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Hemp Marketing, Budgeting and Economics

February 11, 2020



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# ^ Agenda

**01 |** Pyxus  
A Company  
Overview

**02 |** Hemp 101  
Understanding the  
plant, its uses and  
market value

**03 |** Production

**04 |** Current  
Environment  
Economics, Legislation,  
Regulation, etc.

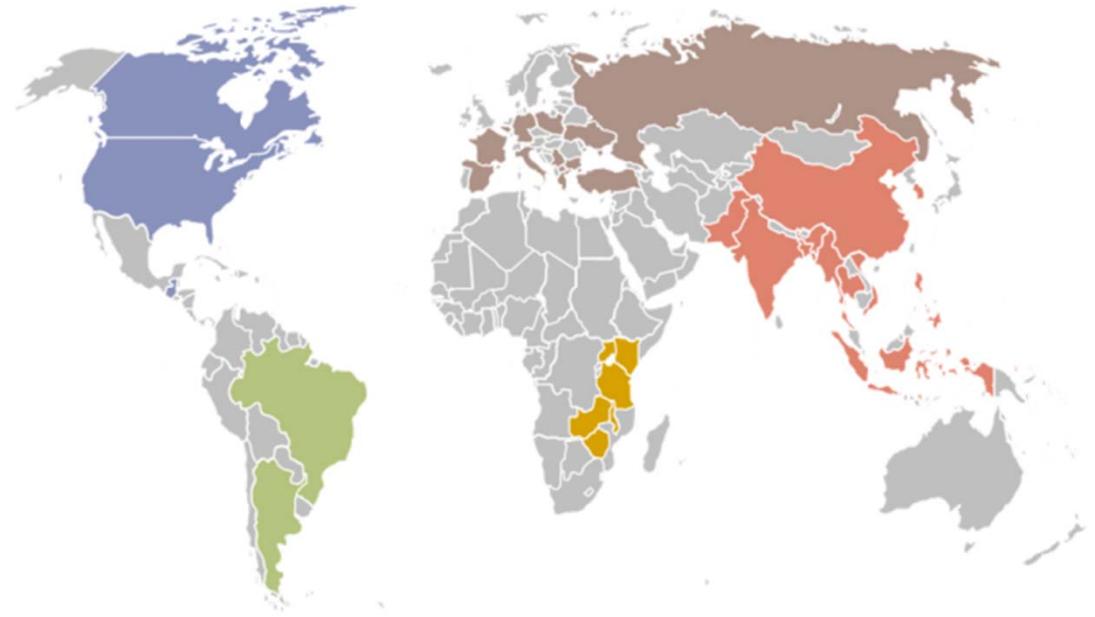
**05 |** Future of the  
Industry



