



Hemp Farming and Production in North Carolina

June 2019

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SCOTT PROPHETER

*Vice President of Agronomy & Outreach,
Criticality, LLC*

JOSH MAYS

*Lead Agronomist,
Criticality, LLC*

Criticality Overview

Established in 2016

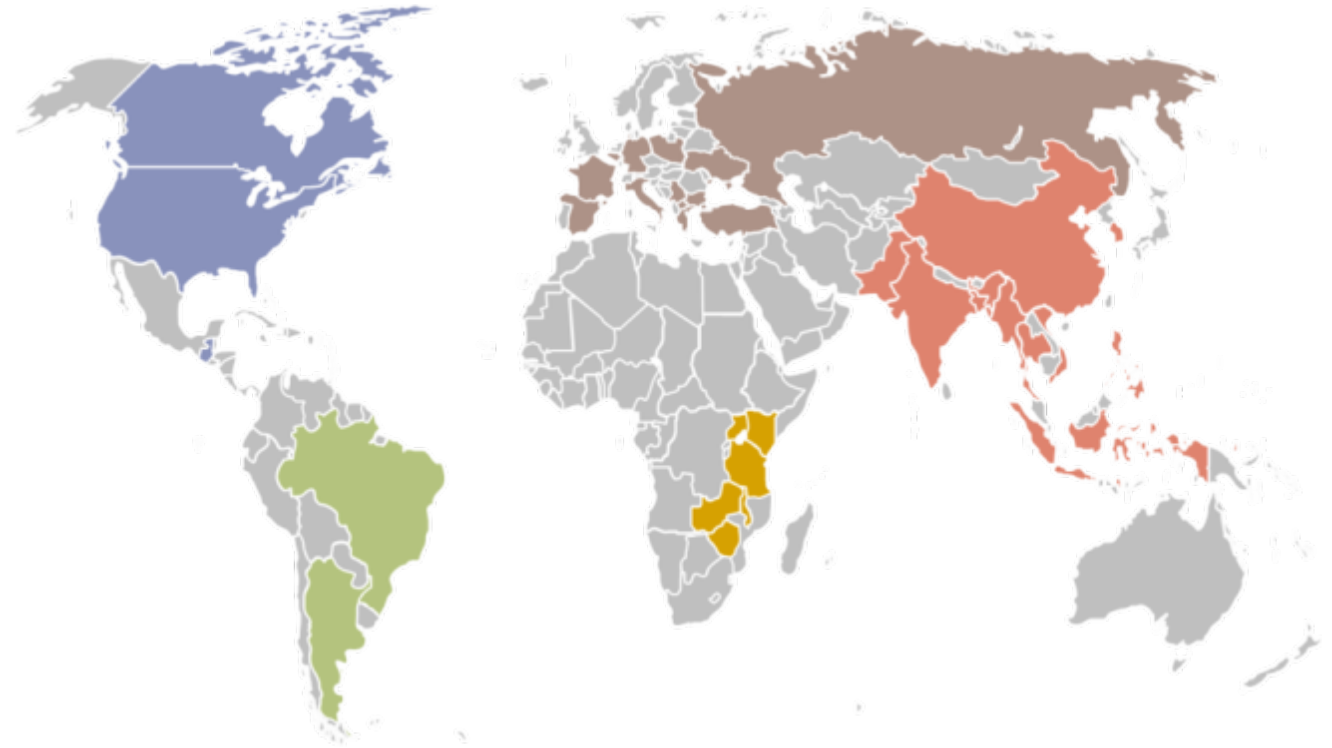
- ▶ Opened a 55,000 sq. ft. extraction facility in Wilson, NC in March 2019
- ▶ Ability to employ up to 90 North Carolinians when operating at full capacity, with an average salary of \$44,000 annually plus benefits
- ▶ Majority of hemp purchased is from NC farmers
- ▶ Capable of processing up to 1,000lbs of hemp per day to produce CBD oil for Korent™ and Korent Select™
- ▶ Highly specialized in environmentally-friendly, supercritical extraction and specialization processes
- ▶ Designed to meet dietary supplement standards (21 CFR 111)



Pyxus Overview

Proven success over 145 years in the agricultural industry,
with a science and data-driven culture

- 145 Years of Agricultural Experience
- 300,000 Global Farmer Relationships
- Global Footprint



