

Economics of Producing Industrial Hemp in New York State: Projected Costs and Returns, 2019 Budgets

Farm business owners can use 2019 budgets to make decisions regarding industrial hemp's place in their cropping systems.

John J. Hanchar
Cornell University/CALS/CCE/NWNY Dairy, Livestock, & Field Crops Program
<jjh6@cornell.edu>

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Summary

- Variable costs of production estimates for 2019 are \$390, \$321, and \$296 per acre for industrial hemp for fiber only, seed (grain) only, and dual purpose fiber and seed (grain), respectively.
- Total costs of production estimates for 2019 are \$546, \$486, and \$491 per acre for industrial hemp for fiber only, seed (grain) only, and dual purpose fiber and seed (grain), respectively.
- Returns above total costs estimates for 2019 are \$248, \$624, and \$867 per acre for industrial hemp for fiber only, seed (grain) only, and dual purpose fiber and seed (grain), respectively.

Background

Farm business owners from across New York State (NYS), including owners in the NWNY region, frequently express interest in alternative, new crops for their potential to enhance the economic viability of their farm businesses. Growers want to know -- Do they make sense, do they have a place in the cropping system given objectives of the farm business? Recent examples include double cropping winter cereals for forage following corn silage, grain sorghum, and malting barley.

Due to legislation at the state level and funding decisions by NYS's executive branch, the state's agricultural sector can add industrial hemp to the list. For more background information on industrial hemp, see *Thayer, Cheryl, and others. 2017. Industrial Hemp: from Seed to Market. Ithaca, NY: Cornell University, Harvest NY. <<https://sips.cals.cornell.edu/extension-outreach/industrial-hemp>>*. "Hemp is commonly used to refer to Cannabis strains cultivated for

industrial (non-drug) use. Industrial hemp has many uses and is used in various products including agricultural products, textiles, recycling, automotive parts, furniture, food and beverages, paper, construction materials, and personal care items.” (Thayer and others, 2017).

To help determine industrial hemp’s place in farm business owners’ cropping systems, farm business owners seek to answer four questions regarding the economics of growing industrial hemp in New York.

- What are expected costs of production?
- What is the expected value of production?
- What is the value of expected profit?
- How sensitive are results to variability in key factors?

Producers looking to evaluate industrial hemp’s possible fit in cropping systems will achieve better results from decision making efforts when they apply a better understanding of expected economic effects and variability.

Examining the Economics of Growing Industrial Hemp in New York

Enterprise budgets comprise projected or expected

- value of production, revenue
- costs of production (variable and fixed inputs)
- returns, for example, return above variable costs, and return above total costs

Analysts developed 2019 budgets to help address questions mentioned above while applying cost of production, enterprise budgeting, and other concepts and analyses (Kay. 1981. Farm Management: Planning, Implementation, Control. New York: McGraw Hill). Previous work, including 2017 cost of production estimates (Hanchar. 2018. "Economics of Producing Industrial Hemp in New York State: Costs of Production Analysis, 2017." https://nydairyadmin.cce.cornell.edu/uploads/doc_582.pdf), Cornell University agronomists and others helped to identify and describe three general scenarios, and field operations, input levels, and machinery complement for each scenario (Tables 1 and 2, respectively).

Industrial Hemp Production Budgets, New York, 2019

Estimates of individual variable, and fixed costs differ by system, while total costs of producing industrial hemp are \$546, \$486, and \$491 per acre for industrial hemp for fiber only, seed (grain) only, and dual purpose fiber and seed (grain), respectively (Table 3). Seeds & Plants costs vary due to differences in seeding rates by scenario with the dual purpose fiber and seed (grain) scenario having the lowest seeding rate (about 20 lbs. per acre) followed by seed (grain) production only (40 lbs. per acre) followed by fiber only (80 lbs. per acre). Costs for Sprays & Other Crop Inputs are highest for the scenarios with seed production due in part to the costs associated with cleaning and drying the grain. Labor and machinery costs (variable and fixed) vary among scenarios due to differences in harvesting tasks, including equipment required. Returns above total costs projections for 2019 are \$248, \$624, and \$867 per acre for industrial hemp for fiber only, seed (grain) only, and dual purpose fiber and seed (grain), respectively

References

For a review of previous work regarding the economics of producing industrial hemp see Thayer, Cheryl, Megan Burley and others. 2017. Industrial Hemp: from Seed to Market. Ithaca, NY: Cornell University/Harvest NY. <<https://sips.cals.cornell.edu/extension-outreach/industrial-hemp>>.

Other resources for this work include the following.

