CLEMSON
COOPERATIVE EXTENSION

INDUSTRIAL HEMP ECONOMICS

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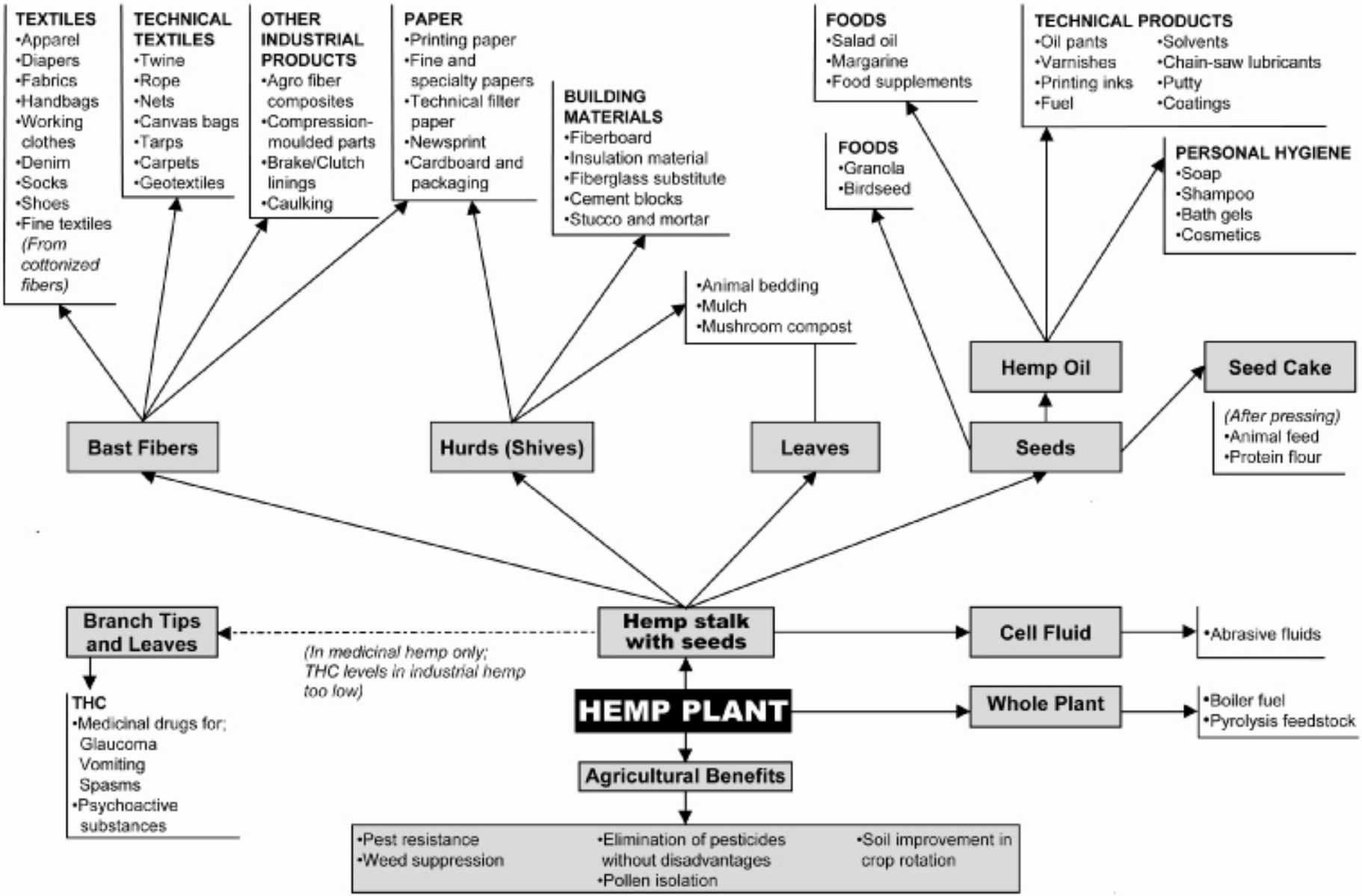
Industrial Hemp Uses

- Fiber - Bast fiber plant similar to flax, kenaf, & jute
- Seed - Food, seed oil, and seed cake
- Dual-Purpose
- Cannabinoids (CBD)