35+

COUNTRIES IN WHICH WE
OPERATE

90

COUNTRIES TO
WHICH WE SHIP
PRODUCT

8,998

EMPLOYEES¹

PYX

NYSE TICKER

9.0M

SHARES OUTSTANDING

\$1.8B

2019 REVENUES

(1) Including seasonal employees



~you

SECTION 02

Introduction to Hemp

History of NC Hemp Production



2014

Federal Farm Bill authorizes states to administer industrial hemp pilot production programs



2015

NC Farm Act establishes state's pilot program



2017

1st growing season of hemp in NC



2018

Federal Farm Bill removes hemp and hemp-derived products from the Controlled Substances Act

Authorizes federal subsidies, such as crop insurance, for hemp growers

Hemp vs. Marijuana



Hemp and marijuana both belong to the cannabis family, a genus of flowering plant from the family Cannabaceae



Cannabis contains a variety of different compounds called cannabinoids; the most dominant are tetrahydrocannabinol (THC) and cannabidiol (CBD); primary difference is THC concentration



Hemp contains a very low concentration of THC (0.3% or less); marijuana has high levels of THC with concentrations typically between 10% to 30%



THC is the psychoactive component of cannabis; hemp, which contains 0.3% THC or less, has no psychoactive properties at this concentration level

Primary Forms of Cannabis

CANNABIS GENUS

A genus of flowering plants in the family Cannabaceae

CANNABIS SATIVA

Two Species

INDUSTRIAL HEMP

- THC < 0.3%; Target CBD
- No intoxicating effects
- Many strains (varieties) targeting high CBD concentrations
- Allowed for international sport competitions
- WHO Report: No public health risk or abuse potential
- DHHS: Negligible potential for abuse
- USDA: Allowed for interstate commerce

MARIJUANA

- THC > 0.3%
- Typically 10-30% THC for recreational use
- Intoxicating effects
- Many strains (varieties) targeting high THC concentrations
- Banned for international sport competition
- No interstate commerce

Sources: WHO report, 2017 https://www.who.int/medicines/access/controlled-substances/5.2_CBD.pdf;
DHHS citation to <https://hempsupporter.com/statement-on-the-status-of-hemp-derived-cbd-under-federal-law/>

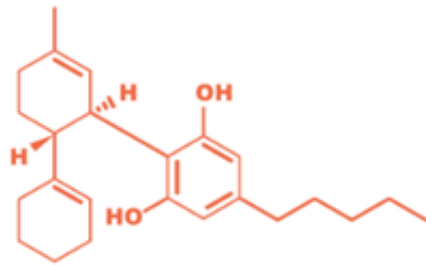
CBD vs. THC

100+ cannabinoids are found in the cannabis plant

- ▶ The two most dominant are THC and CBD
- ▶ Minor cannabinoids include CBG, CBN and CBC

