

The background of the slide features a large, semi-transparent watermark of the Rutgers University seal. The seal is circular and contains the text "RUTGERS UNIVERSITY" around the perimeter and "STATE" in the center. The seal is rendered in a dark red color, matching the background.

RUTGERS

New Jersey Agricultural
Experiment Station

Marketing Hemp

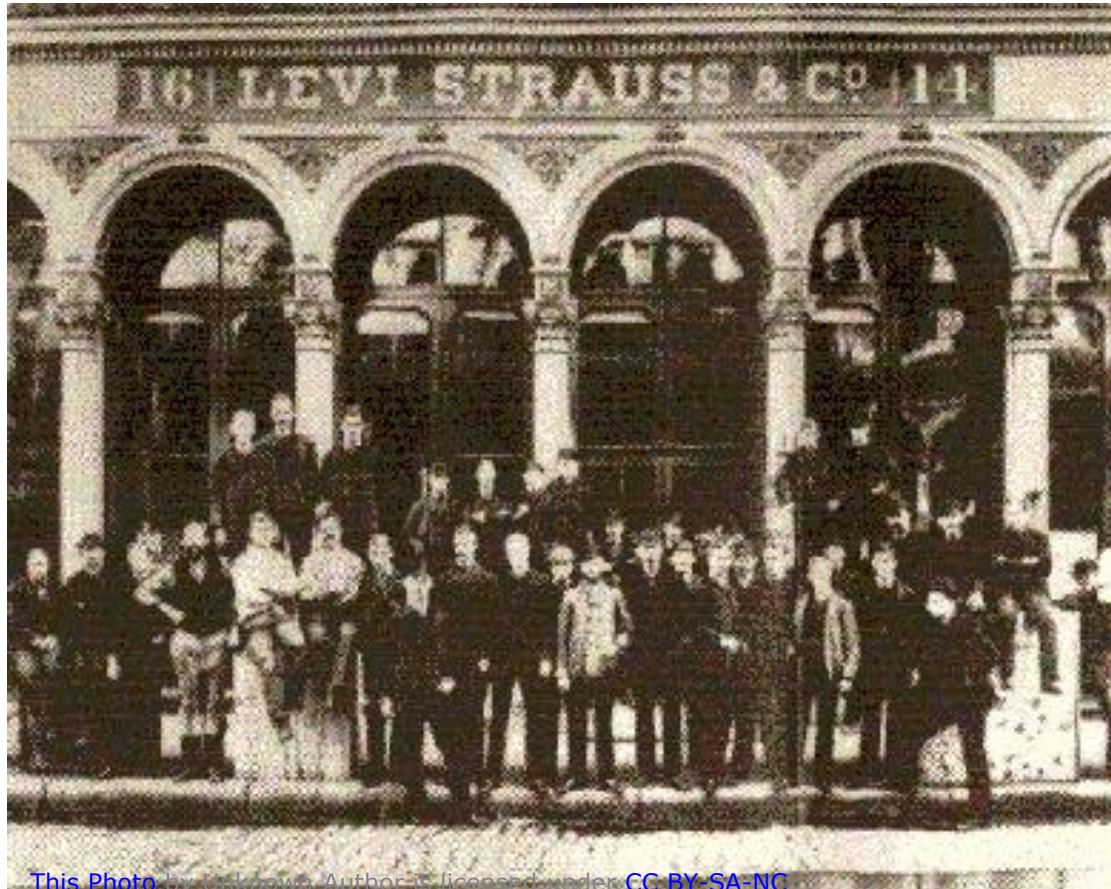
“ we grew it.....now what?”

Stephen Komar and William Bamka

Rutgers NJAES

Cooperative Extension





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Overview

- The current hemp market
- Hemp uses and potential marketing options
- Marketing concerns and considerations
- Production costs

The Hemp Market

- Supply vs. Demand!
- 30 countries permit hemp production
 - China- approx. 150,000 acres
 - Europe – approx. 50,000, acres
 - Canada - 80,000 – 100,000 acres
- U.S. Production data is difficult to quantify

