

NC STATE
UNIVERSITY

Hemp Production Research in Western NC

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NC Alternative Crops & Organics Program

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Associate Professor & Extension Specialist, Dept. of Horticultural Science

- ▶ Located at the Mountain Horticultural Crops Research and Extension Center near the Sierra Nevada Brewery and airport.
- ▶ 30+ years working with farmers and the agricultural industry in NC.
- ▶ Focus on new and emerging crops, hops, hemp, organics, medicinal herbs, and vegetables.
- ▶ Applied, practical, sensible.



Extensive experience with new crop development

- ▶ Hops
- ▶ Truffles
- ▶ Ginseng and other botanicals
- ▶ Ramps
- ▶ Stevia
- ▶ Pyrethrum
- ▶ Luffa sponge gourds
- ▶ Elephant garlic



We started our NCSU hemp research and extension program in 2017

- ▶ I am license holder 84 in North Carolina.
- ▶ Focus initially was on fiber and grain hemp.
- ▶ Proud member of the group of hemp pioneers in WNC.
- ▶ We all worked together-growers, industry, universities.
- ▶ Conducted field research and held lots of meetings.
- ▶ No funding!



Some of my employees had prior experience with hemp-that really helps!

- ▶ **Margaret Bloomquist**, Research Associate, grain and fiber hemp growing experience in Canada
- ▶ **Leonora Bloomquist**, Research Assistant
- ▶ **Katie Learn**, Research Technician, medical marijuana growing experience in California
- ▶ **Dr. Luping Qu**, Research Specialist and breeder
- ▶ **Chloe Moore**, lab/field technician
- ▶ **Gwen Casebeer**, Master's student/Research Assistant
- ▶ **Meagan Roberts**, PhD candidate
- ▶ **Rob Anderson**, former employee, MS on hemp from Kentucky. Atalo Holdings stole him back to Kentucky to work on hemp.



We are starting from scratch with how to grow hemp in North Carolina

- ▶ Work closely with my agronomic crop colleagues, Angela Post (small grains) and Keith Edmisten (cotton), in Raleigh.
- ▶ Bring all our skill sets and experience together to address this crop.
- ▶ Try to duplicate trials across the state as much as possible.
- ▶ NCDA&CS Agronomic Division works with us on fertility issues.
- ▶ Strong support from our Disease and Insect Clinic.



Biggest challenge is all the misinformation propagated on growing hemp

- ▶ Consultants from Colorado charge growers \$10,000+ to advise them how to grow hemp.
- ▶ Many growers rely on marijuana growing information.
- ▶ Strains developed for indoor grow operations are planted outside.
- ▶ Growers often do not have adequate drying facilities.
- ▶ Extension doesn't have any research based information to pass on!



And it is the Wild Wild West when it comes to local processing and marketing

- ▶ I worked with the botanicals industry as FDA developed Good Manufacturing Practices and we adopted Good Agricultural Practices.
- ▶ But most of the 600+ processors in NC appear to have little or no experience with food or dietary supplement processing and the measures that need to be taken to deliver safe, consistent products to the consumer.
- ▶ Contracts to buy hemp from growers are confusing, often change mid-stream, and may not be binding. Some growers were never paid for last year's crop.