MODERN USES FOR HEMP



Source: “Hemp as an Agricultural Commodity”, CRS Report RL32725, March 10, 2017

Timeline of Hemp Products

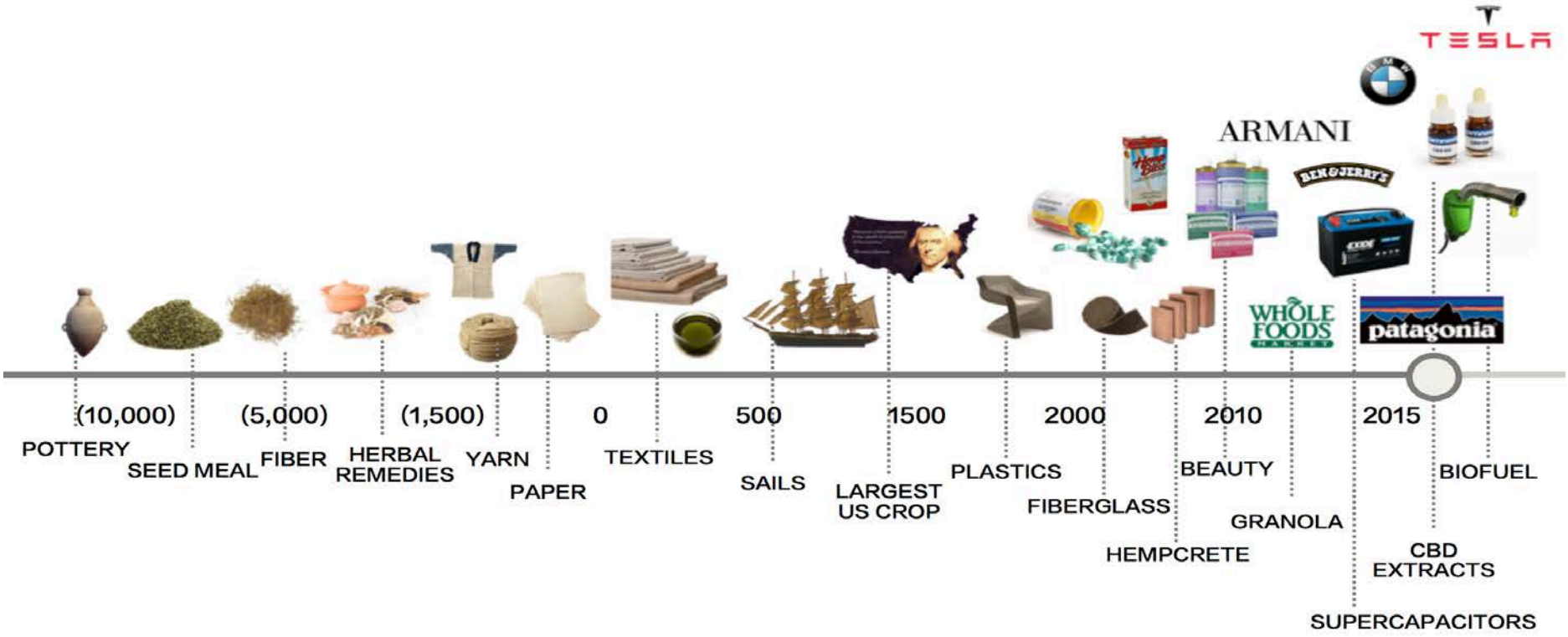
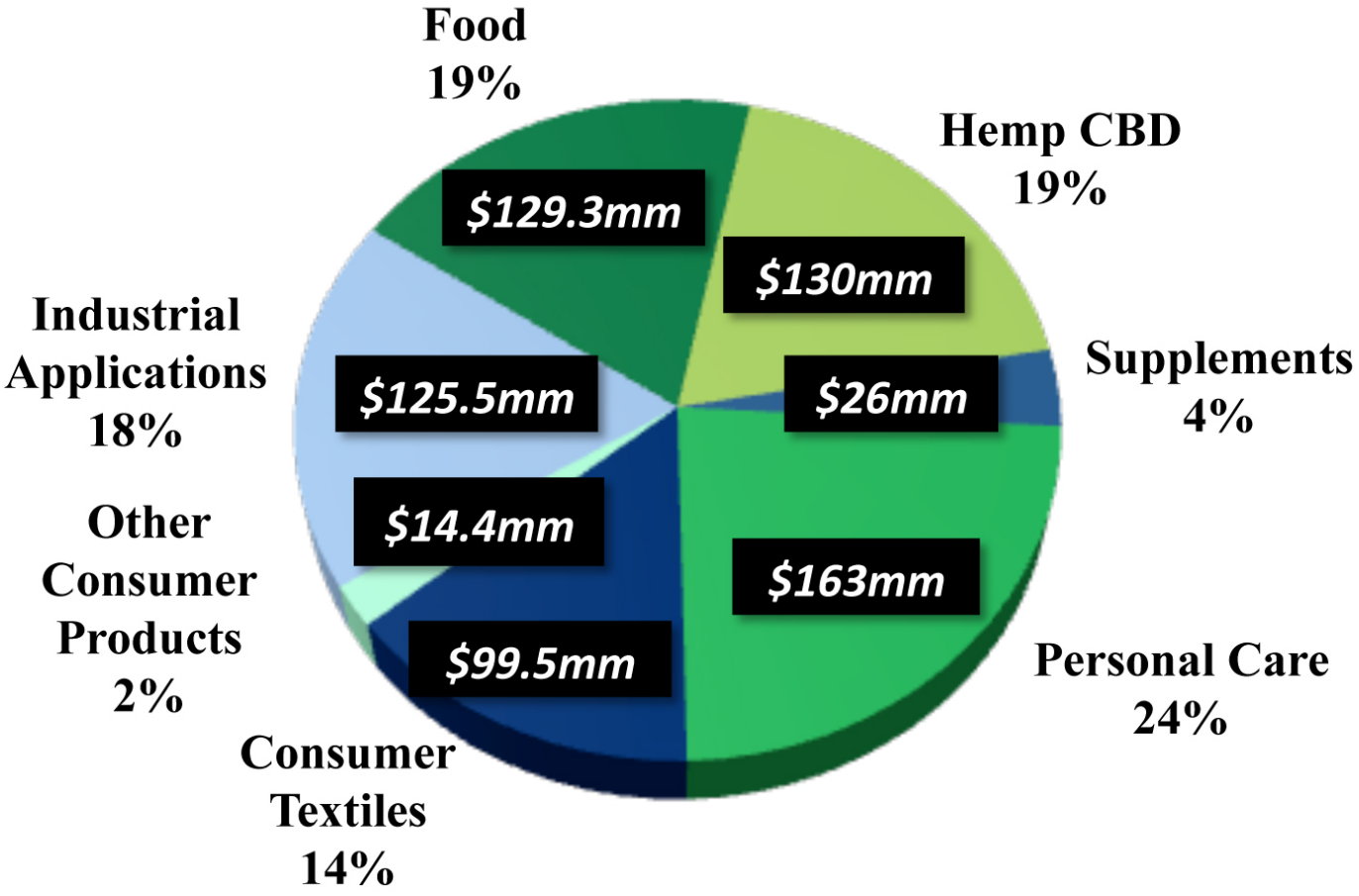
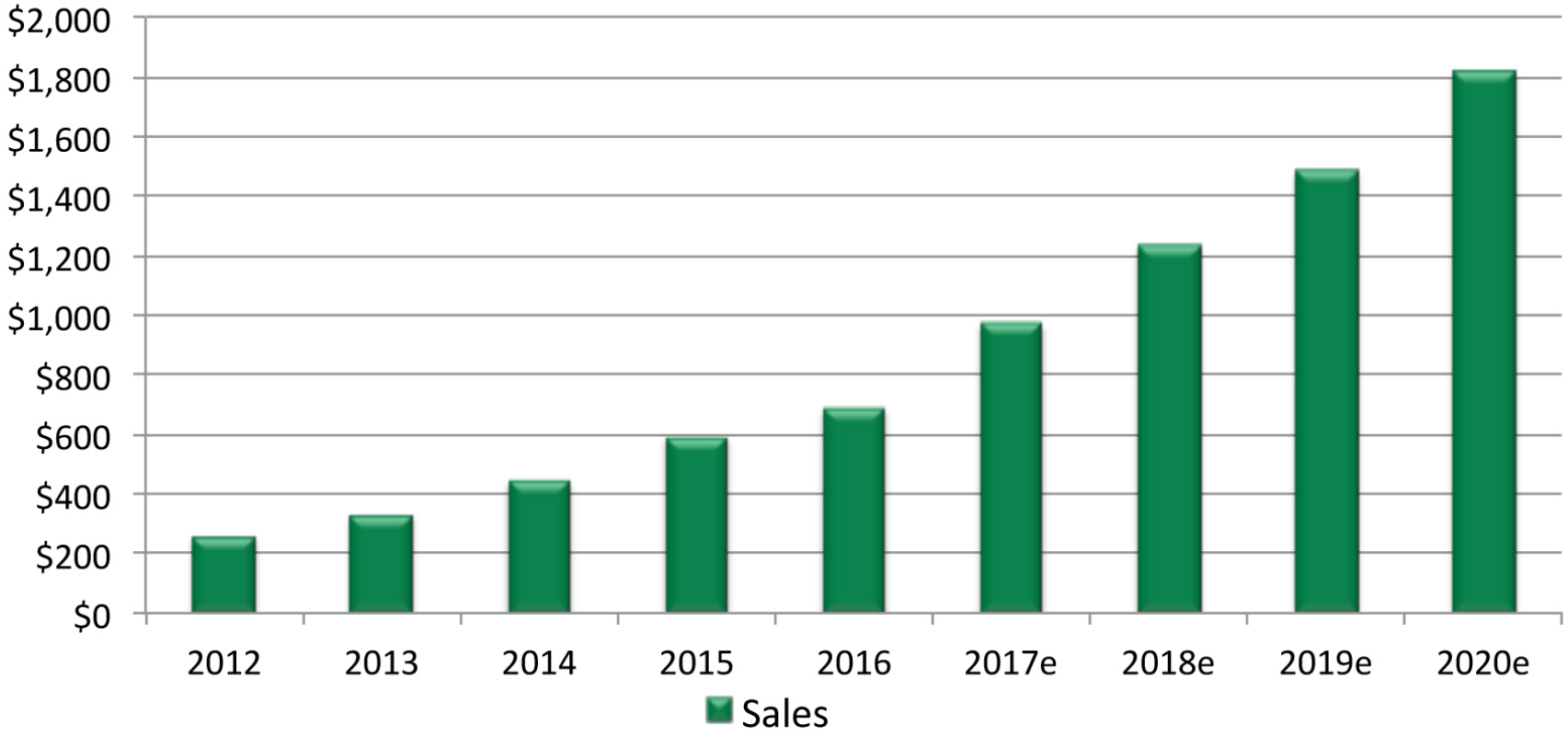