# 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**

EMPLOYEES<sup>1</sup>

**PYX**

NYSE TICKER

**9.0M**

SHARES OUTSTANDING

**\$1.8B**

2019 REVENUES

(1) Including seasonal employees

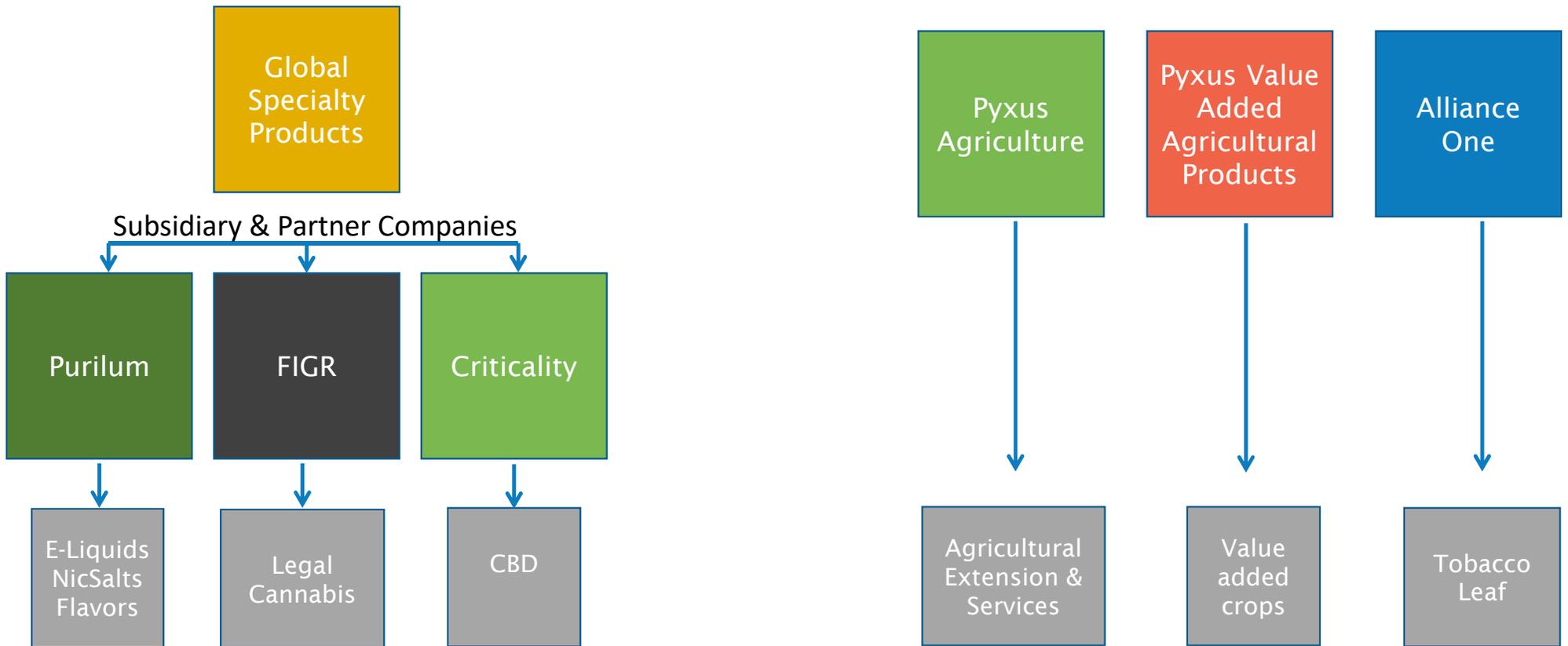


# The Pyxus Brand Portfolio





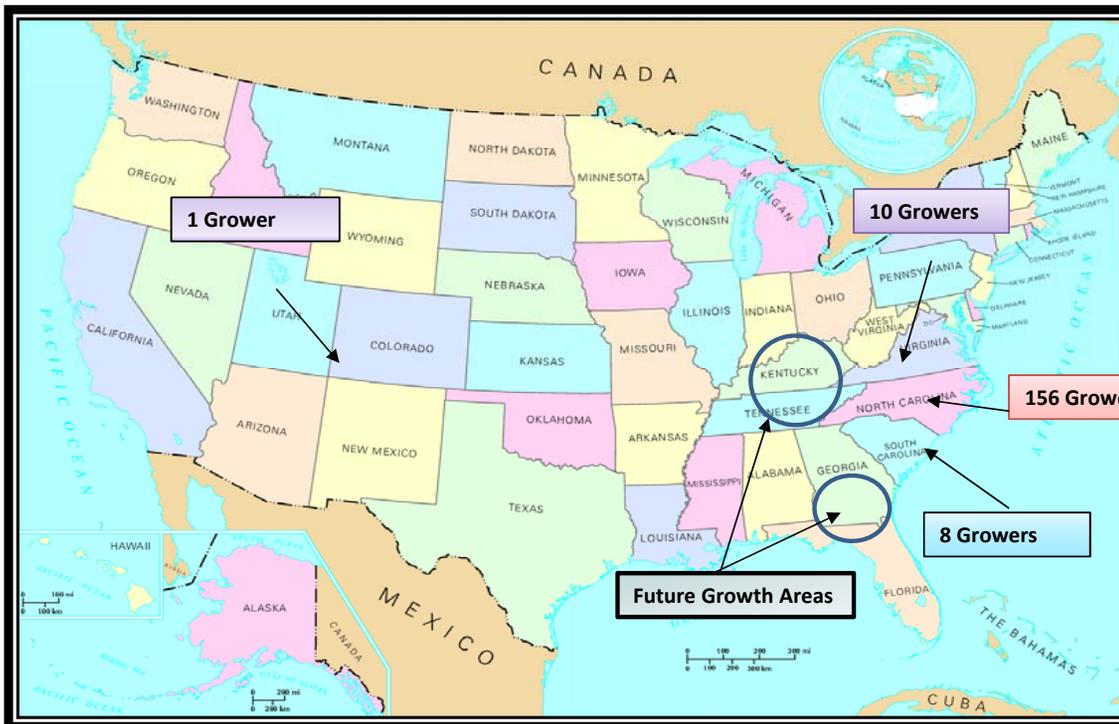
# PYXUS™





## Grower Demographics

Diversifying our production footprint to reduce risk and gather best practices while maintaining our tobacco growing regions.



- 35+ states have pilot industrial hemp programs