Photo from Chicago Reader

Quick overview of what we have done, and are doing, to help NC hemp growers



Grain



Floral/Essential Oil

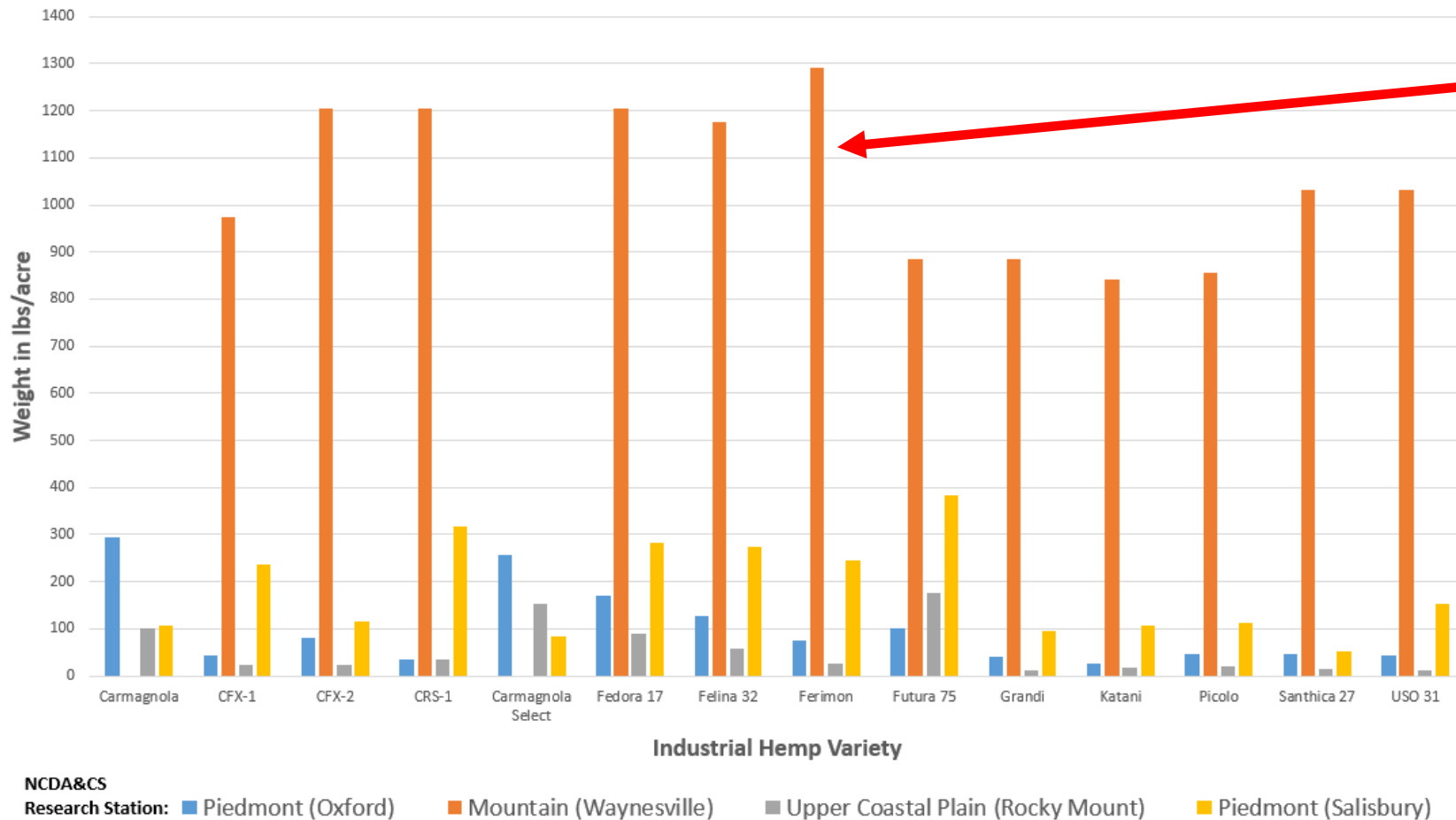


2017 - 2019 Grain & Fiber Variety and Fertility Trials

Mountain Research Station, Waynesville, NC

In collaboration with Angela Post and her former graduate student Zeke Overbaugh

2017 Industrial Hemp Variety Trial Dry Grain Yield by Location (NC)



Orange bars are yields we produced here in WNC compared to those produced in eastern NC by the small grains specialist.

If we had combines and seed dehullers, we could probably have a good hemp grain industry here!