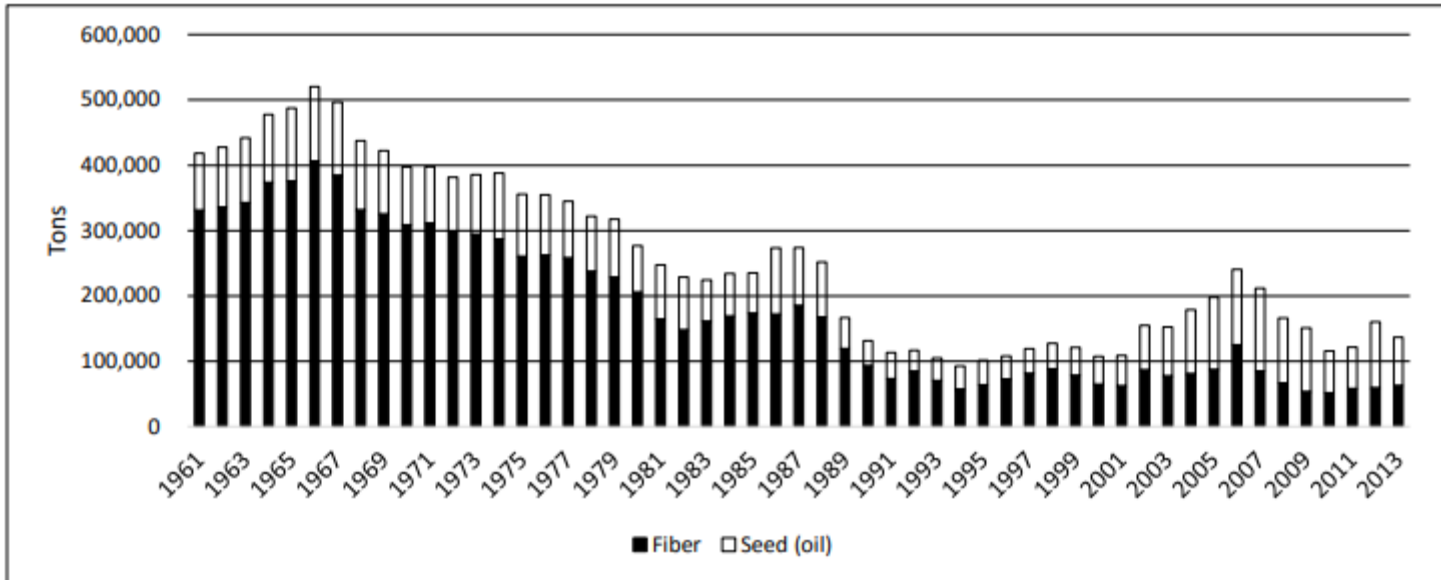


Figure 1. Global Hemp Production⁴

⁴ Agricultural and Business Management Economists at Colorado State University. Jesse Russell is located in Grand Junction, CO and can be contacted at jesse.russell@colostate.edu; Norman Dalsted, PhD and Jeffrey E. Tranel are located in Pueblo, CO; and R. Brent Young, PhD, is located in Sterling, CO. Dalsted is a Professor and Russell, Tranel, and Young are Faculty Affiliates in the Department of Agricultural and Resource Economics.

U.S. Production Estimates

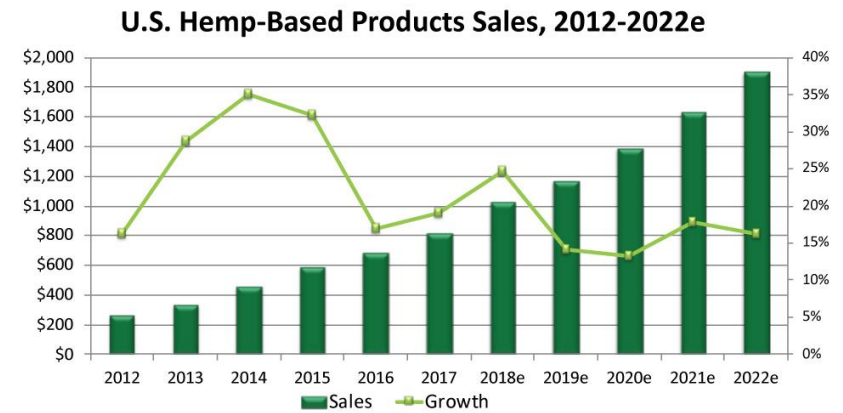
- Colorado: 52,275 acres planted (60% of amount licensed)
- Indiana: 3,000 acres planted (57% of amount licensed)
- Kentucky: 26,000 acres planted (43% of the amount licensed)
- Kansas: 2,600 acres planted (45% of amount licensed)
- Minnesota: 7,278 acres planted (52% of amount licensed)
- Nevada: 4,661 acres planted (33% of amount licensed)
- New York: 4,541 acres planted (22% of amount licensed)
- West Virginia: 641 acres planted (25% of amount licensed)
- Wisconsin: 5,000 acres planted (29% of amount licensed)

- Where does NJ fit in?

Source: hempbenchmarks.com (with permission)

Demand?

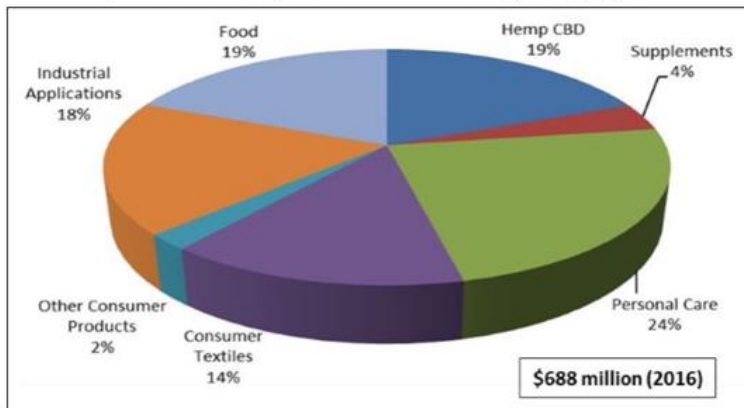
- Demand is increasing
 - CBD +++
 - Grain ++
 - Fiber +
- 2018 Farm Bill = reduced imports
- Much of demand may be met by domestic production



Source: *Hemp Business Journal* estimates (\$ mil., consumer sales)

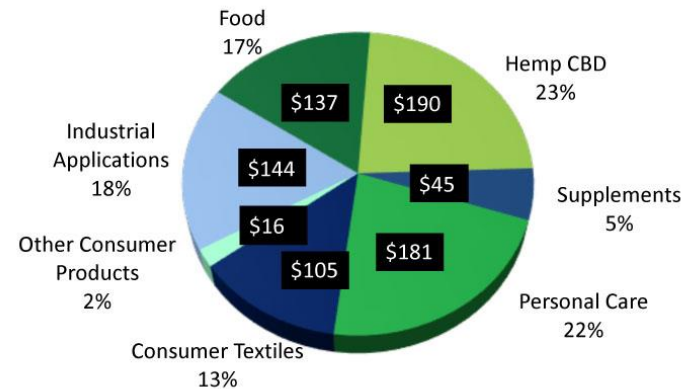
Increased Demand.....

