UTIA INSTITUTE OF AGRICULTURE
THE UNIVERSITY OF TENNESSEE

Hops Production Opportunities in Tennessee

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Hops (*Humulus lupulus*)

- Female inflorescenes of hop plants used for beer bittering and finishing
- Lupulin produced by glandular trichomes (lupulin glands) in the lower parts of the inner surface of bracts of mature female hop cones
- Cannabaceae family
- Climbing perennial
- Dioecious
  - Occasional hermaphrodite
  - Seeds undesirable for brewing beer
  - Only female plants in hop fields
  - Unpollinated flowers or cones


USA Hops


smallfarms.cornell.edu

Hops Production – Winter

Hops Growers of America



- Trellis construction after harvest
- Cover crop establishment between rows
- Rhizomes cut from dormant hop plants (crowns), potted plants transferred to greenhouse to break dormancy, allowing propagation through cuttings

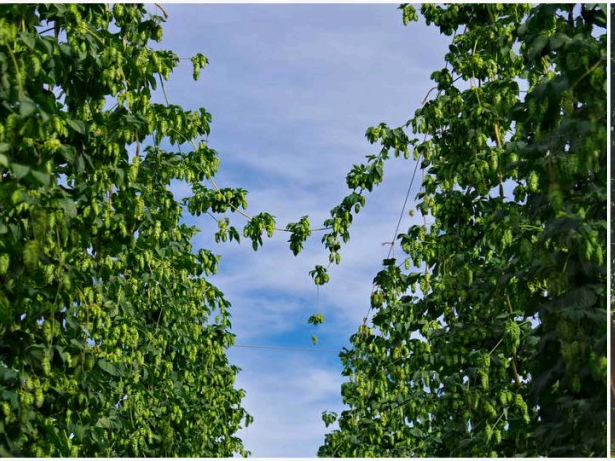
Hops Production – Spring

Hops Growers of America

- New hop yards planted
  - Rhizomes in early spring, potted plants later – high quality material
- Drip irrigation installed
- Initial fertilizer applications based on soil testing
  - In-season nutrients applied based on plant tissue analysis
- Trellis and irrigation systems repaired
- Primary shoots emerge from hop yard
  - Pruned to eliminate disease inoculum, training dates set and established
- Twine tied to overhead trellis, inserted in each hill

Hops Production – Summer

Hops Growers of America



- Bines expand with sidearms that bear the crop
  - Burrs emerge first, then cones (strobiles) develop
  - Hops bloom from summer solstice through July

- IPM, plant protection materials applied
- Hops harvested from August through October

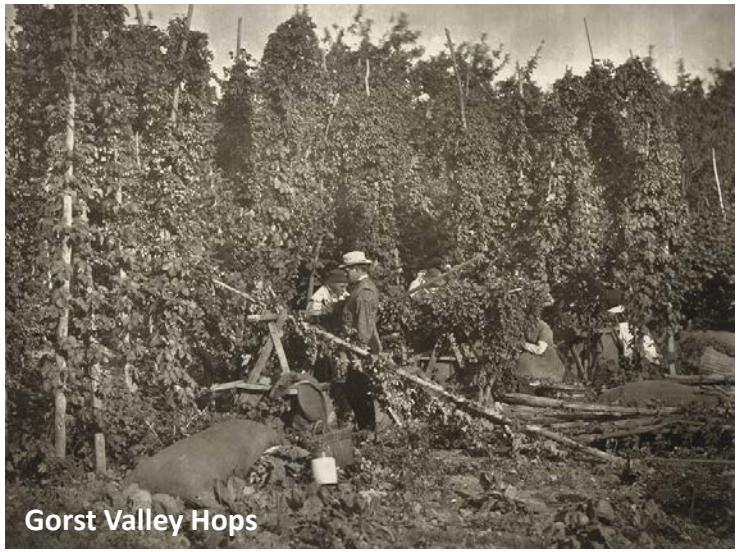
Hops Production – Fall

Hops Growers of America

- Hops are harvested, dried, and baled
- Department of Agriculture inspectors collect samples to verify crop quality for merchants and brewing customers

- Brewers visit farms and merchants for hop selection
- Hops go into dormancy after the first killing frost
- Drip irrigation is removed from the hop yards

Hops Production History in the U.S.