2018-2019 Hemp Floral Spacing and Mulching Trials

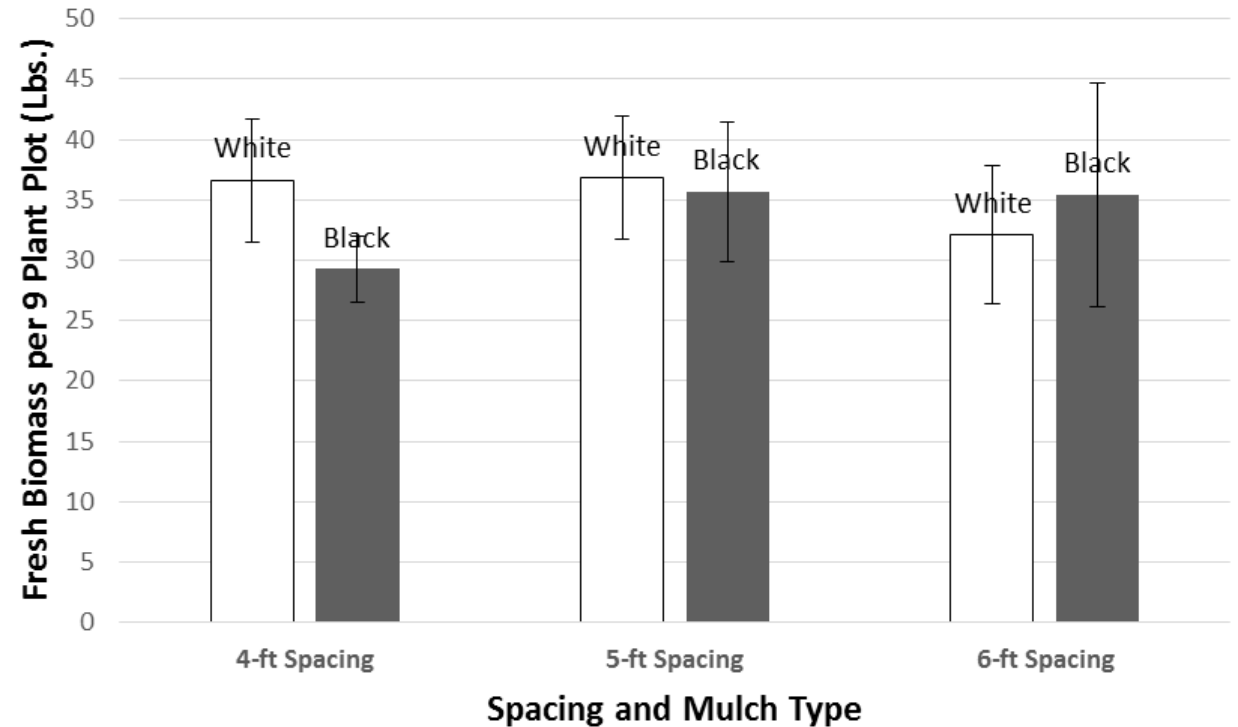
Mountain Horticultural Crops Research and Extension Center, Mills River, NC



Mulch Type x In-row Spacing

- Plastic mulch might not be necessary, but that is the system our vegetable growers know.
- Might be different in row crop regions.
- Repeating study this year in several locations with A. Post.

Variation in Fresh Biomass Yields Between Four, Five, and Six Foot Spacing on Black and White Plastic



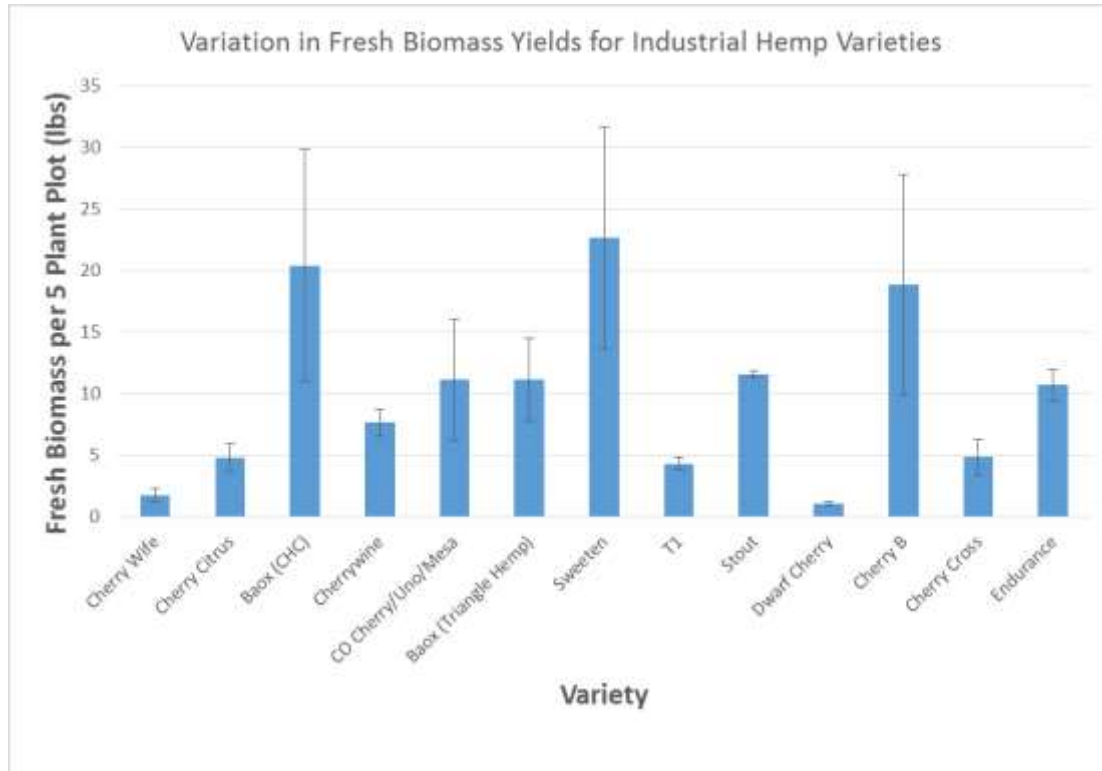


2018-2019 Floral/Essential Oil Variety Trials

Mountain Horticultural Crops Research and Extension Center, Mills River, NC

In collaboration with Angela Post who is replicating these studies in the eastern part of the state

