



Introduction

In North Carolina, growers were allowed to apply for permits and begin growing hemp in 2017. North Carolina legislation allows for hemp to be grown for three market classes: fiber, seed, and floral oils. There are currently over 17,000 acres of hemp permitted in North Carolina, 99% of which is grown for floral oils. Most growers utilize similar production practices for hemp to the other crops they grow. For vegetable and small fruit growers, this means they are utilizing a plasticulture system for hemp production and for tobacco and sweet potato growers, this means they are using a ridged-bed system without plastic (open bed). No research has been completed to determine if one production system is better than the other for hemp production.

Many strains of high-CBD, low-THC *Cannabis sativa* are currently being grown in North Carolina and little is known about yield, flowering date, or size of finished plant, as it relates to current production practices.

Objective

The objective of this study was to determine the effect of open beds vs. plasticulture beds on the performance of six high-CBD, low-THC hemp strains in North Carolina.

Materials and Methods

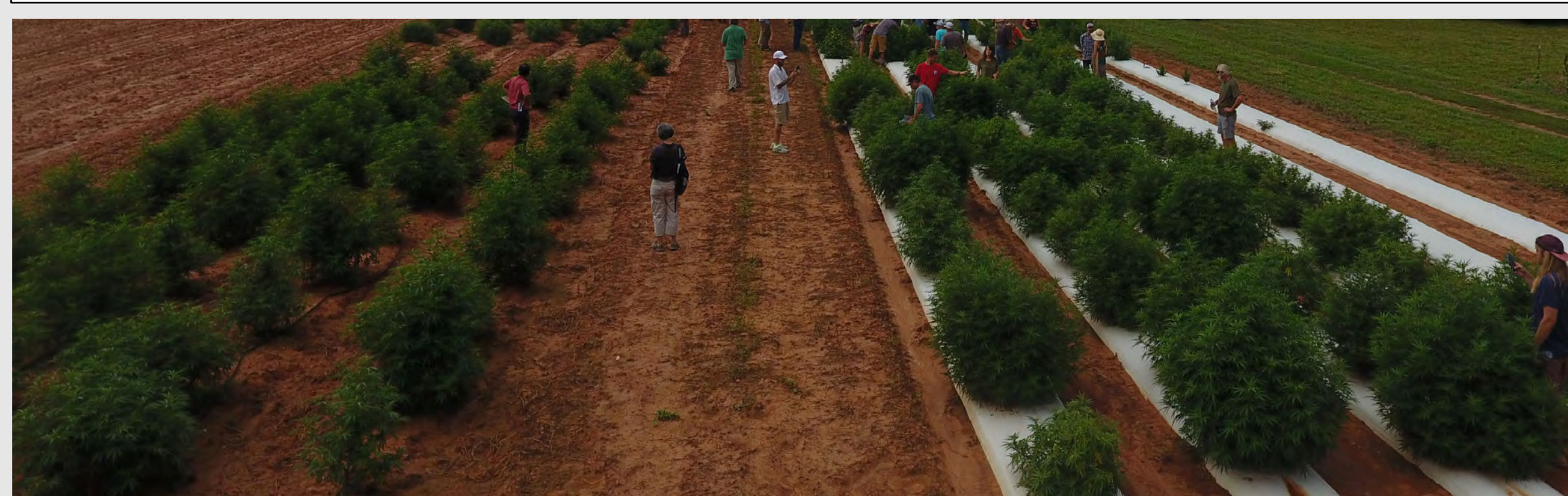
- Location: Mountain Horticultural Crops Research and Extension Center in Mills River, North Carolina
- Experimental Design: Randomized Complete Block with a Factorial Treatment Arrangement. Factor 1 was Bed Type with two levels: open and plastic. Factor 2 was strain, with six levels: 'BaOx', 'Cherry Mom', 'Cherrywine', 'Lifter', 'Sweeten', and 'Suver Haze'. Plots were 5 plants on a 1.5 m spacing between and within rows.
- Planted: June 28th 2020
- Data Collection: Height and width were collected at maturity, Julian Date was recorded for 50% flowering
- Plants were harvested whole on September 18th 2020 at peak maturity based on >75% amber colored trichomes. Plants were dried in a modified warehouse on-site.
- Yield: Whole plant dry weight was recorded at <7% moisture and floral yield (bucked weight) was determined by mechanically separating flowers from biomass using a Wintersteiger Delta small plot combine.
- Analysis: Data were subject to PROC GLM in SAS 9.4 and means separated using Fisher's Protected LSD at $\alpha = 0.05$.