CBD

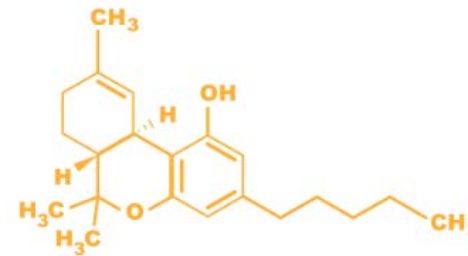
Cannabidiol



No psychoactive properties

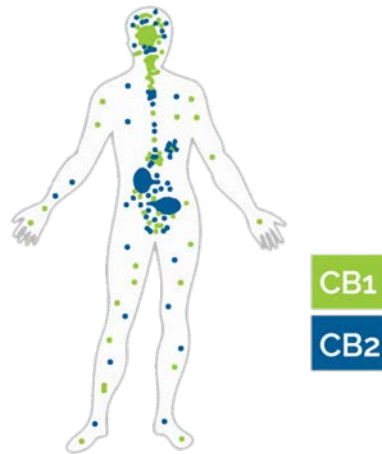
THC

Tetrahydrocannabinol



Psychoactive properties

Effects of CBD



Endocannabinoid System Helps Regulate Physiological and Cognitive Processes



PAIN SENSATION



MEMORY

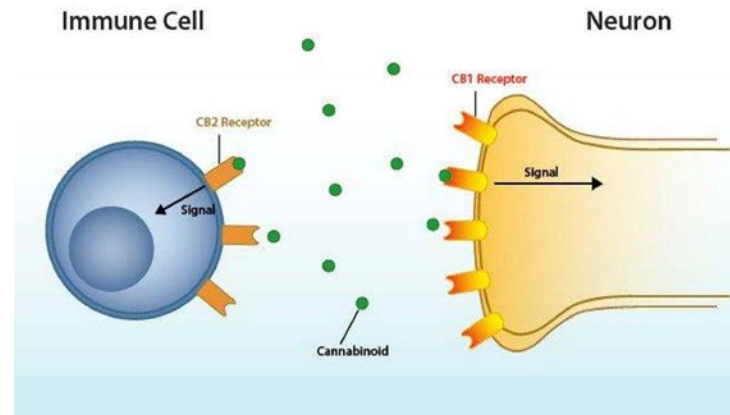


APPETITE








MOOD

Endocannabinoid System A Network Of Receptors Throughout Human Bodies



CBD Delivery Mechanisms Vary

The body is able to absorb CBD through various forms

INTRAVENOUS	INHALATION / VAPORIZATION	ORAL MUCOSAL <small>Hold in mouth rather than swallowed</small>	ORAL	TRANSDERMAL
				
DELIVERY CLASSIFICATION: INTRAVENOUS	DELIVERY CLASSIFICATION: INHALATION / VAPORIZATION	DELIVERY CLASSIFICATION: ORAL MUCOSAL	DELIVERY CLASSIFICATION: ORAL	DELIVERY CLASSIFICATION: TRANSDERMAL
ONSET: IMMEDIATE	ONSET: RAPID: 2-3 MINUTES	ONSET: RAPID: A FEW MINUTES	ONSET: SLOW: 20-60 MINUTES	ONSET: RAPID: A FEW MINUTES
BIOAVAILABILITY ¹ 100%	BIOAVAILABILITY ¹ 40-60%	BIOAVAILABILITY ¹ 35%	BIOAVAILABILITY ¹ 6-15%	BIOAVAILABILITY ¹ topical delivery not designed for systemic release

DELIVERY CLASSIFICATION: Systemic or Local | **Onset:** The time it takes for the product to start working in your body.
Bioavailability: Percentage of the active product (i.e. CBD) that makes it into the bloodstream.

1. Estimated Bioavailability: Actual bioavailability and time to onset of action vary by specific product formulation. Delivery technologies can be used to design shorter, longer or controlled release formulations
2. Low due to first-pass effect; certain amount lost through liver and digestive processes

Industrial Hemp Applications

More Than 50,000 Uses

Industrial hemp is an extremely versatile crop with diverse applications ranging from pharmaceuticals and personal care products to textiles and building materials. The range of byproducts that can be derived from the plant are sustainable alternatives to many environmentally harmful products.

Hemp products are generally divided into 3 groups, based on what part of the plant they are derived from: flower, seed, stalks/stems/fibers.



FLOWERS & LEAVES

- CBD Extract & Isolates
- Other Cannabinoids

SEEDS & HURDS

- Grains
- Cooking Oils
- Personal Hygiene
- Varnishes
- Fuel
- Lubricants
- Solvents
- Animal Feed

STALKS, STEMS & FIBERS

- Textiles (Consumer & Industrial)
- Feed Supplements
- Linings
- Paper Products
- Cement
- Fiberglass Substitutes
- Animal Bedding

A man wearing a green baseball cap, glasses, a grey t-shirt, and blue denim overalls stands in a field of tall cannabis plants. The background shows a sunset sky with orange and purple hues. The right side of the image features a green geometric overlay.

SECTION 03

Economic Impact

A Growing Industry

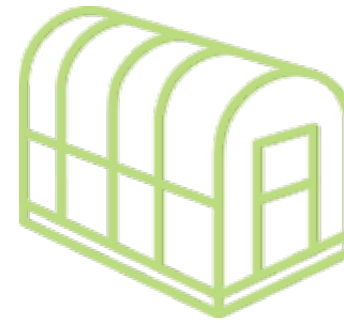
Today, hemp is widely grown in North Carolina as farmers seek to replace less profitable crops.



1,106*
licensed growers



13,166.51*
licensed acres



5,206,312 sq. ft.*
licensed greenhouses

*According to NC Industrial Hemp Commission as of June 6, 2019

Hemp Sales

In recent years, consumers have rapidly increased their consumption of hemp-derived products.