We examined 13 varieties in 2018 and are studying 31 this year



Across four locations with Angela Post.

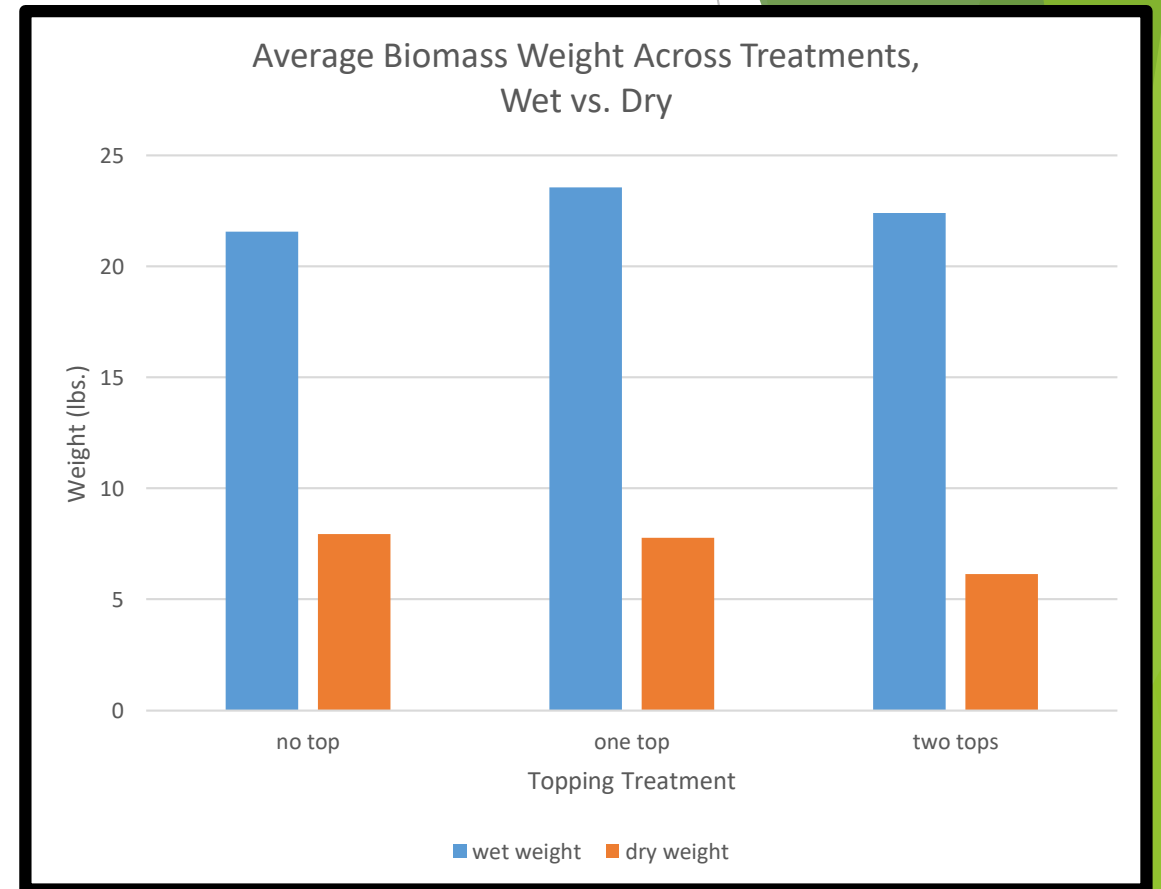
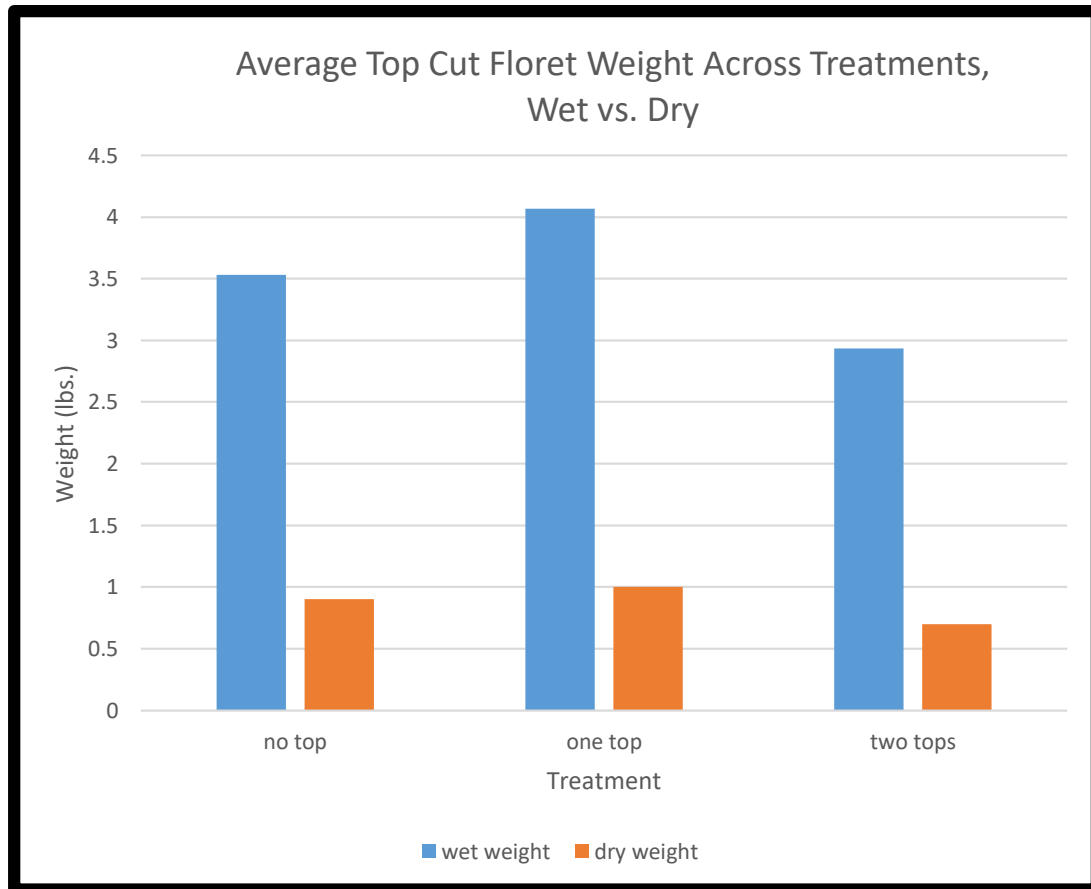


