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**Project Title: *The Economic Potential of Industrial Hemp in the United States***

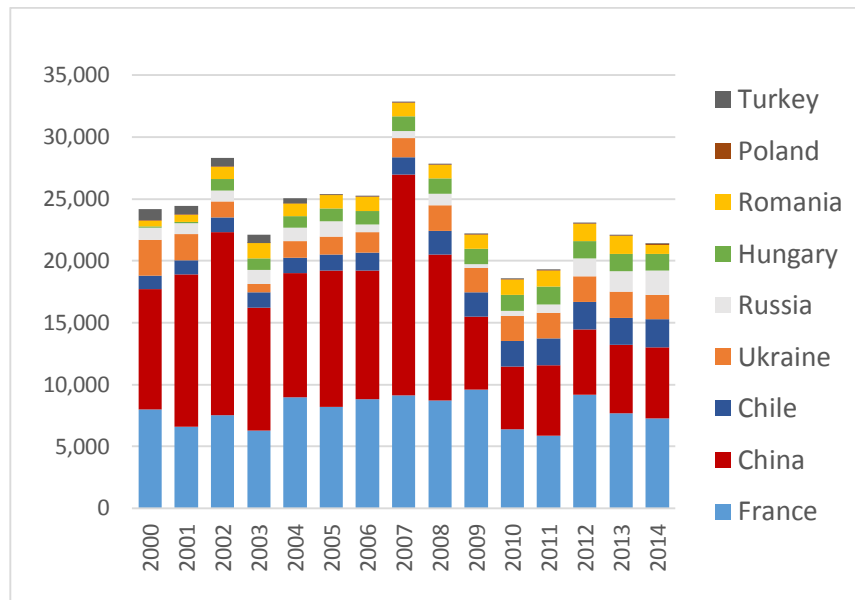
**Date:** March 10, 2016

**Summary:** The potential for domestic production of industrial hemp in the United States has garnered substantial interest since the 2014 Farm Bill opened the door, making it legal again for the first time in over 70 years. Yet, the real opportunity for the nascent hemp industry in the United States likely lies not in farming hemp for currently existing uses, but in innovating new hemp production technologies and products. By unleashing the creative and entrepreneurial energies of the U.S. economy—to create new technologies, new firms, and even entirely new value chains—it is possible to create value and realize economic impact unavailable to the current leading agricultural producers of hemp.

Hemp is a versatile plant which can be used as a food, as animal feed, as a source of fiber for clothing or other materials, for oil products, and potentially for medical uses. Food products made from hemp include meal and flour, nutritional bars, edible oil, pasta, cookies, beer, lactose-free milk and ice cream. Non-food household products made from hemp are shampoo, conditioners, moisturizers, aroma therapies, and cosmetics. Animal feed from hemp, for poultry or fish, imparts high value omega-3 fatty acids. There is growing use of hemp fiber in textiles, building materials, and even plastics and bio-composites. A range of cannabinoid compounds from hemp are being investigated as new drug leads by biopharmaceutical companies. This list suggests the potentially significant development of both consumer and industrial markets for existing and new hemp based products.

The import and sale of hemp products, except for viable seed, is already legal in the United States. Retail sales of hemp products in the United States in 2014 was estimated at \$620 million by the Hemp Industry Association. Adding a few thousand acres of on-farm hemp production in the United State in competition with already established hemp farmers in Europe, China, or Chile (see figure) would be only one—and possibly only a relatively modest—potential change to what is a much larger and rapidly growing industry value chain. More important will be the development of vertically coordinated, reliable supply chains within each of the major sub-branches of the hemp industry's value chain, serving the range of different product applications.

### Area planted for hemp seed production worldwide, in hectares, 2000-2014



**Data source:** UN Food and Agricultural Organization (FAO), FAOStat, 2016

Strategic research into market drivers and constraints, including upstream production requirements and downstream demand responses, are necessary to understand the structure and growth dynamics of the industrial hemp value chain. Profitability of the emergent hemp industry will rest not only in increasing yields and quality on farm, but more so in aligning and optimizing production practices and value chain activities strategically within the portfolio of potential market and retail opportunities, regionally, nationally, and globally.

**Core Objectives:** This project seeks to analyze the economic potential of industrial hemp in the United States, taking a value chain perspective of the industry within the global market context. It will proceed in three steps:

1. **Economic Model of the Industrial Hemp Value Chain** – The first objective is to understand the current shape and structure of the industry value chain, including vertical steps from farm inputs, to cultivation, harvest and post-harvest handling, processing, product manufacturing, and retail sales.
2. **Assess Competitiveness and Growth Potential in Key Segments of the Value Chain** – The second objective is to understand who competes in key segments of industrial hemp value chain in the U.S. and world markets (e.g. seed, feed, fiber processing, food manufacturing, etc.) This will be essential to understand where key growth potential lies for the emergent industrial hemp industry in the United States and where coordinated investments in building out entire segments of the value chain would be best warranted.