Chart obtained from by Dr. Tyler Mark, University of Kentucky

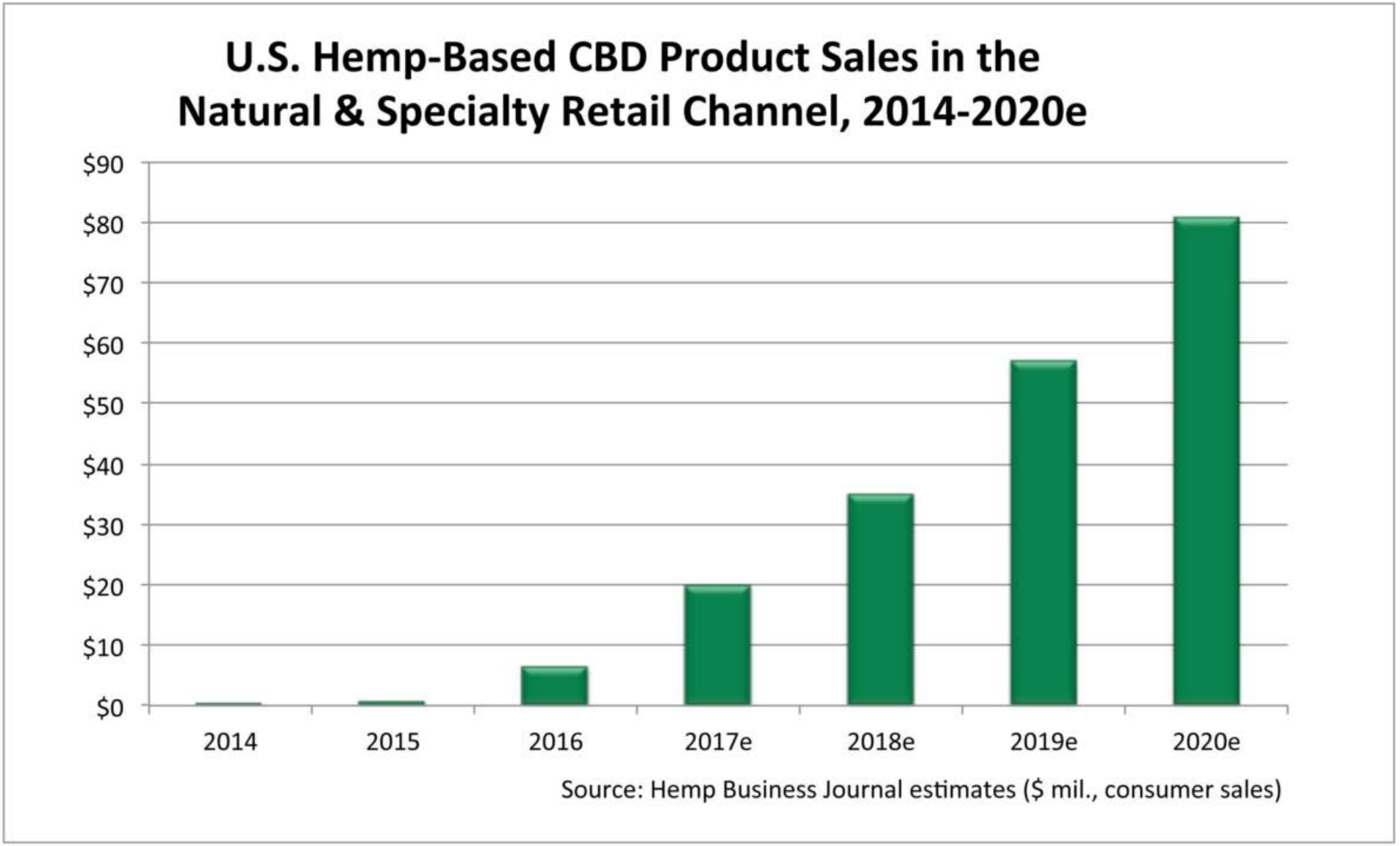
$688 Million Total U.S. Hemp-Based Product Sales by Category in 2016



Source: ***Hemp Business Journal*** **and** ***Vote Hemp*** estimates (consumer sales)

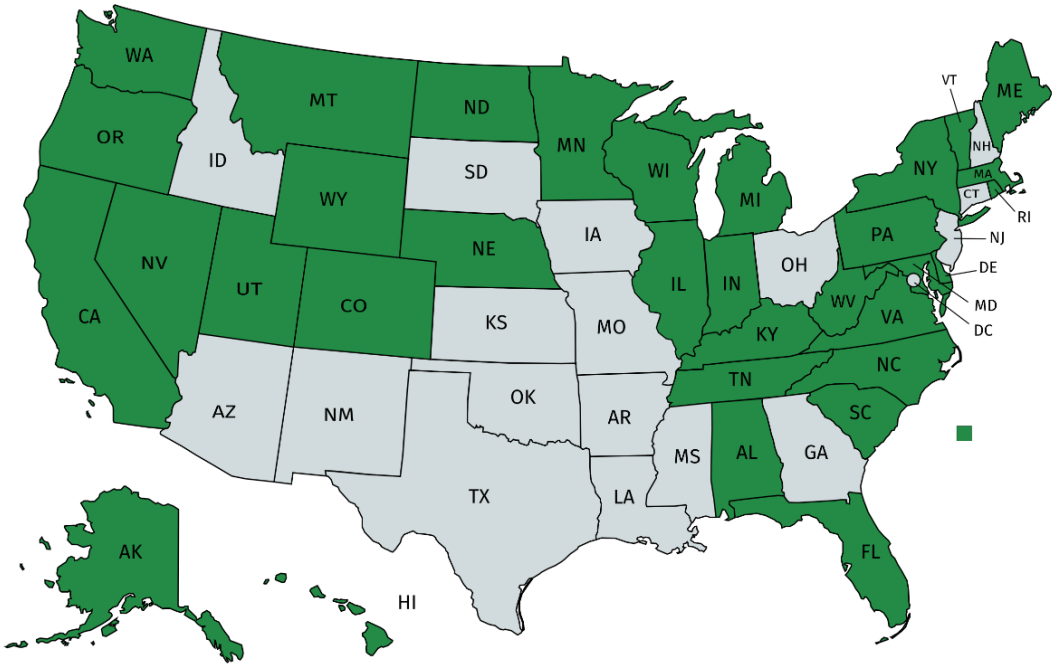


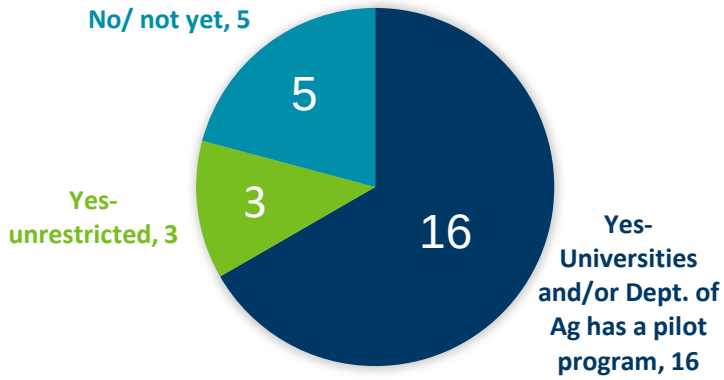
Source: *Hemp Business Journal and Vote Hemp* estimates ($ mil., consumer sales)


U.S. Hemp-Based CBD Product Sales in the Natural & Specialty Retail Channel, 2014-2020e
$90
$80
$70
$60
$50
$40
$30
$20
$10
$0
2014
2015
2016
2017e
2018e
2019e
2020e
Source: Hemp Business Journal estimates ($ mil., consumer sales)