- Close to 80,000 acres permitted nationwide in 2018
- Pyxus contracted approx. 1000 acres in 2019
  - Conventional
  - Organic

# 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
- **Cannabinoids & CBD are found only in the flower material at levels needed for commercialization**



## 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



# Hemp Sales

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



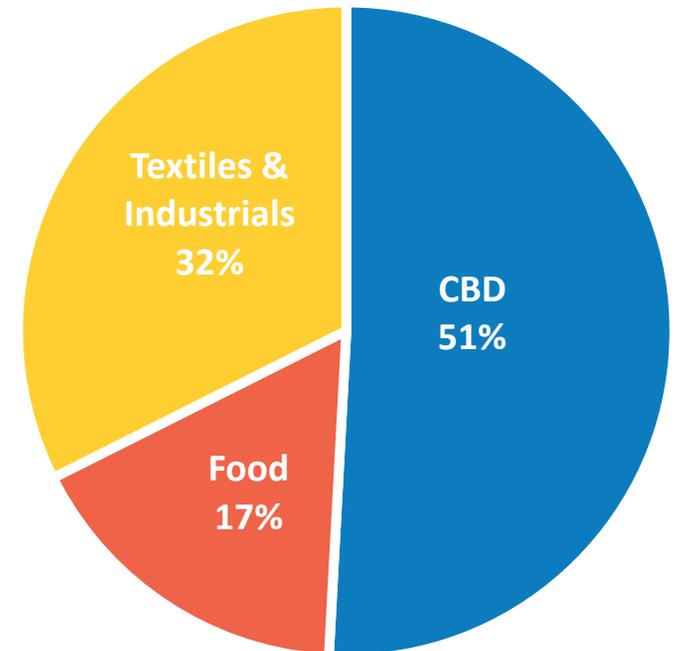
Total sales in the U.S. market reached ~\$820MM in 2017