3. **Identify Opportunities for Investment in Innovation** –American innovation in production technologies as well as in the creation of new products across the range of applications, will be the main way by which a growing U.S. hemp industry can create and capture new value. We will catalogue innovations already underway through a variety of indicators, including research publications, plant variety registrations, patents, new product launch data, augmented with case studies of leading innovators and interviews with thought leaders in the industry to identify and assess key trends.

**Impacts and Outcomes:** The goal of this project is to inform strategy and, ultimately, to enable a financially and environmentally sustainable industrial hemp industry in the United States. This project will provide investors, farmers, companies, and policymakers with essential knowledge about the structure and growth opportunities of this industry, to enable them to make sound decisions. In the process, this project will actively engage the industry in a conversation about industry structure, growth potential, and innovation. To enable this, our outreach plans consists of:

1. Early, and ongoing, speaking engagements at public meetings and seminars to develop a rapport with producers, manufacturers, retailers, and policymakers, and to gain industry interest in and support for the study. Specific collaborative agreements will be sought with the Hemp Industry Association and other groups that may have strategic interests in collaborating on this project.
2. Face-to-face meetings with individual actors within the industry will be a significant portion of outreach plans for the study. During these meetings the primary focus will be understanding development of the value chain and the collection of firm and sector level production data. These meetings will both provide the necessary data information needed for the study and provide better knowledge for producers to be better trained as business owner/operators.
3. Research findings, as they are produced, will be compiled in a professional report, presented at industry meetings, policymaker briefings, and academic conferences. Findings will also be prepared for scholarly, industry, and popular publications, as appropriate.

**Our Team:** The lead investigators on this project represent a unique combination of analytical skills and policy experience. We have a proven track record of high impact research and industry engagement with two prior publications in this immediate vein of work:

1. Gregory Graff, Annabelle Berklund, and Kathay Rennels, *The Emergence of an Innovation Cluster in the Agricultural Value Chain Along the Colorado Front Range*, Colorado State University, November 2014.
2. Gregory Graff, Ryan Mortenson, Rebecca Goldbach, Dawn Thilmany, Steven Koontz, Stephan Davies, and Kathay Rennels, *The Value Chain of Colorado Agriculture*, Department of Agricultural and Resource Economics and the Office of Engagement, Colorado State University, February 2013.

## Preliminary Budget

Principal Investigator: Gregory Graff

Principle Investigator: Kathay Rennels

**Phase 1 (2016-2017)** The initial phase of this project, focusing on value chain structure and competitive assessment, is anticipated to last 15 months, from May 15, 2016 to August 15, 2017 (one academic year flanked by two summers).

### A. Salaries and Wages

Graduate Research Assistants	34,800
Faculty member- 50% time 6 months	32,700
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Total Salaries and Wages	\$ 67,500

### B. Fringe Benefits

GRAs	1,800
Faculty	9,300
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Total Fringe Benefits	\$ 11,100

### C. Travel

Industry meetings and speaking engagements	5,000
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Total Travel	\$ 5,000

### D. Other Direct Costs

Materials & Supplies	
- Databases subscription (EMSI, Census of Business)	7,200
- Publication costs	1,000
	-----
Total Other Direct Costs	\$ 8,200

**E. Total Direct Costs** **\$ 91,800**

### F. Indirect Costs

50% of TDC as per University guidelines	\$ 45,900
6% of TDC – foundation administrative	\$ 5,500

**G. TOTAL PHASE 1 BUDGET** **\$ 143,200**

**Phase 2 (2017-2018)** The second phase of this project, focusing on economics of innovation in industrial hemp, is anticipated to last 12 months, from August 15, 2017 to August 15, 2018 (one academic year and one summer).

**A. Salaries and Wages**

Graduate Research Assistants	34,800
Faculty member- 50% time 3 months	17,300
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Total Salaries and Wages	\$ 42,100

**B. Fringe Benefits**

GRAs	1,800
Faculty	5,600
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Total Fringe Benefits	\$ 7,400

**C. Travel**

Industry meetings and speaking engagements	5,000
	-----
Total Travel	\$ 5,000

**D. Other Direct Costs**

Materials & Supplies	
- Databases subscription (Thomson Innovation)	10,200
- Publication costs	1,000
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Total Other Direct Costs	\$ 11,200

**E. Total Direct Costs**

**\$ 65,700**

**F. Indirect Costs**

50% of TDC as per University guidelines	\$ 32,850
6% of TDC – foundation administrative	\$ 3,950

**G. TOTAL PHASE 2 BUDGET**

**\$ 102,500**