States that allow cultivation of hemp

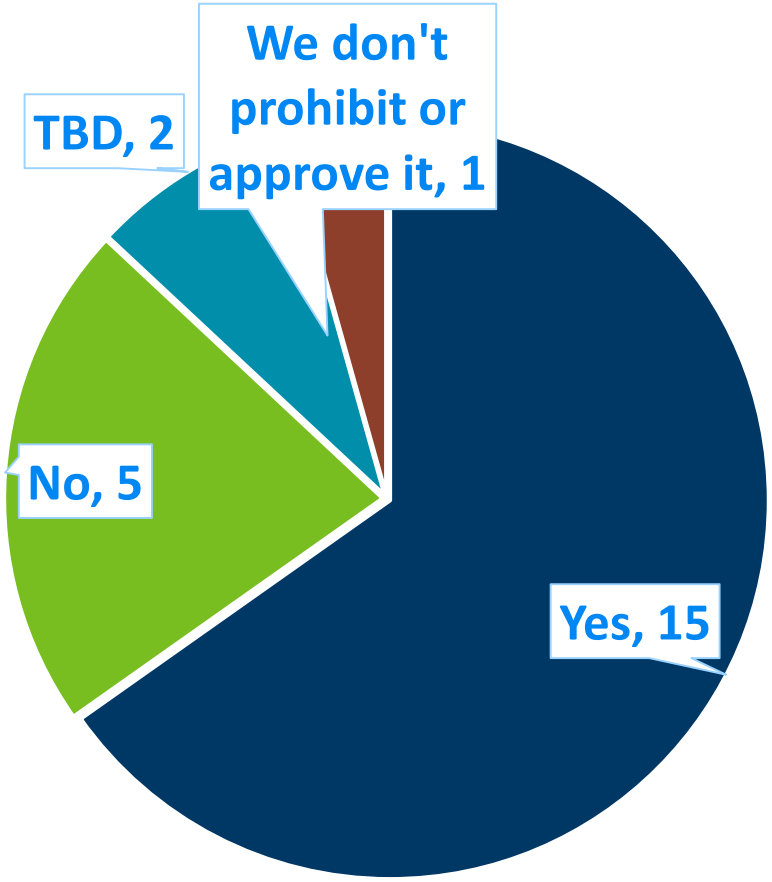
- **33 States allow hemp production of some sort (mostly in the form of a pilot program)**





Industrial Hemp State Survey results presented at National Hemp Regulators Conference, Louisville, KY, July 19, 2017 , 24 states responding.

CBD Production



Total acreage and indoor square footage harvested (2016)

State	2016 Outdoor Acreage	2016 Indoor Square Footage
Colorado	5,921	1.3 million
Kentucky	1,870	324,600
Maine	¼ acre	----
Minnesota	38	----
Missouri	----	3,000
Nevada	100	1,000
North Dakota	70	----
Oregon	1,300	3,000
Virginia	37	----
TOTAL	**9,336**	**1.63 million**

Source: National Hemp Regulators Conference, Louisville, KY, July, 2017

Average yield- for grain & fiber (2016)

State	Grain Yield	Fiber Yield
Colorado	Does not collect yield data	Does not collect yield data
Kentucky	518 lbs/ac (of the 1/3 of fields that had a harvest)	2,740 lbs/ac (of the 1/3 of fields that had a harvest)
Maine	500 lbs/ac	----
Minnesota	1,334 lbs/ac	2,140 tons/ac (1 pilot)
Nevada	Unknown	Unknown
North Dakota	900- 1,200 lbs/ac	----
Oregon	Unknown	Unknown
Virginia	Unknown	----
AVERAGE	**659 lbs/ac**	**2,714 lbs/ac**

Source: National Hemp Regulators Conference, Louisville, KY, July, 2017

The Kentucky Industrial Hemp Research Pilot Program began in 2014, shortly after the Farm Bill was signed. We imported seeds from Italy and planted approximately 33 acres of hemp that year.

KDA Industrial Hemp Research Pilot Program
Annual Overview

Production Year	# University Projects	Approved Processors	Approved Growers	KY Counties with Hemp	Approved Acres	Planted Acres	Harvested Acres	% Grain	% Fiber	% CBD
2014	7	9	20	14	-	33	-	47%	32%	21%
2015	8	29	99	41	1,742	922	500	47%	6%	47%
2016	17	45	137	60	4,600	2,300	2,000	34%	6%	60%
2017	15	48	204	71	12,800	TBD				