Gorst Valley Hops

- 1648 – Massachusetts
- Mid-1800s – New York
  - Prohibition, downy mildew
- Early 1900s – Washington, Oregon, California
- 1933 – End of Prohibition, expansion of hops acreage
- WWII – Idaho expands acreage
- 1990 – California commercial hops production ends
- Present – Pacific Northwest produces over 97% of U.S. hops

Hops Production in the U.S.

USDA AGRICULTURE COUNTS

National Hop Report

ISSN: 2158-7825

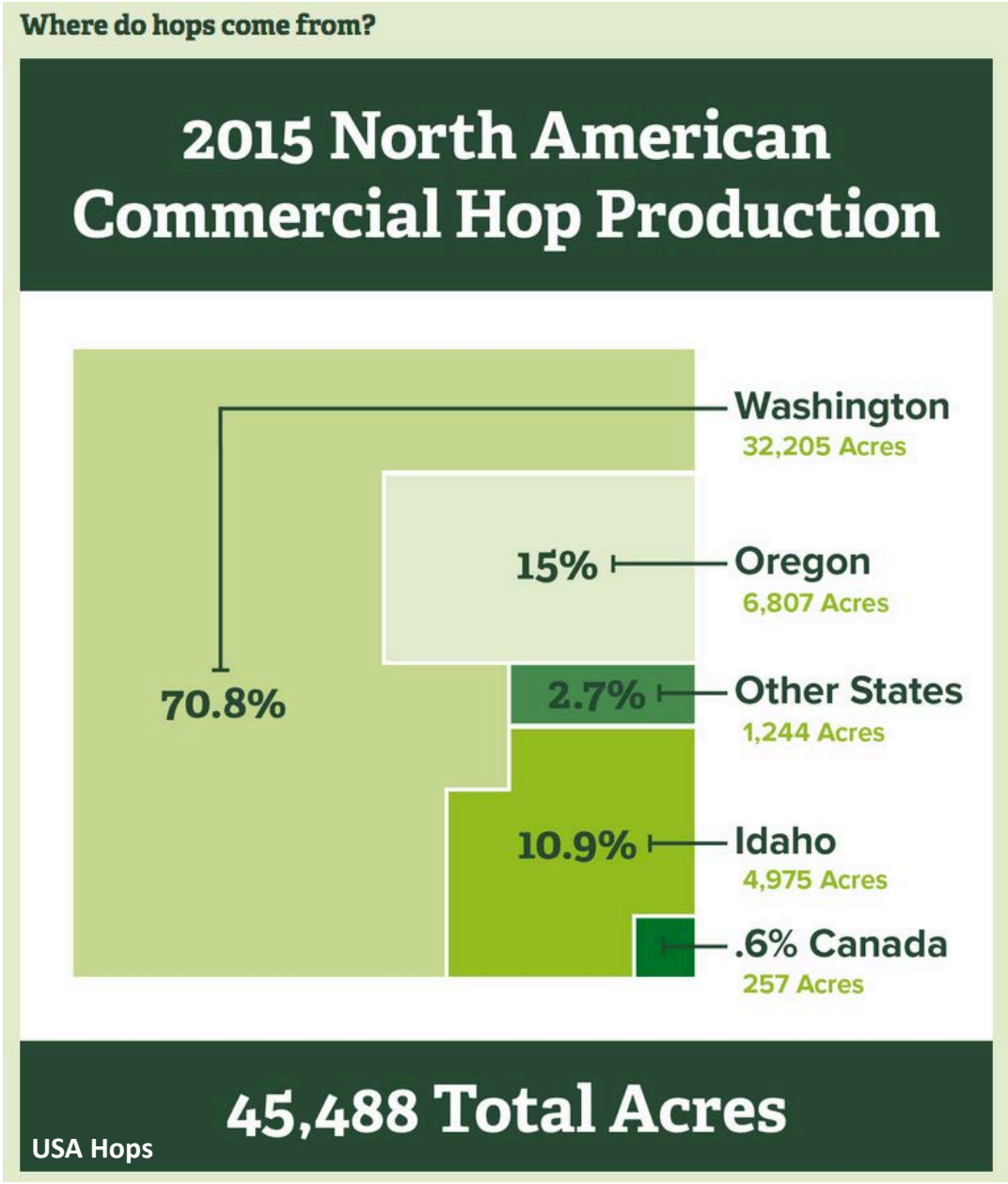
Released December 19, 2017, by the National Agricultural Statistics Service (NASS), Agricultural Statistics Board, United States

