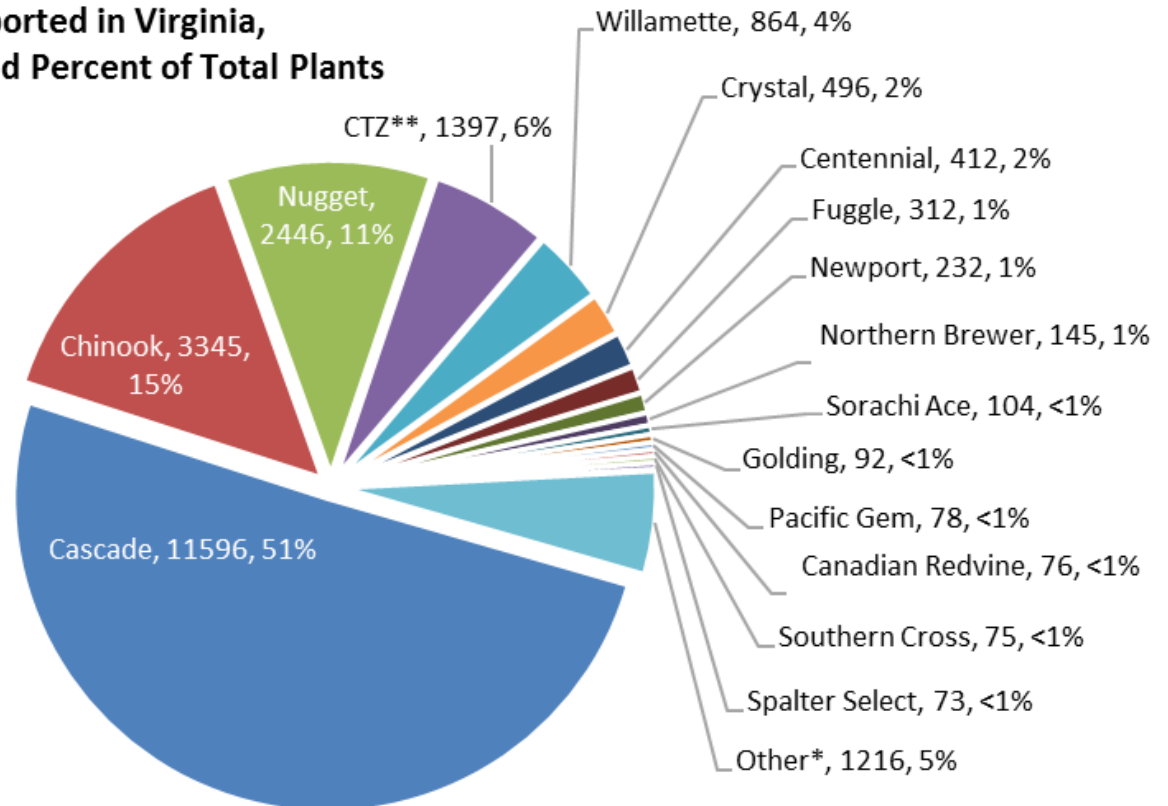
2015 VARIETIES

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



2016 VARIETIES

**2016 Hop Varieties 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 varieties with fewer than 50 reported plants in the state OR any varieties grown by only one respondent. The “other” category also includes data from growers who reported plants but did not specify varieties or provide data by variety.

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

HOW DID OUR TOTAL PLANT NUMBERS COMPARE TO LAST YEAR?