Figure 2. U.S. Hemp-Based Product Sales by Category, 2016



Source: HIA, "2015 Annual Retail Sales for Hemp Products Estimated at \$573 Million," May 9, 2016.

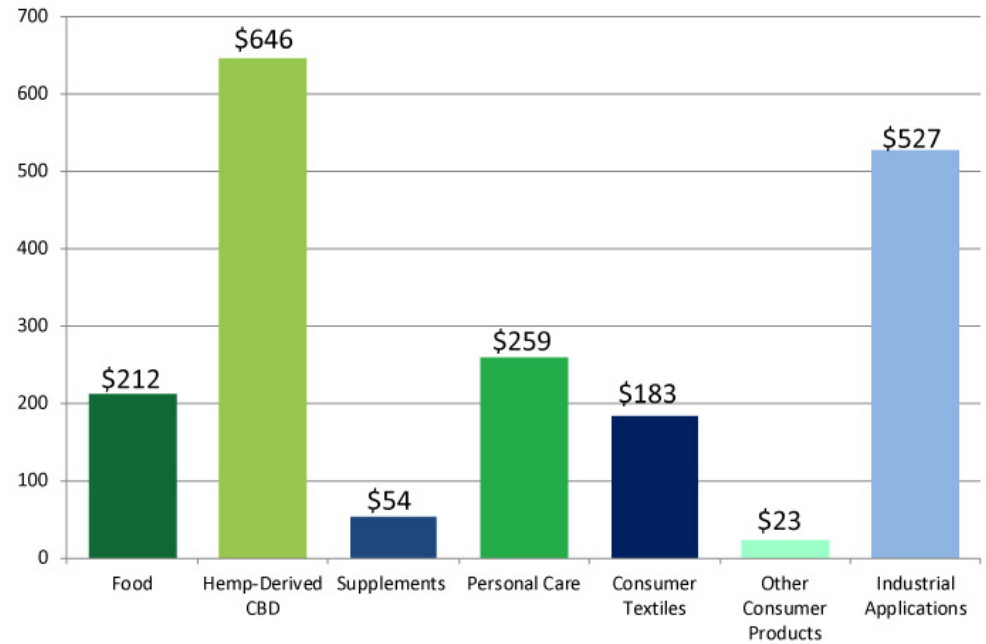
\$820 Million U.S. Hemp-Based Product Sales by Category in 2017



Source: *Hemp Business Journal* estimates (\$mil., consumer sales)

Estimated positive Growth in Demand

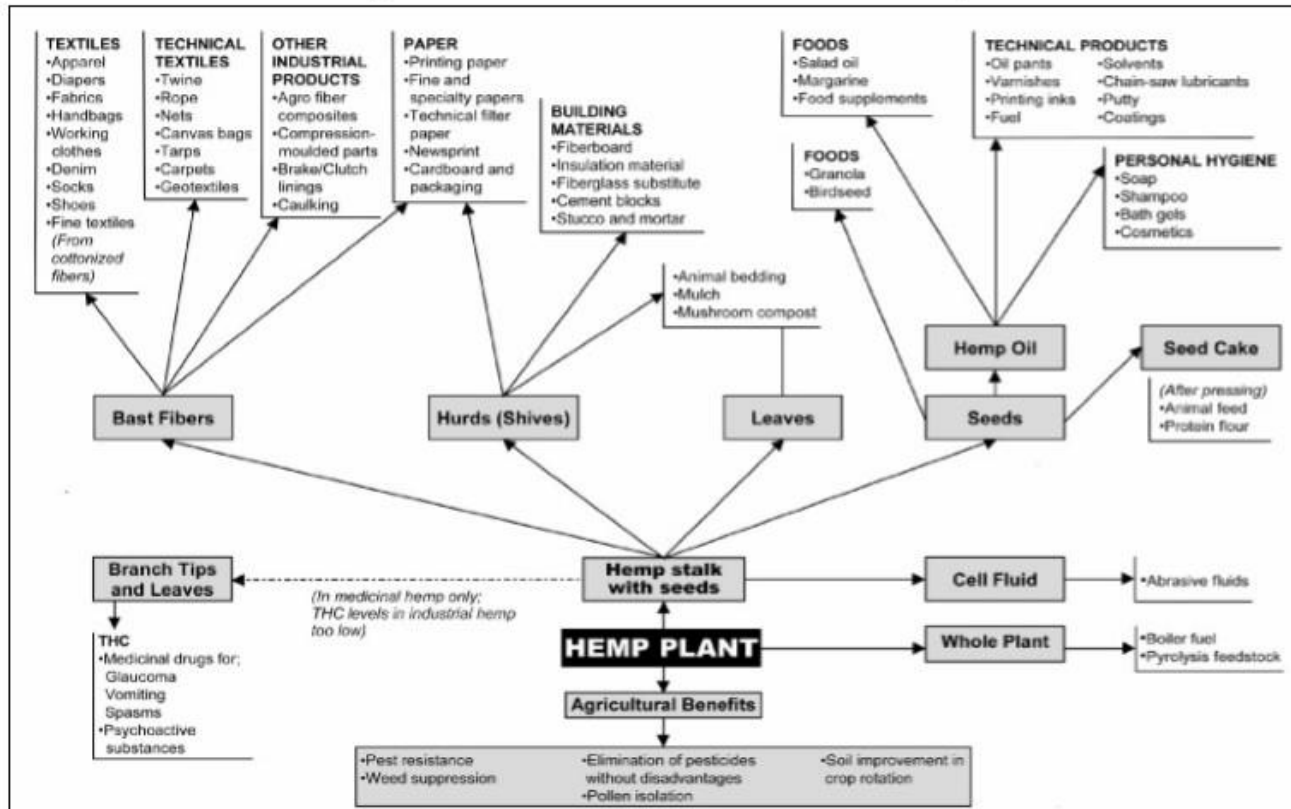
**\$1.9 Billion U.S. Hemp-Based Product
Sales by Category in 2022e**