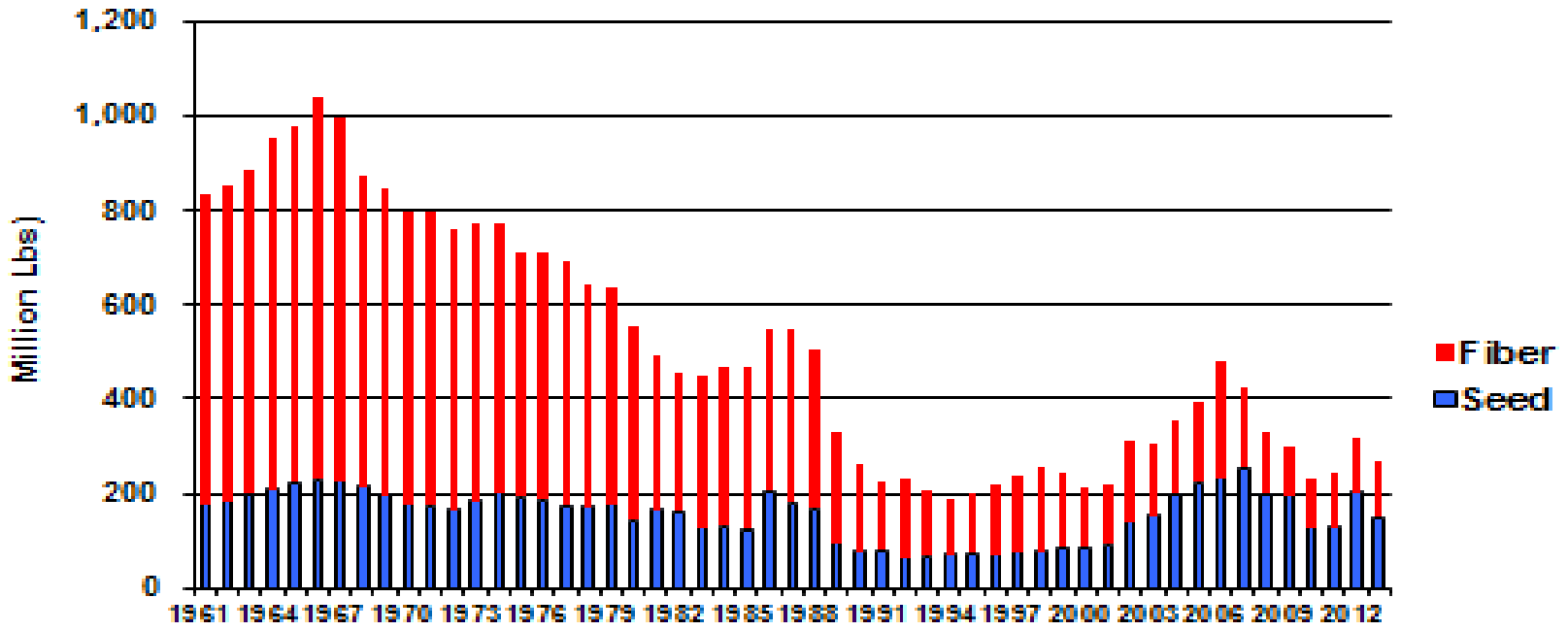
Source: Doris Hamilton, Kentucky Department of Agriculture

End products for the 2016 harvest

- **Cannabinoid extracts/CBD is the main harvested product- 7 states.**
- Minnesota, North Dakota, and Virginia- exclusively grain or fiber harvest in 2016.
- 2017 - CBD will be the end product for approximately 60%, Grain and seed production will be about 30% and fiber, about 10%.