Survey Year	Total Number of Plants Reported in Virginia
2014	13,317
2015	13,912
2016	22,959

2016 REPORTED YIELD

2016 Harvest Yield Data

Variety	# Crowns	Reported Wet Yield (pounds)	Reported Dried Yield (pounds)
Cascade	11,596	5,794	708
Chinook	3,345	240	124
Nugget	2,446	906	10
CTZ*	1,397	131	29
Willamette	864	10	5
Crystal	496	113	20
Centennial	412	5	4
Fuggle	312		
Newport	232		17
Northern Brewer	145	3	22
Sorachi Ace	104	15	
Golding	92		
Pacific Gem	78		
Canadian Redvine	76	22	3
Southern Cross	75	16	2
Spalter Select	73		
Other	1,216	1,284	10
Total	22,959	8,539	954

*Some growers were unable to report harvest data with their plant and variety totals, and some chose only to report plant numbers. The figures shown represent the values growers provided. Growers reported wet yield (for harvested batches that were measured wet/fresh) or instead reported dried yield (for hops that were measured in a dried state).

**“Wet Yield Approximation” relies upon a conservative dried-hop-to-wet-hop conversion rate (1:4) to convert reported dried hop yield to an estimated wet hop yield and add it to the existing total reported wet yields. This enables us to compare 2016 wet hop yield data with prior annual totals; Virginia growers currently predominantly measure and report hop yields in the wet/fresh state.

Total estimated yield, with wet yield approximation:** 12,357

HOW FAR ARE WE GETTING?

Year-by-Year Comparison of Plant Totals and Reported Yield

	2014	2015	2016
Total Plants	13,371	13,912	22,959
Total Wet Yield/Wet Yield Approximation (pounds)	8,109	5,367	12,357