Source: *Hemp Business Journal* estimates (\$ mil., consumer sales)

Uses for Hemp

Figure 1. Modern Uses for Industrial Hemp

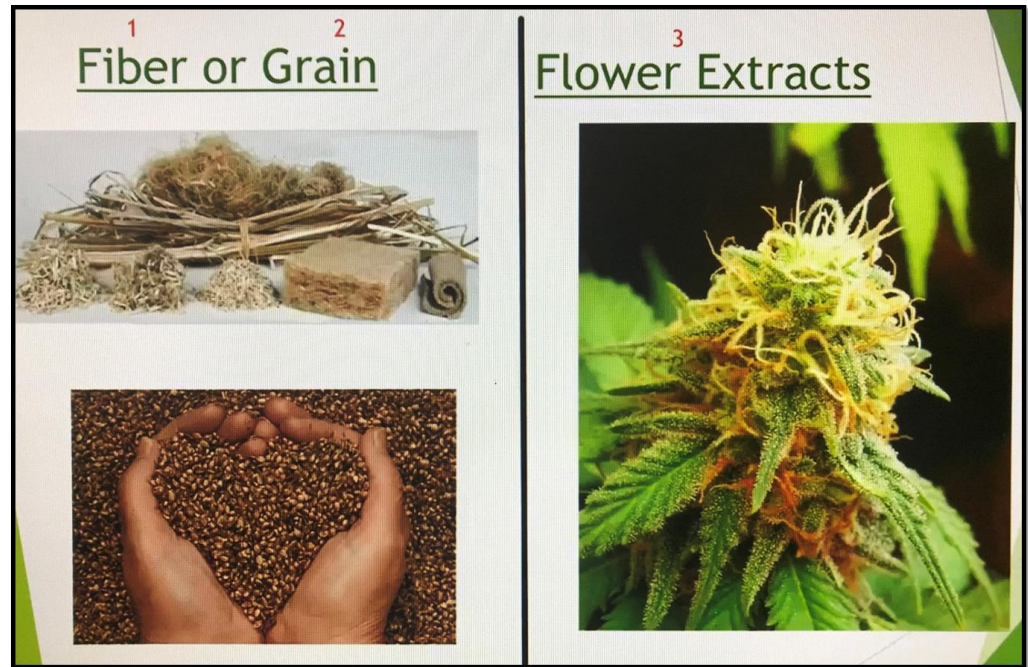


Source: Industrial Hemp Association of Tasmania, <http://www.ihat.org.au/>.

Notes: Other hemp product charts include D. G. Kraenzel et al., "Industrial Hemp as an Alternative Crop in North Dakota," AER-402, North Dakota State University, July 23, 1998; and National Hemp Association, <http://nationalhempassociation.org/>.

Three End Markets for I-Hemp

- Seed/Grain for food products
- Fiber
- Flower Extracts “CBD”



End market determines which type of industrial hemp you grow and how you grow it.

Hemp Uses

- Seed
 - Pressed oil
 - Hemp Hearts
 - Hempseed meal



- Fiber
 - “Bast” or Bark
 - Inner core or “Hurd”



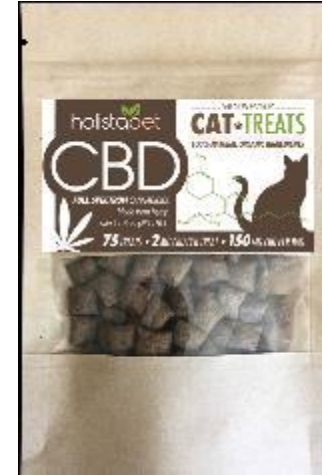
Photo: Fedgidefish/Flckr



- Fiber
 - “Bast” or Bark
 - Inner core or “Hurd”



- Pharmaceutical/Supplement
 - CBDs (Low THC)
 - Medical marijuana (CBD+THC)
 - Recreational marijuana (High THC)