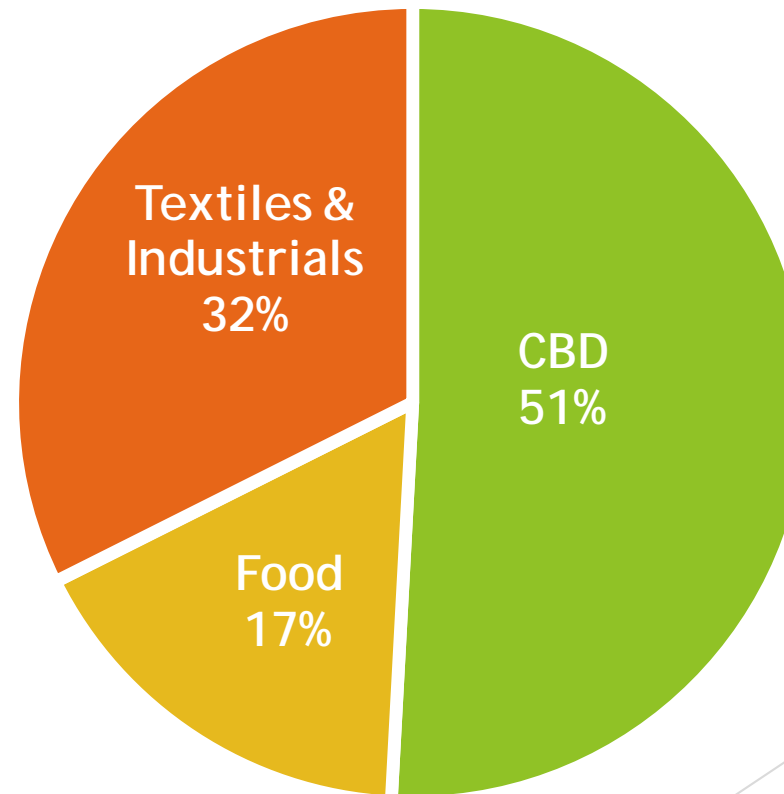
Total sales in the U.S. market reached ~\$820MM in 2017



Represents ~19% YOY growth



CBD accounts for more than half of all hemp sales



The Economic Opportunity

Hemp: A Crop Diversifier for North Carolina Farmers

1 acre of high CBD hemp equals 15 acres of tobacco by revenue*

A successful high CBD hemp crop can provide a farmer with \$10,000+ per acre*

621 registered processors in NC providing a much needed spark to distressed rural economies**

Potential statewide economic impact of well over \$100 million***

Majority of equipment used to cultivate tobacco can be used for hemp production

*Source: Internal data collection from Pyxus and Criticality

**Source: NC Industrial Hemp Commission

***Source: <https://www.fayobserver.com/news/20180714/is-hemp-future-of-nc-agriculture>

Infrastructure Investments by North Carolina Farmers



Greenhouse

\$50,000*



Cultivation
Equipment

\$22,000*



Transplanter

\$22,000*



Sprayer

\$25,000*



Drying Barns

\$20,000*

* The average cost of infrastructure when purchased new

A man with a beard, wearing a red t-shirt and khaki pants, stands in a field of tall green plants. He is reaching up with his right hand to touch the top of one of the plants. The background is filled with more of these plants and some trees in the distance. The image has a green geometric overlay on the right side.

SECTION 04

Regulation

Working Together to Build a Responsible Industry

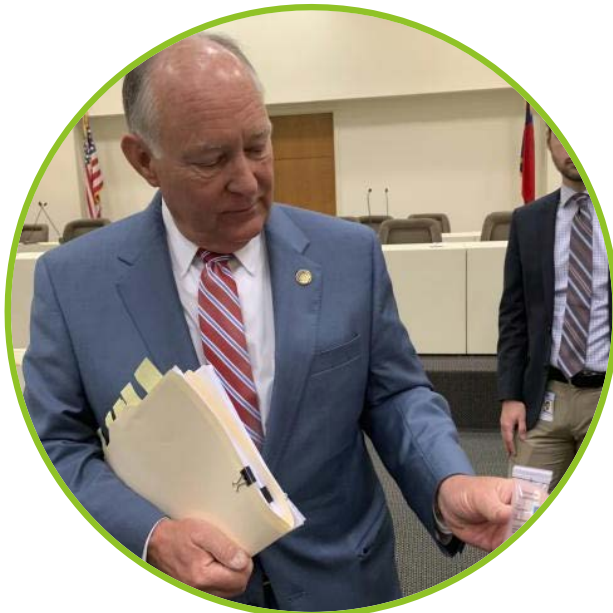
Industry is committed to working with regulators, law enforcement, and other stakeholders to create a responsible regulatory framework to protect consumers

Wilson Mayor Bruce Rose (right) attends Criticality's grand opening in March 2019



Differentiating from Marijuana

- High-performance liquid chromatography (HPLC) machines can test for THC content in cannabis to differentiate hemp from marijuana. Data from these machines can and should be used in marijuana enforcement.*
- New technology is emerging, such as field test kits, providing officers on patrol the ability to quickly, efficiently and affordably test for THC content.**