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

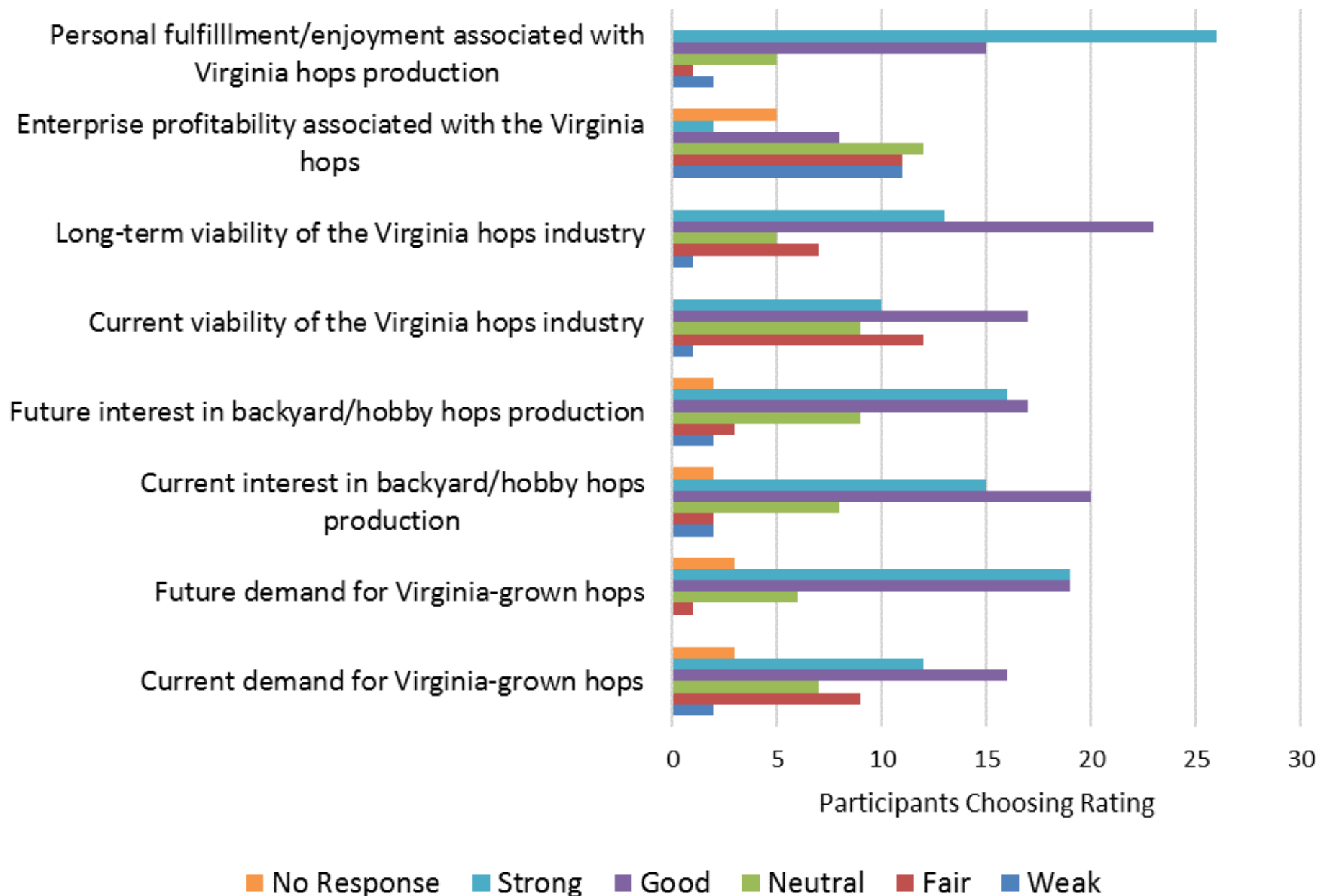
FUTURE GROWTH

Growers commented on their expansion plans. On the 2015 survey, growers indicated a collective planned increase of 8,000 plants to the existing total of 13,912.

Growers did not collectively report a large planned increase for 2017 when they completed the 2016 survey, but it appears as though some growers have plans to exit, while others are making plans to expand more aggressively.