Results

The type of bed significantly impacted hemp height and width when averaged across strains (Fig 1A & B). Open beds resulted in 11.7 cm taller and 8.2 cm wider plants than plasticulture beds; however, this

did not impact whole dry weight (Fig. 1C) or stem diameter (Fig. 1D) when averaged across strains.

There was a strong strain effect for height, width, diameter, and floral weight but not whole plant dry weight (Table 1). Strains 'BaOx', 'Cherrywine', and 'Sweeten' outperformed other strains (Table 1).



Results

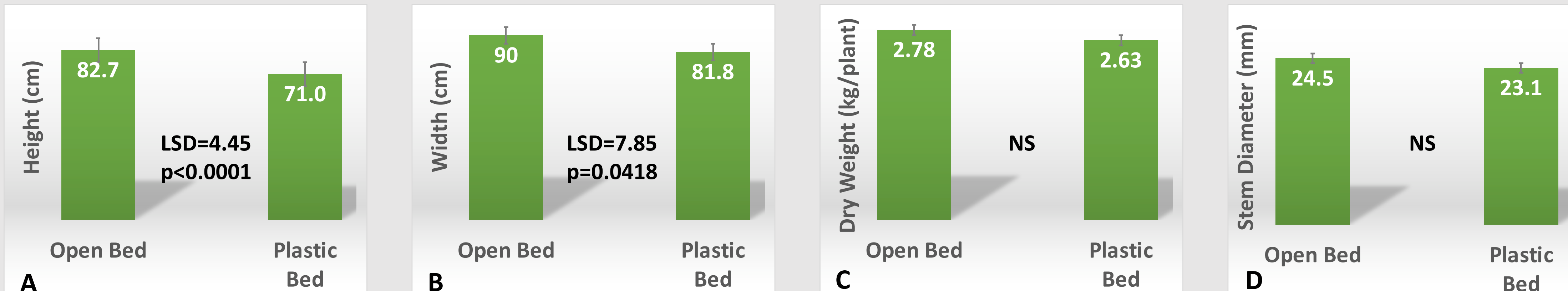


Figure 1.A) Height in cm; B) Width in cm; C) Whole plant dry weight in kg/plant; and D) Stem diameter in mm averaged across varieties within bed type at Mills River, NC in 2019.

Table 1. Height, width, whole plant dry weight, floral weight, and Julian Date of 50% flowering presented by variety averaged across bed types in Mills River, NC in 2019.

Hemp Strain	Height (cm)	Width (cm)	Diameter (mm)	Dry Weight (kg/plant)	Floral Yield (kg/plant)	Julian Date
Cherrywine	87 a [†]	112 a	32 a	0.82 a	0.43 a	261
Baox	87 a	112 a	31 a	0.82 a	0.40 a	261
Sweeten	86 a	104 a	31 a	0.68 a	0.37 a	255
Suver Haze	77 b	65 bc	18 b	0.41 a	0.26 b	220
Cherry Mom	61 c	70 b	16 b	0.32 a	0.20 b	261
Lifter	63 c	52 c	14 b	0.27 a	0.20 b	214
P > f	<0.0001	<0.0001	<0.0001	0.41	<0.0001	-
LSD	8	14	4	NS	0.07	-

[†] Values followed by the same letter are not significantly different ($\alpha = 0.05$)

Conclusions

North Carolina hemp growers can continue to utilize production practices most suitable to their own current operations. Bed type did not have a significant impact on final yield with all other factors being equal. However, growers can improve overall plant height, stem diameter, and floral yield by choosing a strain well adapted to North Carolina growing conditions. In 2019 'BaOx', 'Cherrywine', and 'Sweeten' performed well regardless of bed type. Note these are all long-flowering types harvested in late-October in NC which may increase risk of loss from severe weather during that time in NC.

References

1. Moore, K., L. Bradley. 2018. North Carolina Extension Gardener Handbook. NC State University, College of Agriculture and Life Sciences
2. Post, A., J. Davis, and K. Edmisten. 2019. Extension education program overview: North Carolina Industrial Hemp Pilot Program. In *ASA-CSSA-SSSA International Annual Meeting Abstracts*. Madison, WI.
3. Cranshaw, W., M. Schreiner, K. Britt, T.P. Kuhar, J. McPartland, and J. Grant. 2019. Developing insect pest management systems for hemp in the United States: a work in progress. *J. of Integrated Pest Management* 10:1-10.