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Experiment Station

CERIA
BREWING Co

This is Cannabis

FIRST RELEASE STANDARD WARNING: KEEP AWAY FROM CHILDREN

CERIA
BREWING Co

DE-ALCOHOLIZED CANNABIS BEER

Grainwave
BELGIAN-STYLE WHITE ALE

20mg THC
5mg THC PER BOTTLE

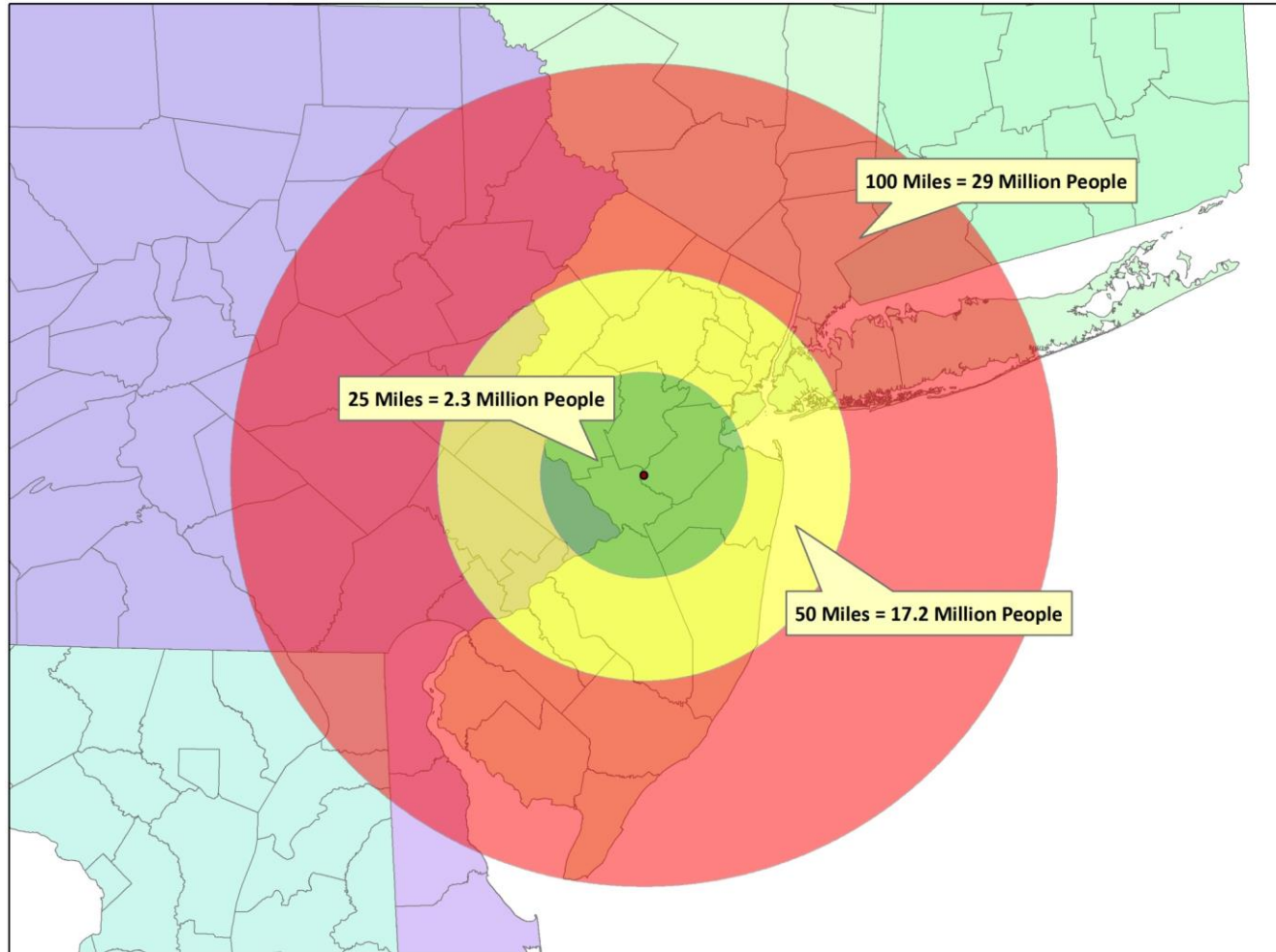
NET WT 40 FL OZ
4 10 FL OZ BOTTLES

DE-ALCOHOLIZED CANNABIS BEER

TRY ONE TODAY!

DEALCOHOLIZED CANNABIS BEER FOR THE PEOPLE™

Market Potential





Seed and Grain Marketing

- Seed and grain varieties are sold much like any other commodity
- New/ developing market.
- Contract growing opportunities?
- Market is developing
- Opportunity for organic grain/flour production?
- Niche marketing opportunities?



Fiber Marketing

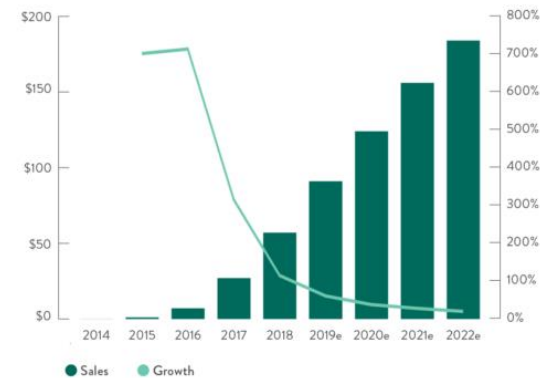
- Fiber has many uses
- New/ developing market
- Limited processing
- Limited buyers
- Post-harvest production and management
- Market is developing
- Opportunity for organic fiber production?
- Niche marketing opportunities?



CBD Marketing

- CBD is clearly the hot topic
- Post-harvest production and management
- Opportunity for organic production?
- Niche marketing opportunities?
- Understanding consumer demand is crucial!