Hanchar, John J. 2018. "Economics of Producing Industrial Hemp in New York State: Costs of Production Analysis, 2017." https://nydairyadmin.cce.cornell.edu/uploads/doc_582.pdf),

Lazarus, William F. 2018. Machinery Cost Estimates, May 2018. University of Minnesota. <z.umn.edu/machdata>

Minnesota Department of Agriculture/Plant Protection Division/Industrial Hemp Pilot Program. 2018. 2017 Industrial Hemp Pilot Program. <http://www.mda.state.mn.us/plants/hemp/hempannualreport.aspx>

Penn State University. 2018. Industrial Hemp Production. <<https://extension.psu.edu/industrial-hemp-production>>

Plastima, Alejandro and others. 2018. 2018 Iowa Farm Custom Rate Survey. Ames, Iowa: Iowa State University Extension and Outreach. Ag Decision Maker File A3-10. <<https://www.extension.iastate.edu/agdm/crops/pdf/a3-10.pdf>>

Purdue University. 2015. Hemp Project, Hemp Production. <https://dev.purduehemp.org/hemp-production/>

Robbins, Lynn and others. 2013. Economic Considerations for Growing Industrial Hemp: Implications for Kentucky's Farmers and Agricultural Economy. Lexington, Kentucky: University of Kentucky. <https://www.uky.edu/Ag/AgEcon/pubs/reshempimpfarmer28.pdf>

Table 1. Selected characteristics by industrial hemp scenario, New York, 2019 Budgets.

Scenario	Selected Characteristics
Hemp fiber only	Chisel plow, disk, drill, cut, rake 2 to 3 times 4 to 5 weeks after cutting (in field retting process), bale, transport to storage
Dual system fiber plus seed	Chisel plow, disk, drill, combine with draper head, transport seed to on farm storage for cleaning etc., fiber harvest items from above
Hemp seed production only	Chisel plow, disk, drill, combine etc. as above for seed, bush hog fiber residue

Sources: Robbins, Lynn and others, 2013; Jodi Putnam, Field Crops Specialist, Cornell University NWNy and others from Cornell University's Industrial Hemp Research and Extension Group.

Table 2. Selected machinery complement characteristics by industrial hemp scenario, New York, 2019 Budgets.

Scenario	Item	Description
Hemp fiber only	Chisel plow	23 ft
	Disk	21 ft
	Planter	20 ft conventional grain drill
	Sickle bar mower	9 ft
	Rake	22 ft
	Round baler	4x5, 20 ft
	Round bale transport	
Dual system fiber plus seed	Tractors, power units	40 to 200 hp
	Chisel plow	23 ft
	Disk	21 ft
	Planter	20 ft conventional grain drill
	Combine with draper head	23 ft
	Transport, clean, dry grain	
	Sickle bar mower	9 ft
Hemp seed production only	Rake	22 ft
	Round baler	4X5, 20 ft
	Round bale transport	
	Tractors, power units	40 to 275 hp
	Chisel plow	23 ft
	Disk	21 ft
	Planter	20 ft conventional grain drill
Hemp seed production only	Combine with draper head	23 ft
	Transport, clean, dry grain	
	Tractors, power units	130 to 275 hp

Sources: Sources, Table 1; Lazarus, 2018.

Table 3. Value of production, variable, fixed and total costs, and returns, dollars per acre, by industrial hemp production scenario, conventional tillage system, New York, 2019 budgets.

Budget Items	Hemp Fiber Production & Harvest	Hemp Seed (Grain) Production & Harvest	Hemp Fiber & Seed (Grain) Production & Harvest
		--- \$ per Acre ---	
<u>Value of Production</u>			
Fiber	794.00		248.00
Seed (Grain)		1,110.00	1,110.00
Total Value	794.00	1,110.00	1,358.00
<u>Costs of Production</u>			
<u>Variable Inputs</u>			
Fertilizers & Lime	81.60	81.60	81.60
Seeds & Plants	209.43	104.72	48.48
Sprays & Other Crop Inputs	17.67	62.35	39.61
Labor	37.41	15.23	46.05
Repair & Maintenance			
Tractors	3.60	18.73	20.66
Equipment	13.63	13.24	23.35
Fuel & Lube	17.17	17.41	28.76
Interest on Operating Capital	9.51	7.83	7.21
Variable Costs Total	390.04	321.12	295.72
<u>Fixed Inputs</u>			
Tractors	23.16	40.18	52.84
Equipment	30.67	22.40	40.88
Land Charge	101.88	101.88	101.88
Value of Operator & Family Management			
Fixed Costs Total	155.71	164.46	195.59
Total Costs	545.74	485.58	491.31
<u>Returns</u>			
Returns above Variable Costs	403.96	788.88	1,062.28
Returns above Total Costs	248.26	624.42	866.69

Notes:

- Reported totals may not equal the sum of individual items due to rounding.
- Expected value of hemp fiber production: \$0.10 per pound; expected value of hemp seed (grain) production: \$1.10 per pound
- Expected yield, hemp fiber production, fiber production and harvest only scenario: 3.97 tons per acre; expected yield, hemp fiber production, dual purpose fiber and seed (grain) production and harvest scenario: 1.24 tons per acre; expected yield, hemp seed (grain) production: 1,000 pounds per acre
- Revenues, costs and returns reflect expected 2019 price levels.
- Fertilizers & Lime costs 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. 2018. <z.umn.edu/machdata>
- This analysis excludes a charge for management inputs.
- Questions? Comments? Contact John Hanchar <jjh6@cornell.edu>