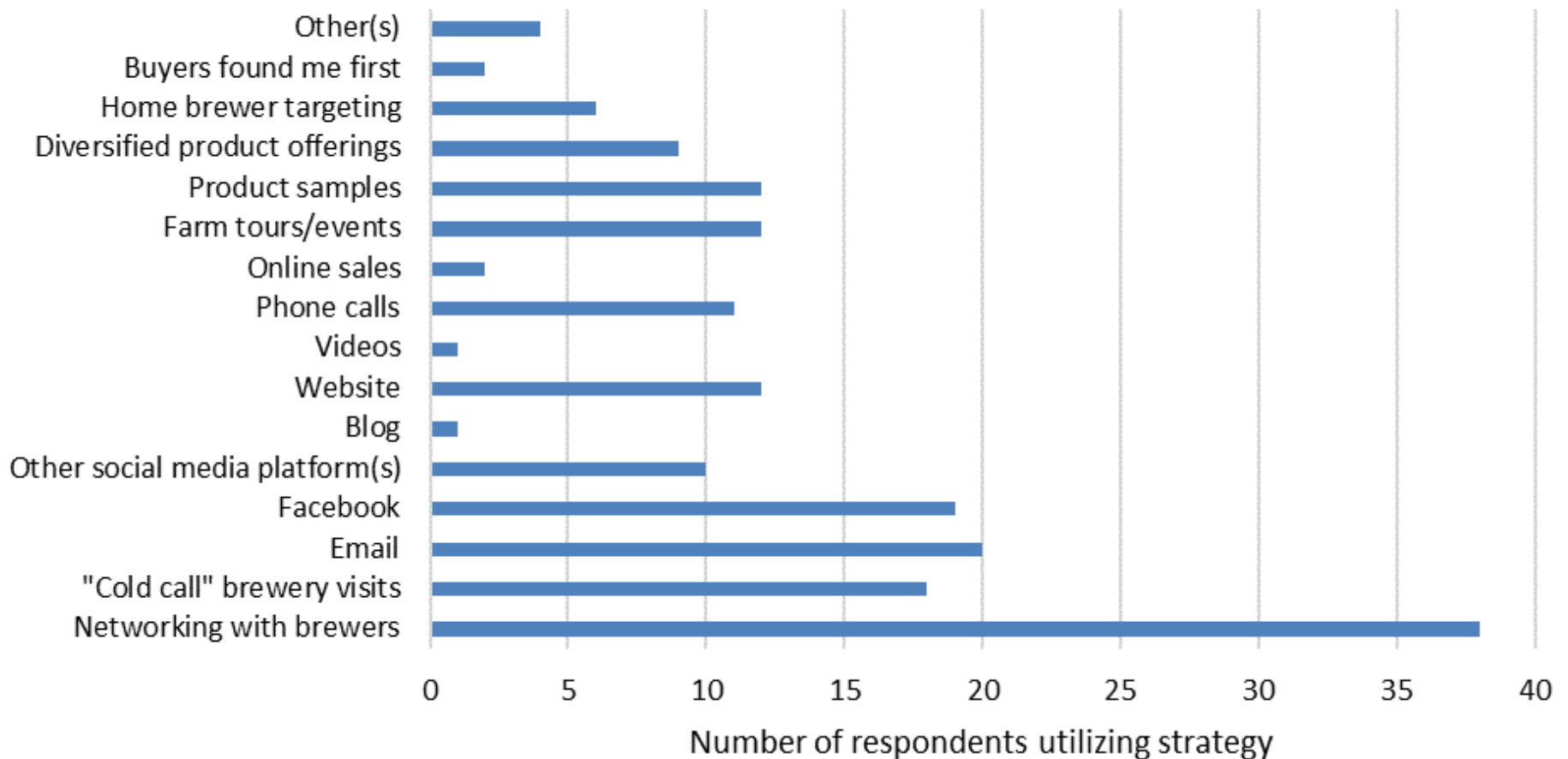


Perceptions and Outlooks Associated with Virginia Hops

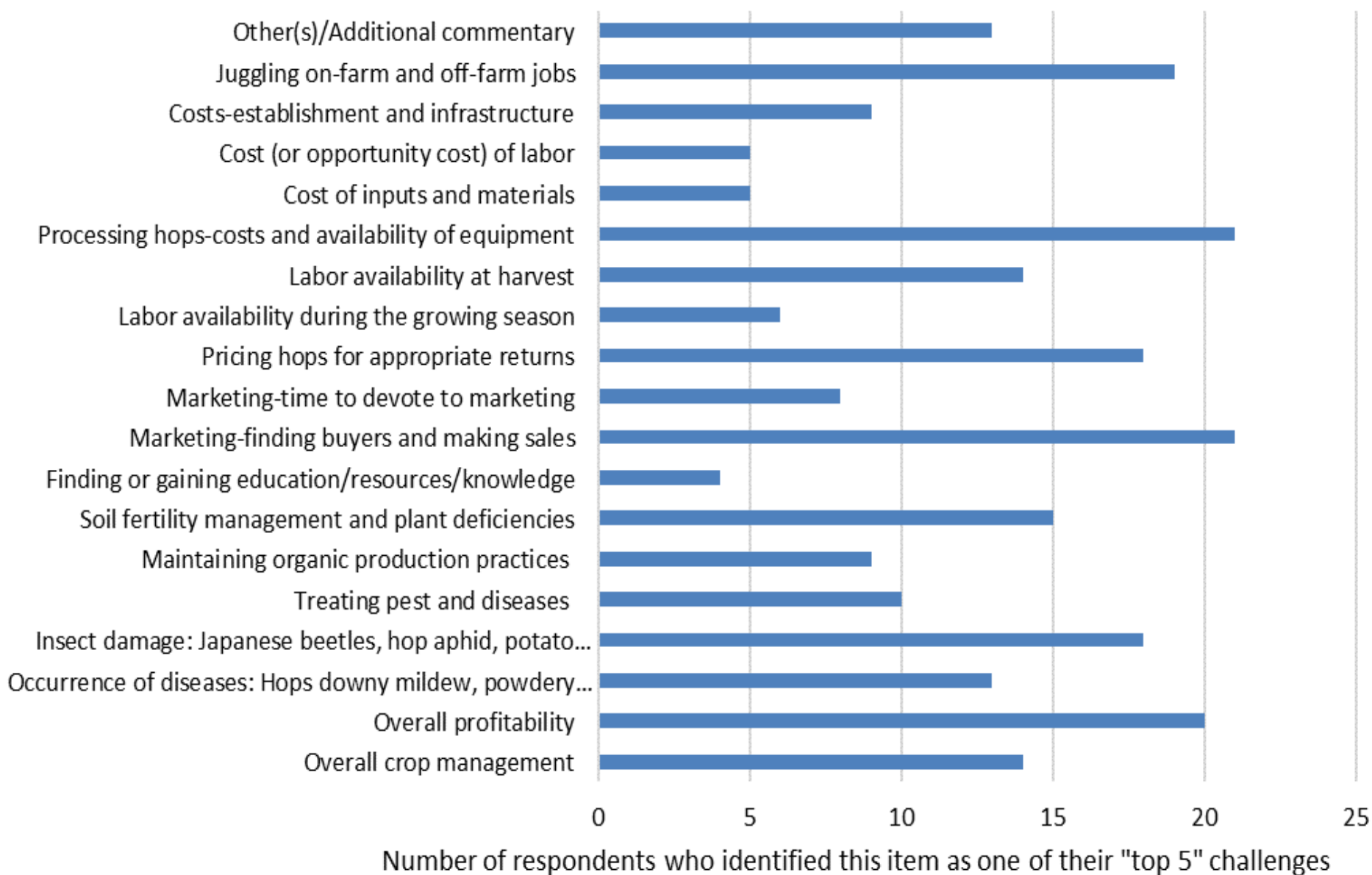


HOW ARE WE MARKETING?

Hop Marketing Strategies



Challenges Associated with Growing Hops



CLOSING COMMENTARY FROM GROWERS

- Many growers had good experiences planting crowns this year, while others reported difficulties with rhizomes.
- Insects were more problematic this year than in prior years. Japanese beetles caused some damage in many yards.
- Virginia growers need access to pelletizing equipment and/or pelletizing services; existing infrastructure may be inadequate, too distant, or not yet operational.
- Pricing hops is difficult; some growers want more guidance and uniformity to promote reasonable returns. Other expressed concerns over the profitability of small-scale hops production under the current average prices.
- Many growers tried new and less-common varieties; results varied. Some growers reverted back to Cascade replacements after experimental plantings failed. Others commented on the disadvantages Virginia growers face due to lack of access to trademarked varieties. Growers would like more research-based guidance on varieties adapted to local conditions.
- Some growers engaged in organic production practices this year.
- Demand for wet hops was weak in some locations, creating a difficult marketing situation; conversely, a few growers reported a perceived increase in demand in their localities.
- Growers will have difficulty matching the prices of hops from the west coast; brewers are seeking hops that meet certain price points. Brewers also want assurances that local hops meet high quality standards.