Source: National Hemp Regulators Conference, Louisville, KY, July, 2017

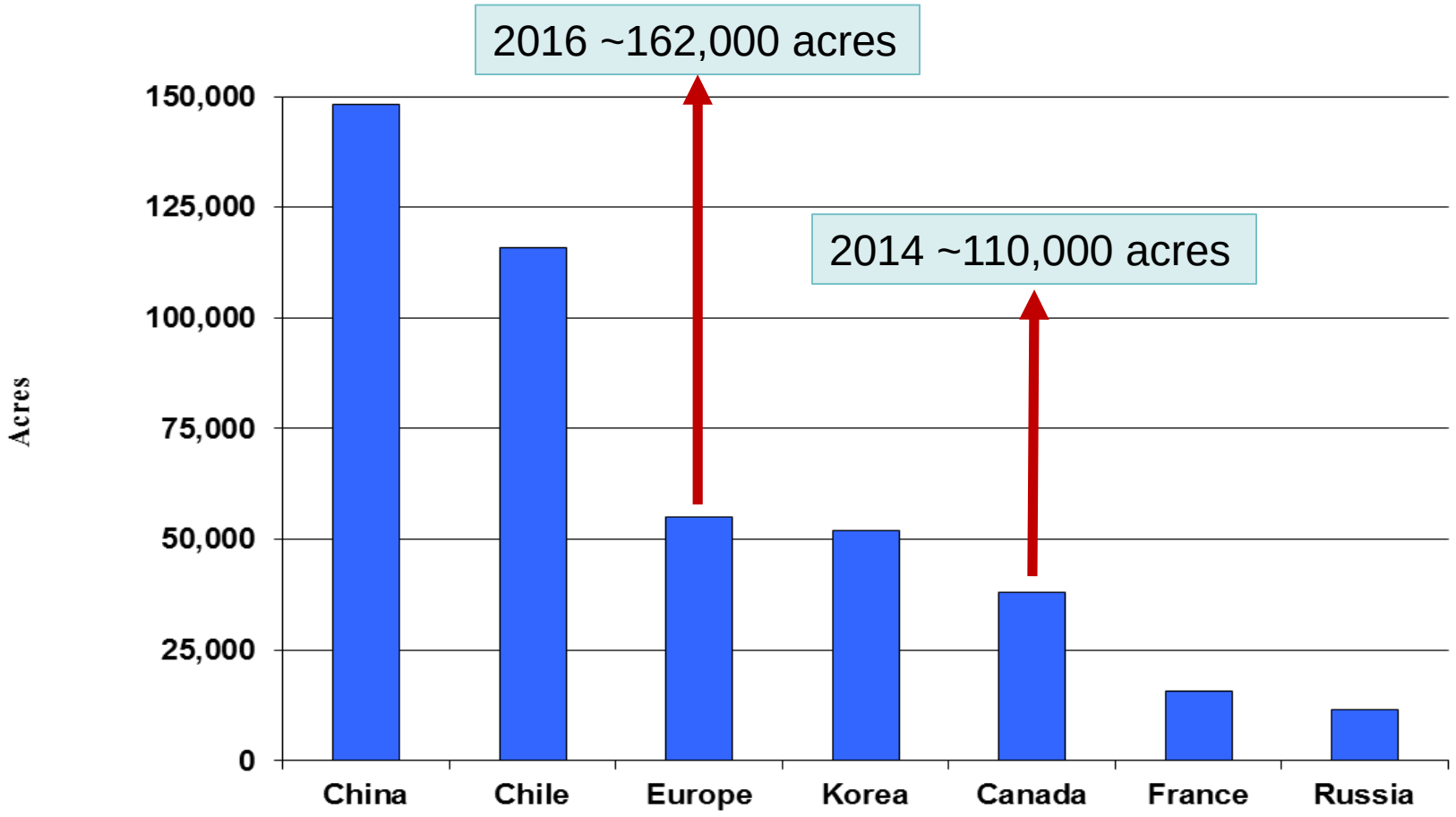
World Hemp Seed and Fiber Production



Source: FAOSTAT

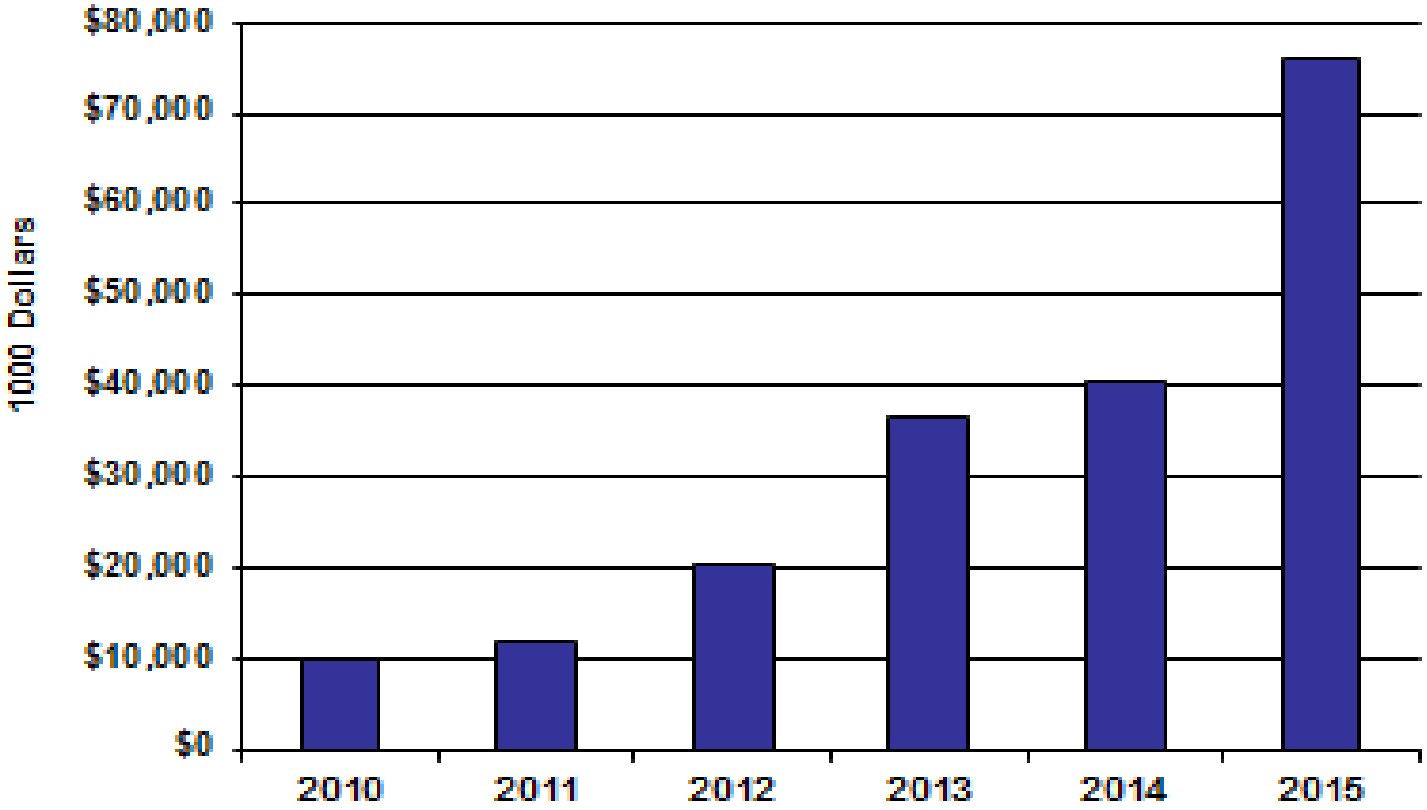
30 nations grow industrial hemp as an agricultural commodity

2011 Hemp Acreage for Selected Countries/Regions



Original slide provided by Dr. Tyler Mark, University of Kentucky

Value of U.S. Hemp Imports



Source: CRS using data from US International Trade Commission and Global Trade Atlas

Industrial Hemp Cost of Production – Enterprise Budgets

- 2013 University of Kentucky Study
  - Estimated Cost of Production using educated guesses since there is no production experience to base an enterprise budget upon.
- Alberta, Canada – 2015 study of 10 hemp seed operations.
- University of Kentucky is working on budget based on 2016 survey data.
- Cost of production will be studied as part of the SC Industrial Hemp Pilot Program.

Expected Hemp Yields

	Low Productivity (100 bu corn)		Medium-Low Productivity (125 bu corn)		Medium-High Productivity (150 bu corn)		High Productivity (175 bu corn)	
	Fiber Yield Tons/Acre	Seed Yield (lbs)	Fiber Yield Tons/Acre	Seed Yield (lbs)	Fiber Yield Tons/Acre	Seed Yield (lbs)	Fiber Yield Tons/Acre	Seed Yield (lbs)
Fiber Only	***4.6***		***5.8***		***6.9***		***8.1***	
Dual System	***2.2***	***520***	***2.8***	***650***	***3.3***	***780***	***3.9***	***910***
Seed Only		***600***		***750***		***900***		***1050***

Source: http://www.uky.edu/Ag/AgriculturalEconomics/pubs/reshempimpfarmer28.pdf

Net Returns Fiber Production

Yield Level (tons/year)	$50/ton Fiber Price	$75/ton Fiber Price	$100/ton Fiber Price	$125/ton Fiber Price
4.0	-$376	-$276	-$176	-$76
6.0	-$359	-$209	-$59	$91
8.0	-$342	-$142	$58	$258
10.0	-$325	-$75	$175	$425
Notes: Costs include labor and depreciation/overhead but not land costs. $3.50/gal fuel; N, P, and K at $.50/unit; 50 miles one-way trucking to market.				