Hop Area Harvested, Yield, Production, Price, and Value – States and United States: 2015-2017

State and year	Area harvested	Yield per acre	Production	Price per pound	Value of production
	(acres)	(pounds)	(1,000 pounds)	(dollars)	(1,000 dollars)
Idaho					
2015	4,863	1,794	8,724.9	3.53	30,799
2016	5,648	1,646	9,297.7	5.50	51,137
2017	6,993	1,968	13,759.2	5.00	68,796
Oregon					
2015	6,612	1,613	10,667.8	3.24	34,564
2016	7,765	1,596	12,395.3	5.25	65,075
2017	7,851	1,517	11,913.2	5.00	59,566
Washington					
2015	32,158	1,849	59,453.3	4.71	280,025
2016	37,444	1,748	65,446.6	5.84	382,208
2017	38,438	2,047	78,693.6	6.22	489,474
United States					
2015	43,633	1,807	78,846.0	4.38	345,388
2016	50,857	1,713	87,139.6	5.72	498,420
2017	53,282	1,959	104,366.0	5.92	617,836

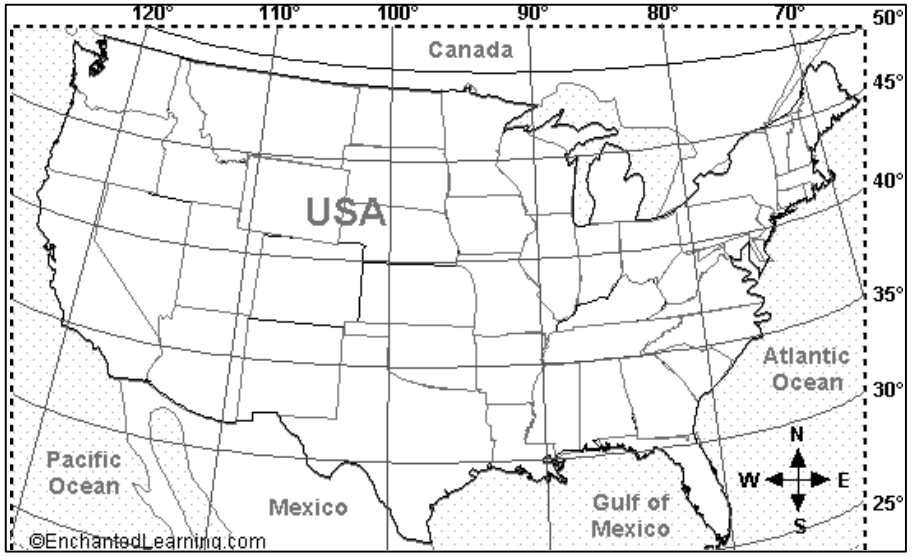
Hops Production in the U.S.

- Traditionally produced in the Pacific Northwest
  - Washington, Oregon, Idaho
  - MI, NY, WI, MN, other states
  - In 2017, none south of KY (USDA-NASS)



Hops Production in the U.S.