2018-2019

Floral Topping Study

Elysium Farm, Fletcher, NC and the Mountain Horticultural Crops
Research and Extension Center, Mills River, NC

Yield Differences Between Topping Treatments:



- A lot of effort with little return.
- This study is being repeated this year.

Nine on-farm trials this year! Seven conducted by two graduate students looking at colored mulches



Student support from Women in Hemp and the Dept. of Horticultural Science.

Extension/Outreach



- Field days
- Workshops
- Conferences
- Agent training
- Website
- News updates



A screenshot of the NC State Extension website for Industrial Hemp. The page features a red navigation menu on the left with links for 'Meet Our Staff', 'Events', 'Industrial Hemp Pilot Research Program', 'Important Program Forms', 'Frequently Asked Questions (FAQ)', 'Planting Sources (Seeds, Clones, Transplants)', 'Hemp Connections', 'Hemp Resource Links', 'NC Hemp Organizations and Companies', 'Recently Approved Applications', and 'Business Resources: Attorney & Law Firm Fees & Financial Institution Insurance Companies'. The main content area includes a search bar, an 'Events' section with 'NC State Industrial Hemp Field Day' (Nov 27, 10:00 AM - 3:30 PM) and 'Sustainable Agriculture Conference' (Nov 1-2, 9:00 AM - 5:00 PM), a 'News and Updates' section with articles like 'Hemp License Application and the "Bona Fide Farmer": Is There a Minimum Farm Income Requirement?', 'Hemp Flower Testing for THC', 'How to Determine Female and Male Hemp Plants', 'Nutrient Matters: Hemp Plant Nutrition Information', and '2019 Small-Farm, Late-Season Hemp Production Notes', and 'Hemp Mother Plants'. The background image shows hands holding hemp seeds.



For more info on our program visit ncherb.org