Republican Sen. Brent Jackson of Sampson County demonstrates a potential field test that could help law enforcement officers discern whether a substance is hemp or marijuana. (Image WRAL)

*Source: <https://www.ncbi.nlm.nih.gov/pubmed/28841427>

**Source: <https://www.dfs.virginia.gov/field-test-kits/field-test-kit-evaluation/marijuana-field-test-kits/>

Impacts of Overregulation

The legislative language in the hemp products* definition “...as approved by the FDA or USDA...” has the potential to:

- ▶ Decimate the NC hemp industry
 - ▶ CBD revenue forecasts shrink by 90% or more
- ▶ Processors will no longer locate in North Carolina and rural economies will feel the pain
 - ▶ Neighboring states will capitalize on our missed opportunity
- ▶ Negatively impact farmers
 - ▶ Current crops and infrastructure investment will be wasted
 - ▶ Future hemp crops will be worth no more than current commodity crops

* Source: "§ 106-568.51. Definitions. (6)

Hemp Products Definition

- ▶ The more we limit the commercial operations of hemp farmers, the more we limit the economic viability of the North Carolina farmer.
- ▶ To avoid limiting the potential of North Carolina's farmers and our economy, the North Carolina Farm Act of 2019 should contain the following language:

§ 106-568.51. Definitions.

(6)Hemp Product - Any product within the federally... but not limited to, cosmetics, personal care products, food intended for animal or human consumption ~~as approved~~ unless prohibited by the United States Food and Drug Administration or the United States Department of Agriculture by final rule or regulation...

Justification: Until there are clear rules from federal agencies, products should be assumed to be free from federal government regulations. To limit businesses on what they are permitted to produce prior to government action equates to reducing the marketability of hemp as a commodity for NC farmers.

Allowing Smokable Hemp Flower

- ▶ Farmers have the potential to make roughly 3 to 4 times the profit on smokable hemp flower than they do on hemp grown for extraction.
- ▶ Among cultivators surveyed, 84% grew hemp to produce CBD in 2017, and nearly seven in 10 grew the plant for nothing but CBD.*
- ▶ To avoid limiting North Carolina's farmers and our economy, the North Carolina Farm Act of 2019 should contain the following language:

§ 106-568.51

(7e) Smokable hemp. - A product that does not exceed the federally defined THC level for hemp in a form that allows THC to be introduced into the human body by inhalation of smoke. ~~"Smokable hemp" includes~~ hemp buds, hemp flowers, whole or ground raw hemp plant material, hemp cigars, and hemp cigarettes, but excluding hemp in whatever form that is or has been grown, processed or manufactured by a Licensee for commercial sale.

Justification: Protects legal products for NC licensed growers, handlers, processors without impacting the 2020 ban otherwise stated in the legislation.

* Source: MJ Biz Daily Annual Hemp & CBD Industry Factbook, 2018

Handling Definition

"§ 106-568.51. Definitions.

(5a) Handling. - Possessing or storing hemp plants for any period of time on premises owned, operated, or controlled by a person licensed to handle hemp. "Handling" also includes possessing or storing hemp plants in a vehicle for any period of time other than during its actual transport from the premises of a person licensed to cultivate, handle, or process hemp to the premises of another licensed person. "Handling" does not include possessing or storing finished hemp products.

Justification: The current language could be construed by law enforcement if product is being transported to an out-of-state customer that is compliant with that state's laws. This protects the growers, processors and transporters.

Cannabinoid-related Compound

G.S. 106-121(1a). Definitions and general consideration.

(1a) The term "cannabinoid related compound" means chemical compounds and constituents found within the hemp plant that are biologically active and are classified in subgroups...but not including those chemical compounds and constituents that are found in any finished hemp products.

Justification: As defined, "cannabinoid-related compounds" includes all cannabinoids, terpenes, flavonoids, and other related compounds derived from hemp. There does not appear to be any limit on the form or substance of those "cannabinoid-related compounds" and the definition is very broad. Agency staff and law enforcement could assume "cannabinoid-related compounds" includes a finished hemp product (i.e. CBD oils, salves, topical creams and every other retail CBD product). It is not just limited to "cannabinoid-related compounds" in the plant or raw flower itself, or in the intermediary extracts ("in process" goods) that processors/extractors and product manufacturers create and use in their business operations (i.e.: crude oil, distillate, and isolate forms of CBD that are mixed and diluted back down into the final end-use consumer products).



Thank You