Represents ~19% YOY growth



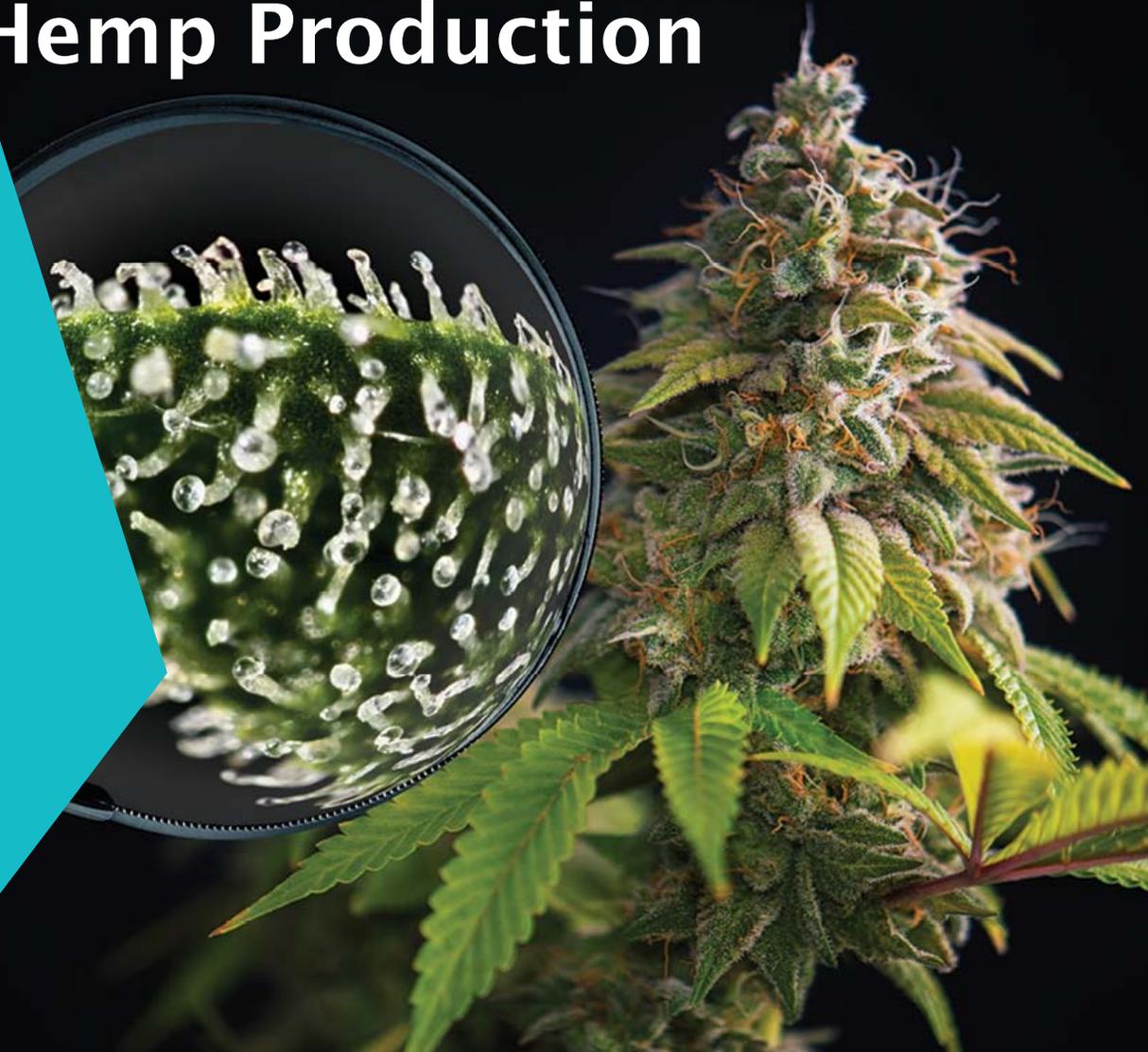
CBD accounts for more than half of all hemp sales



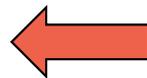
Sources: Hemp Business Journal "The CBD Report", October 2016; Hemp Industries Association; Pyxus-commissioned primary IPSOS study of US and Canadian consumers, May 2018

# ^ What Makes Hemp Production Profitable?

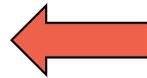
- ▶ Cannabis plants contain collection of chemical compounds called cannabinoids
- ▶ 100+ cannabinoids within the plant (THC/CBD/CBG etc....)
- ▶ Cannabidiol (CBD) is widely considered to have the most significant role in the cannabis plant's medicinal benefits
- ▶ Trichomes (pictured here) are small, crystal-like structures that form a resin on cannabis flowers, which facilitates production of cannabinoids
- ▶ Trichomes produced from CBD-dominant strains of cannabis are the focus of the industrial hemp industry



# Understanding the Cannabis Plant



Foliar pesticides



Soil applied pesticides & heavy metals

- ▶ Cannabis is a bioaccumulator, which means it accumulates substances such as pesticides and heavy metals from its surroundings
- ▶ These sources of contamination are a major concern in the marketability of the crop
- ▶ Pre-plant testing for the presence of heavy metals and pesticides is critical in site selection

# Heavy Metals

- ▶ Mercury, Cadmium, Lead & Arsenic are target heavy metals of concern
- ▶ Soil sampling to determine source contamination
- ▶ Limited research to determine the uptake, translocation, and transfer factors
- ▶ Must factor the end-use product and extraction methodology
- ▶ Regulations continue to take shape