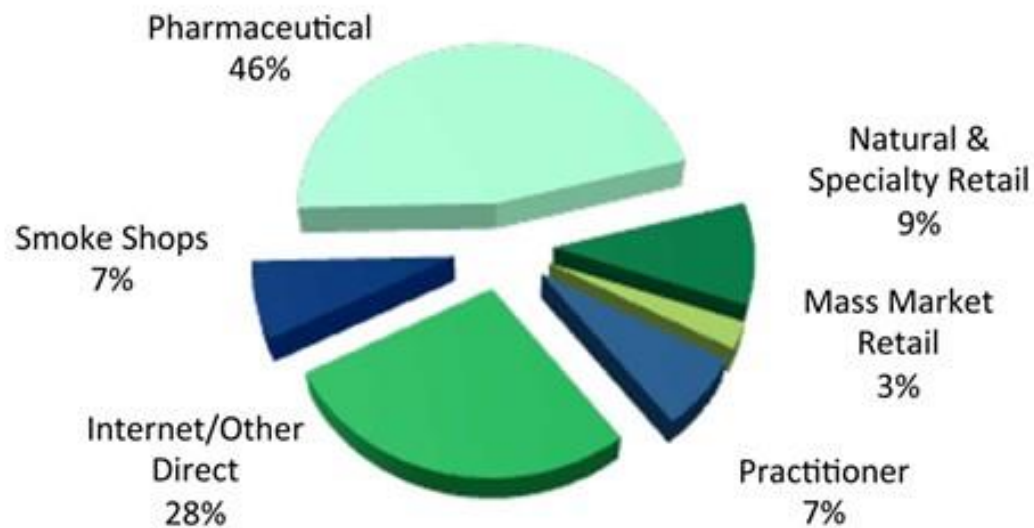
U.S. HEMP-BASED CBD PRODUCT SALES IN THE NATURAL & SPECIALTY CHANNEL
2014-2022E



\$200 MILLION
EXPECTED SALES IN THE
NATURAL & SPECIALTY
CHANNEL BY 2022

© 2018 New Frontier Data | Source: Hemp Business Journal estimates (\$ mil., consumer sales)

\$736 Million U.S Hemp-Based CBD Product Sales by Channel in 2020e



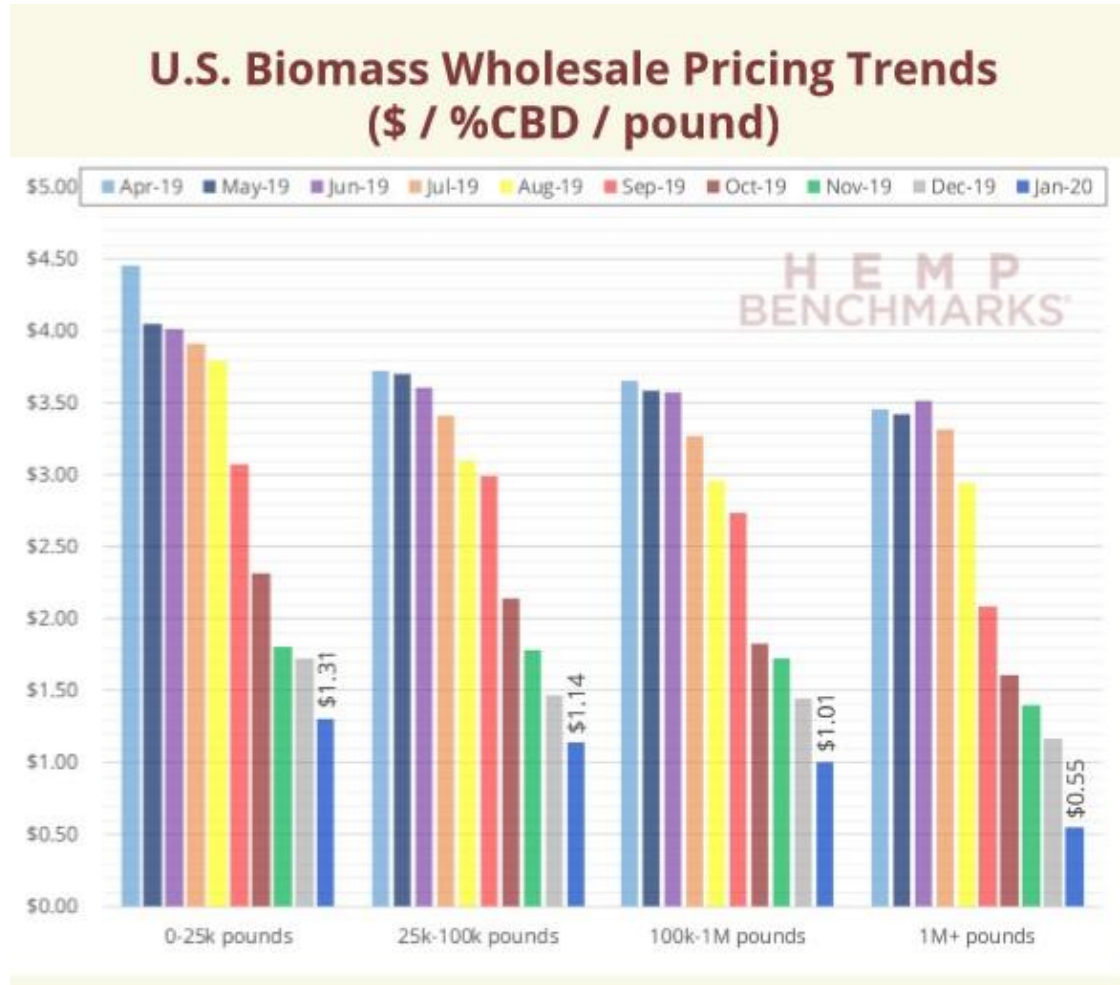
Source: Hemp Business Journal estimates (consumer sales)

HempBusinessJournal

- Crop Insurance ?
- ~~No~~ few labeled pesticides
- Still learning consumer demand
- Markets?
- Processing?



Downward Price Trend?



Refined Hemp Oil Pricing Trends (\$ / kilo)



Cannabinoid/CBD Yields

- Maximum production for one plant = approx. one pound dried floral material for extraction.
- The very first year of the program KDA received reports of prices as high as \$1,000 / lb for dried material, **HOWEVER** prices today continue to decline **RAPIDLY**.
- Emerging market; more product on market will see reductions in price to between \$5-\$10/lb.
- Extract generated per lb of dried material varies widely.
- Transition to mechanized harvest will change things.