- Networking, grower group meetings, conferences, and Extension programs have been helpful to some growers.
- Marketing is increasingly important to growers, and growers may be able to work with one another, industry groups, and Extension personnel to develop some out-of-the box strategies for reaching brewers.

SUMMARY

Interest in hops remains strong; meanwhile, the cohort of growers who entered the industry in 2013-215 has gained another year of experience, and growers in this cohort are reaching critical decision points surrounding future marketing plans, pelletizing, expansion, quality assurance programs, and pricing.

This cohort of growers has also gained more management knowledge, and many growers are currently taking advantage of Extension services, industry services, and networking opportunities

THE EVOLUTION OF HOP RESOURCES

- **2012:** Hops weren't on our radar! Growers relied on NC data
- **2013:** Agents met some growers and learned about some industry needs. Old Dominion Hops Cooperative had just formed.
- **2014:** “Hops Summit” in VA: formal needs assessment meeting between faculty and growers during a hops conference organized by Stan Driver. Media attention drives up interest in hops.
- **2014-2016:** Extension faculty work closely with growers and develop publications, pest management guides, hops resource website, Facebook page, research programs, field days, workshops, South Atlantic Hops Conference, soil testing, hops analysis, and more. Old Dominion Hops Cooperative triples in membership

RESOURCES...