# Crop Protection Agents & Pesticides

- ▶ Strict tolerance thresholds in the final product
- ▶ Organic does not mean compliant (Pyrethrins & Spinosad)
- ▶ Persistent & systemic insecticides/ fungicides are primary concern (Coragen, Lorsban, Prevalon, Belt, Pyrethroids, Ridomil, Metastar, etc.)
- ▶ Limited labeled crop protection agents, recent EPA movement
- ▶ Soil sampling to confirm source contamination levels
- ▶ Regulations continue to take shape





# Open Field Production

- ▶ Cheapest cost of production
- ▶ Scales well with increased demand
- ▶ Equipment cost subsidized by other crops (tobacco/sweet potato)
- ▶ Irrigation not required
- ▶ Widely available in North Carolina





# Plasticulture Production

- ▶ More expensive than open field
- ▶ Difficulty scaling with increased demand
- ▶ More management intensive than open field
- ▶ Irrigation capability required



# Greenhouse Production

- ▶ Most expensive production system
- ▶ Difficulty scaling with increased demand
- ▶ Most management intensive production system
- ▶ Irrigation capability required
- ▶ Potential higher quality in a controlled environment
- ▶ Season extension capability for additional markets





# The Economic Opportunity

Hemp: A crop diversifier for NC 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+ profit per acre\*

Typical costs of Pyxus contracted grower is \$8,000-10,000+/acre

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

Equipment used for hemp production is heavily subsidized by other crops grown in North Carolina

\*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>

# A Growing Industry

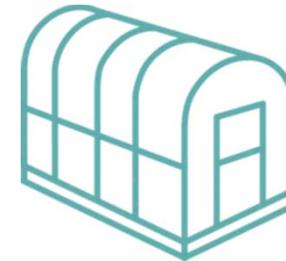
Today, hemp is widely grown in North Carolina as farmers seek to replace less profitable crops.



**1,404\***  
licensed growers



**17,589.51\***  
licensed acres



**6,900,337 sq. ft.\***  
licensed greenhouses

\*According to NC Industrial Hemp Commission as of February 1, 2020



# Market Saturation

Hemp: Are we growing too fast?

Large amount of hemp biomass on the market

Varying degrees of quality and grades of processing

How does this impact Pyxus?

Future price of hemp in North Carolina?

Hemp can be profitable and used to grow the agricultural sector, but proceed wisely and with caution

# ^ What's the Hold Up?

## BANKING

- Protections are needed to provide financial institutions security when operating in the hemp industry
- Loans, bank accounts, lines of credit
- Credit card transactions are a key factor

## LEGISLATION

- Need for realistic USDA framework to shape the federal program
- NC legislation that complies with USDA and allows for regulation of the industry
- Opens the door for crop insurance

## REGULATION

- Standardized regulation of processors and products
- Ensure product integrity and public safety
- FDA regulation would open up future markets as a food ingredient and dietary supplements



# Impact of the USDA Interim Final Rule & Total THC



Testing will require 0.3% TOTAL THC – No longer just Delta-9 THC



Delta-9 THC is the psychoactive component, but new testing requires decarboxylation of THCa into Delta-9 THC



Conversion:  $D9\ THC + THCa \times 0.877$   
Example: 0.25% D9 & 0.38% THCa = 0.58% TOTAL THC



Significant impact on farmers & processors, will swing CBD average from 10% to approx. 7% with current genetics



USDA rule is still in interim status



# What's Next?

## The Progression of Hemp in NC

### CANNABINOIDS

- Minor cannabinoids of key interest: CBG and CBC
- Future products with unique blends of CBD and other cannabinoids
- Pet products
- Make-up and skincare products
- Dietary supplements (combo products)
- Plant genetics are key

### TEXTILES & INDUSTRIAL

- Need for increased infrastructure to create a profitable market
- Building supplies (hempcrete)
- Paper products
- Fiberglass replacement
- Plastic replacement

### FOOD INGREDIENT

- Food & Beverage
- Seeds & Cooking Oils
- Animal feeds
- Livestock feed



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Thank You!