- Generally restricted to a band ranging from 35 to 50 degrees north latitude (about 1000 miles wide)
  - Memphis 35.1495° N
  - Bristol 36.5951° N



- Two factors negatively impact hops production as one proceeds south
  - Lack of sufficient sunlight during the growing season
  - Lack of adequate chilling over winter months

Lack of adequate chilling during season?

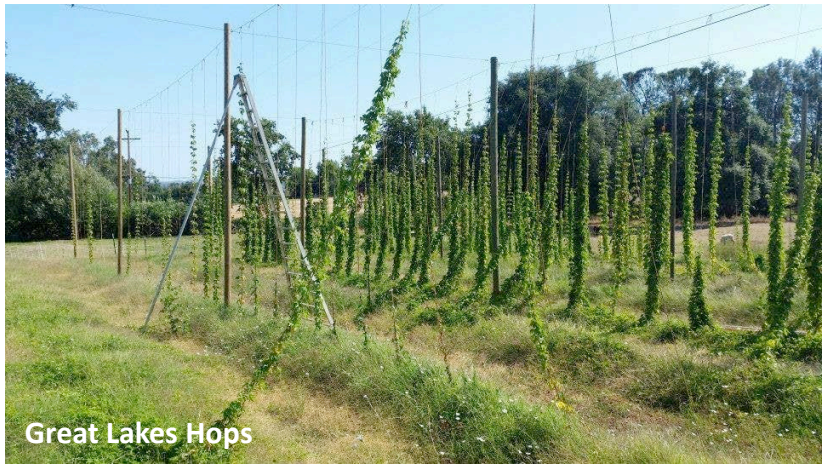
- Hops reported to need 1-2 months of winter temperatures below 40°F
- Dependent of variety and weather
- Inadequate chilling may not be a problem in TN
  - Currently regularly crop peaches in Memphis
  - Peaches have a chilling requirement of >1,000 hours
  - *but* may have come close to inadequate chilling in winter of 2017-2018

Lack of sufficient sunlight during season?

- Hops need long day lengths to flower and produce adequate cone yields
- Lack of sunlight could be significant problem
- FL and VA looking at supplemental lighting – economically viable?

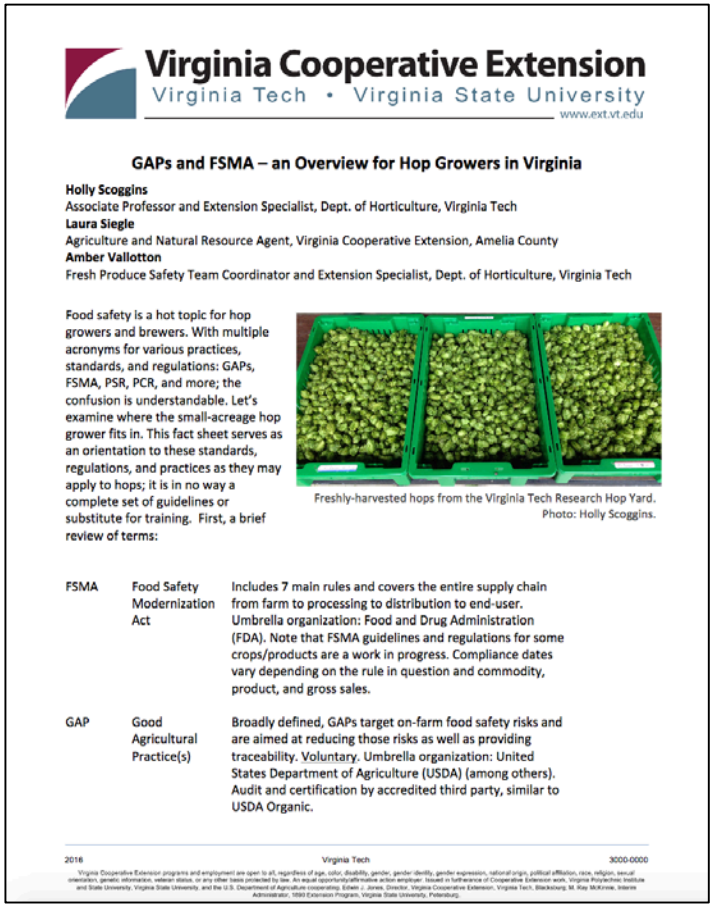
Viability of Hops Production in SE Agronomically