Source: http://www.uky.edu/Ag/AgriculturalEconomics/pubs/reshempimpfarmer28.pdf

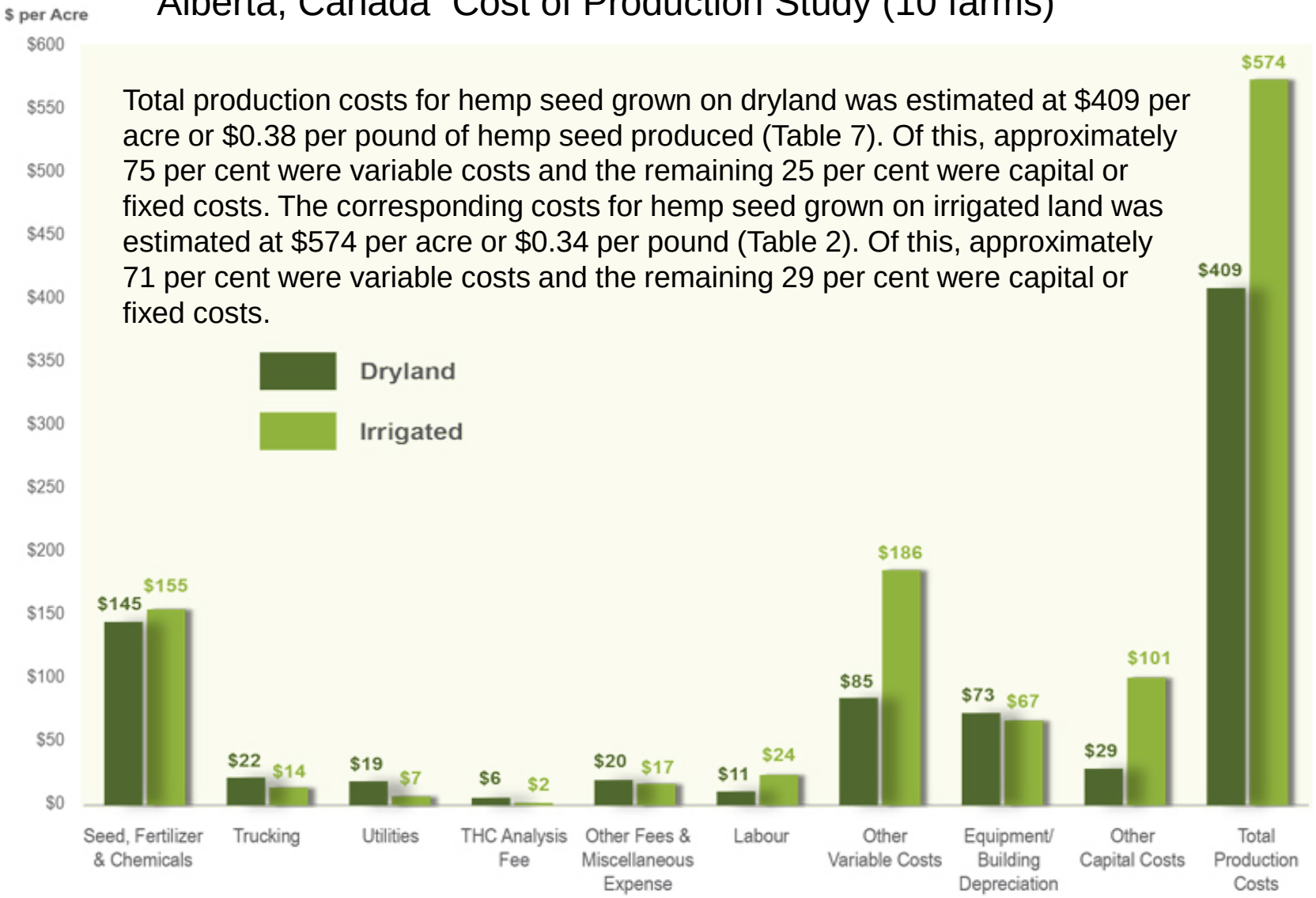
Net Returns Seed Production

Yield Level (lbs/year)	$.50/lb Seed Price	$.60/lb Seed Price	$.70/lb Seed Price	$.80/lb Seed Price
600	$11	$71	$131	$191
800	$102	$182	$262	$342
1000	$192	$292	$392	$492
Notes: Costs include labor and depreciation/overhead but not land costs. $3.50/gal fuel; N, P, and K at $.50/unit; 50 miles one-way trucking to market.				

Source: http://www.uky.edu/Ag/AgriculturalEconomics/pubs/reshempimpfarmer28.pdf

Figure 5. **Breakdown of Hemp Seed Total Production Costs, 2015**

Alberta, Canada Cost of Production Study (10 farms)



Source: “Industrial Hemp Enterprise”. Alberta Agriculture and Forestry, Revised March 2017.

Net Returns CBD

Closing Thoughts

- Yield uncertainty will result in highly variable returns.
- Cost of production will depend on type of production system, think of corn, soybeans, flax, tobacco…
- Processors have to develop in SC to be competitive.
- Contract risk is concern, especially on CBD side.
- CBD use is driving acreage planted in US.

THANK YOU