START HERE!

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



The screenshot shows the Virginia Cooperative Extension website. The header features the VCE logo and navigation links for Agriculture, Community & Leadership, Natural Resources, Family, Food & Health, Lawn & Garden, and 4-H / Youth. A search bar is located in the top right. The main content area is titled "Hops" and includes a large image of hop cones. Below the image, a paragraph describes the growing hops industry in Virginia. To the right of the main content, there are sections for "Follow VCE" with social media icons, "Need help?" with a location pin, "Publications and Resources" with a book icon, "Events and Calendars" with a calendar icon, and "Partners" with a list of affiliated institutions. The "Featured Publications" section lists several resources related to hops, including a soil sample information sheet, a growers survey, a pest management guide, a weed control fact sheet, a budget tool, and need-to-know information about extension resources and the industry. The "Related Topics" section includes a link to "Commercial Horticulture". The "Events" section includes a link to "Hops in the Park". At the bottom, there are social media sharing icons and a footer with the text "Share" and "Hops in the Park".

Virginia Cooperative Extension
Virginia Tech • Virginia State University

Agriculture Community & Leadership Natural Resources Family Food & Health Lawn & Garden 4-H / Youth

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.

Presentations **Services** **What's New**
Agencies and Organizations **Websites**

- » 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

Related Topics

- » Commercial Horticulture

Events

Hops in the Park

Follow VCE

Social Media Directory

Need help?
Find your city or county's local office

Publications and Resources

Events and Calendars

Explore more Extension resources:

extension
America's Research-based Learning Network®

Partners

- » Virginia Tech College of Agriculture and Life Sciences
- » Virginia State University College of Agriculture
- » Virginia Agricultural Experiment Station
- » Virginia Agricultural Research and Extension Centers

Share

EXTENSION RESOURCES FOR GROWERS ON THE HOPS SITE

Virginia Cooperative Extension Hops Publications:

- **Hops Pest Management Guide**
- **Hops in Virginia: 2014 and 2015 Grower Surveys**
- **Weed Control in Hops**
- **Need-to-Know Information about Extension Resources**
- **Need-to-Know Information about the Industry**
- **Hops Budget Tool**
- **GAPs and FSMA – An Overview for Hop Growers in Virginia**

Also on the site:

- **Link to Virginia State University Hops Website**
- **Facebook link: Hops at Virginia Tech**
- **Loudon Suitability Model for Hops**
- **Presentations, tools, and links to TONS of great hops resources!**

MORE EXTENSION RESOURCES FOR GROWERS

Virginia Tech Hops Laboratory Services-see your Extension office to access these services

- **Hops Analysis Service at Virginia Tech Enology Lab:** Tests moisture, alpha and beta acids, and other flavor and aroma components. Go to <http://www.hops.fst.vt.edu/>
- **Hops Crop Code for Soil Testing-75:** visible on the updated commercial crop soil testing forms online. Get from Extension office.

CURRENT HOP PROJECTS

- Research and cultivar trials at Virginia Tech and Virginia State University
- Collaboration with growers and Old Dominion Cooperative
- GAP and food safety education
- South Atlantic Hops Conference-March 24-25, 2017 Asheville



2017 SOUTH ATLANTIC HOPS CONFERENCE: MARCH 24-25, ASHEVILLE

Eventbrite

Search for events

Browse Events

Sign up Log in Help

SAT, MAR 5 AT 8:00 AM, RICHMOND, VA

2016 South Atlantic Hops Conference

By: Jeanine Davis, conference coordinator, NC State University



\$0-\$1,039.95

GET TICKETS

THANK YOU!





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