As farmers flock to hemp, Amish and 'English' in Pennsylvania foresee real profits

by [Sam Wood](#), Updated: September 23, 2019

Flood of hemp harvest hitting the market could sink price, profits for farmers

by [April Simpson](#) and [Sophie Quinton, Stateline](#), Updated: September 16, 2019

We are Not Alone



Table 2. Industrial Hemp Crop Report, United States, 2016-2017

State	Number Production Acres		Purposes Grown
	2016	2017	
Colorado	5,921	9,700	Fiber, grain, seed for sale, CBD
Hawaii	1	TBD	NA
Indiana	2	5	NA
Kentucky	2,525	3,100	Fiber, grain, seed for sale, CBD
Maine	1	30	Unknown
Minnesota	51	1,205	Fiber, grain, CBD (nonmedical)
Montana	0	542	
Nebraska	1	1	NA
Nevada	216	417	Fiber, grain, CBD
New York	30	2,000	NA
North Carolina	0	965	
North Dakota	70	3,020	Grain
Oregon	500	3,469	NA
Pennsylvania	0	36	NA
Tennessee	225	200	CBD
Vermont	180	575	CBD research
Virginia	37	87	Fiber, grain research
Washington	0	175	NA
West Virginia	10	14	Fiber, grain
Total	9,770	25,541	

Source: CRS from information from Vote Hemp, “2017 U.S. Hemp Crop Report,” January 2018 (number of acres), and the Colorado Department of Agriculture, “2016 National Hemp Regulatory Meeting Survey,” October 2016 (“purposes grown”). “NA” indicates that information is not available.

Table 1. Variable, fixed and total costs, dollars per acre, by industrial hemp production scenario, conventional tillage system, New York, 2017 analysis.

Cost Item	Hemp Fiber Only	Dual System Fiber Plus Seed	Hemp Seed Production Only
		--- \$ per Acre ---	
Variable Inputs			
Fertilizers & Lime	\$69.15	\$69.15	\$69.15
Seeds & Plants	\$133.33	\$50.00	\$66.67
Sprays & Other Crop Inputs	\$18.22	\$46.81	\$71.71
Labor	\$27.10	\$33.87	\$12.25
Repair & Maintenance			
Tractors	\$4.03	\$20.26	\$17.90
Equipment	\$11.54	\$21.13	\$12.51
Fuel & Lube	\$11.71	\$20.03	\$12.55
Interest on Operating Capital	\$6.88	\$6.54	\$6.57
Variable Costs Total	\$281.96	\$267.79	\$269.31
Fixed Inputs			
Tractors	\$25.89	\$54.17	\$38.81
Equipment	\$19.11	\$29.24	\$20.56
Land Charge	\$100.00	\$100.00	\$100.00
Value of Operator & Family Management			
Fixed Costs Total	\$145.00	\$183.41	\$159.37
Total Costs	\$426.96	\$451.20	\$428.68

NOTES:

- Costs reflect 2017 price levels.
- Fertilizers & lime reflect Cornell University agronomists' recommendations regarding N and Purdue University regarding phosphorus and potash.
- Seeds & Plants costs vary by scenario with respect to seeding rates, but are constant with respect to seed price per pound.
- Sprays & Other Crop Inputs include crop professional fees, machinery hire rent & lease, and others. Estimates reflect no spray inputs, since no pesticides are registered for use on industrial hemp in the United States.
- Labor costs reflect labor from hired and/or family and/or owner/operator sources.
- Machinery related variable and fixed costs per Lazarus. 2017. <z.umn.edu/machdata>
- This analysis excludes a charge for management inputs.

2019 Industrial Hemp Extract Production Budget (1 Acre)

REVENUE ¹	Description	Quantity	Unit	Total (\$/acre)
	Projected Cannabidiol (CBD) % of Dry Matter	10%	% of dry matter	
	Price Per % CBD Oil	\$1.50	\$ per %	
	Total Plant Population (# of Transplants Per Acre)	1,500	transplants/acre	
	Percent of Transplants Harvested/Marketed	95%	%	
	Average Dried Floral Material Per Plant (lbs)	1.00	lbs/plant	
	Total Harvested Dried Floral Material	1,425	lbs/acre	
Estimated Gross Revenue				\$21,375.00

EXPENSES	Unit	Quantity (#/acre)	Price (\$/unit)	Total (\$/acre)	
Variable Expenses					
Transplants ²	Transplants	1,500	\$4.00	\$6,000.00	
Soil Test ³	plot	1	\$20.00	\$20.00	
	Heavy Metal	plot	1	\$50.00	\$50.00
	Pesticide Residue	plot	1	\$350.00	\$350.00
Fertilization ⁴	Dolomite Lime - Spread	ton	1	\$30.00	\$30.00
	Nitrogen - N	lb	100	\$0.46	\$46.00
	Phosphorus - P	lb	150	\$0.60	\$90.00
	Potassium - K	lb	180	\$0.34	\$61.20
	Other	lb	0	\$0.00	\$0.00
Fertigation	Nitrogen - N	lb	100	\$0.48	\$48.00
	Other	lb	0	\$0.00	\$0.00
Plastic Mulch ⁵	Plastic Mulch	acre	1	\$285.00	\$285.00
Irrigation ⁶	Drip Tape	acre	1	\$156.00	\$156.00
	Pumping Cost	hr	96	\$2.14	\$205.44
	Water Cost	1,000 gal	0	\$3.00	\$0.00
Machinery Costs ⁷	Fuel, Operator Labor, Repair and Maintenance	ac	1	\$305.18	\$305.18
Other Processing Costs	Drying/Grinding/On-Farm Processing	ac	1	\$0.00	\$0.00
Other Expenses ⁸		acre	1	\$0.00	\$0.00
Non-operator Labor Expense ⁹					
	Pre-plant and Planting Labor	hrs	50	\$11.63	\$581.50
	In-season Labor	hrs	50	\$11.63	\$581.50
	Harvest Labor	hrs	100	\$11.63	\$1,163.00
	Post-harvest Labor	hrs	175	\$11.63	\$2,035.25
	Management Labor	hrs	25	\$15.00	\$375.00
	Other Labor	hrs	0	\$11.63	\$0.00
		hrs	400		\$4,736.25
Total Labor Expense					
Marketing and TDA Charges					
Pallet Boxes	Boxes and Plastic Cover	box	10		
Transportation to Processor ¹⁰	50 miles One-Way to Market	ac	1		
License Fee ¹¹	Up to 5 acres	plot	1		
Sampling Fee ¹²	1 Variety	variety	1		
Inspection Fee ¹³		hr	2		
Cannabinoid Test ¹⁴		variety	1		
Total Marketing and TDA Charges					
Interest ¹⁵	Half of Specified Variable Expenses	\$	\$13,181.65		
Total Variable Expenses					
Fixed Expenses					
Machinery ¹⁶	Depreciation, Interest, Taxes, Insurance and Housing	ac	1		
Irrigation System ¹⁷	Capital Recovery	ac	1		
Drying Barn ¹⁸	Annual Lease	ac	1		
Drying Materials ¹⁹	Depreciation	ac	1		
Land Rent ²⁰		ac	1		
Total Fixed Expenses					
Total Expenses					