- Several years of regional hops research
  - NC State, Virginia Tech, University of KY
- Lots of challenges
  - "Yields tend to be low…"
  - Daylength, disease, insects
  - "Where day length is too short, flowering occurs when node number is met, but before the plants have put on a lot of growth."
  - Relatively high fertility needs
  - Weeds, insects, diseases


Great Lakes Hops

Requirements – Producer Level

- Market
- Site selection
  - Elevation and uniform gentle slope (2-5%) facing NE
  - Deep, well-drained, sandy loam soil
  - pH 6.0-6.5
  - Good air circulation
- Irrigation
- Equipment, transport, storage
  - Sell wet hops immed. after harvest
- Production, labor costs
  - H2A
- Industry Standards
  - FSMA
  - GAP
  - Quality Inspection
  - Hops Traceability



Virginia Cooperative Extension
Virginia Tech • Virginia State University
www.ext.vt.edu

GAPs and FSMA – an Overview for Hop Growers in Virginia

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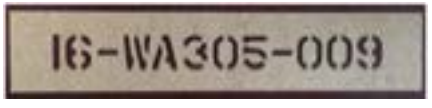
Food safety is a hot topic for hop growers and brewers. With multiple acronyms for various practices, standards, and regulations: GAPs, FSMA, PSR, PCR, and more; the confusion is understandable. Let's examine where the small-acreage hop grower fits in. This fact sheet serves as an orientation to these standards, regulations, and practices as they may apply to hops; it is in no way a complete set of guidelines or substitute for training. First, a brief review of terms:

Freshly-harvested hops from the Virginia Tech Research Hop Yard. Photo: Holly Scoggins.

FSMA	Food Safety Modernization Act	Includes 7 main rules and covers the entire supply chain from farm to processing to distribution to end-user. Umbrella organization: Food and Drug Administration (FDA). Note that FSMA guidelines and regulations for some crops/products are a work in progress. Compliance dates vary depending on the rule in question and commodity, product, and gross sales.
GAP	Good Agricultural Practice(s)	Broadly defined, GAPs target on-farm food safety risks and are aimed at reducing those risks as well as providing traceability. Voluntary. Umbrella organization: United States Department of Agriculture (USDA) (among others). Audit and certification by accredited third party, similar to USDA Organic.



Research Needs

- Multi-location field research at four UT RECs representing different regions within TN
  - Variety evaluation, development
  - Plant populations and spacings
  - Trellising
    - Types of trellises, heights
  - Disease, insect, and weed management
    - There are pesticides labeled for hops – state labels
    - TN has different pest pressure than other hops
  - Soil fertility and nutrient monitoring
    - Nutrient sources, other products, application method

Source: Jeanine Davis, NCSU

Source: selbst fotografiert von Marti

Many of our clientele who are interested in hops

- are passionate about the crop and their plans.
- have “researched” the topic.
- are optimistic, determined, and “ready to go”.
- ambitious in scale of production.
- have high expectations for profitability or don’t care about it.
- have limited to no agricultural experience.
- lack equipment and may lack consistent labor.
- underestimate challenges and limitations.
- may overestimate rewards of their efforts.
- can be challenging in communications.
- may be vulnerable.

need assistance, so we must prepare ourselves.

Summary

- May be a potential crop for some people in TN
- Lots of unanswered questions
- There are reasons for current hops production areas
- Research before production
  - Develop and disseminate fact-based materials for most informed decision – takes time and money
- Planning, networking, education, moderation
- At this point, it is high risk…


Great Lakes Hops