RETURNS OVER SPECIFIED EXPENSES

*Disclaimer: This budget does NOT imply any production recommendations. Significant variability in plant spacing, fertilization rate, irr methods, and other input costs exist in the production of industrial hemp for extract. This spreadsheet should not be considered repre provided as a template or guide that can be used to estimate production costs for planning purposes.

Hemp Extract Net Return Table (\$/acre)

Price (\$/lb) is determined by CBD percentage and price per percent in dried floral material (leaves and flower). The mid-point price and yield will update with changes on the budget tab.

Price (\$/lb)	Yield (lbs/acre)										
	175	425	675	925	1,175	1,425	1,675	1,925	2,175	2,425	2,675
7.00	(13,588)	(11,838)	(10,088)	(8,338)	(6,588)	(4,838)	(3,088)	(1,338)	412	2,162	3,912
8.00	(13,413)	(11,413)	(9,413)	(7,413)	(5,413)	(3,413)	(1,413)	587	2,587	4,587	6,587
9.00	(13,238)	(10,988)	(8,738)	(6,488)	(4,238)	(1,988)	262	2,512	4,762	7,012	9,262
10.00	(13,063)	(10,563)	(8,063)	(5,563)	(3,063)	(563)	1,937	4,437	6,937	9,437	11,937
11.00	(12,888)	(10,138)	(7,388)	(4,638)	(1,888)	862	3,612	6,362	9,112	11,862	14,612
12.00	(12,713)	(9,713)	(6,713)	(3,713)	(713)	2,287	5,287	8,287	11,287	14,287	17,287
13.00	(12,538)	(9,288)	(6,038)	(2,788)	462	3,712	6,962	10,212	13,462	16,712	19,962
14.00	(12,363)	(8,863)	(5,363)	(1,863)	1,637	5,137	8,637	12,137	15,637	19,137	22,637
15.00	(12,188)	(8,438)	(4,688)	(938)	2,812	6,562	10,312	14,062	17,812	21,562	25,312
16.00	(12,013)	(8,013)	(4,013)	(13)	3,987	7,987	11,987	15,987	19,987	23,987	27,987
17.00	(11,838)	(7,588)	(3,338)	912	5,162	9,412	13,662	17,912	22,162	26,412	30,662
18.00	(11,663)	(7,163)	(2,663)	1,837	6,337	10,837	15,337	19,837	24,337	28,837	33,337
19.00	(11,488)	(6,738)	(1,988)	2,762	7,512	12,262	17,012	21,762	26,512	31,262	36,012
20.00	(11,313)	(6,313)	(1,313)	3,687	8,687	13,687	18,687	23,687	28,687	33,687	38,687
21.00	(11,138)	(5,888)	(638)	4,612	9,862	15,112	20,362	25,612	30,862	36,112	41,362
22.00	(10,963)	(5,463)	37	5,537	11,037	16,537	22,037	27,537	33,037	38,537	44,037

*Disclaimer: The total cost is utilized to determine the potential profit for several yield and price scenarios. The price of industrial hemp for extract is not well established, so extreme caution is recommended when evaluating price potential. This budget should not be construed as a reflection of all circumstances across the state, as significant variability will occur.

Type of Hemp	Grain	Floral Material	Fiber
Purpose	For human food (hemp hearts, oil, and protein powder), or seeds for planting hemp.	For extraction of plant resin (which includes CBD and other cannabinoids) for health and wellness products.	For construction, textiles, from stalks, bast (bark-long outer fibers), hurd (core-inner woody material).
2017 Avg. Yield*	518 pounds per acre	1,024 pounds per acre	2,556 pounds per acre
2017 Avg. Price*	\$1.70 per pound**	\$7.20 per pound	\$0.34 per pound
Grower Fees	\$100 – Application Fee \$400 – Grower Participation Fee PER Address \$750 – Site Modification Surcharge PER field or greenhouse	Same As Previous	Same As Previous
Processor Fees***	\$500.00	\$3,000.00	\$500.00

* Based on 2017 Grower Production Reports.

** Includes both grain for food and certified seeds for planting. Average price for grain only is about \$0.80.

*** There is a \$500 fee for handlers of raw materials. Handlers must be licensed by KDA.

Conclusions

- Understand the crop!
 - Limitations vs potential
- Have a marketing plan before you grow!
- Pay attention to supply vs. demand!
- Understand potential regulatory considerations.....