

Economics of Producing Industrial Hemp in New York State: Costs of Production Analysis, 2017
Progress Report, Initial Results, June 2018 – Draft

John J. Hanchar, Cornell University/NWNY Dairy, Livestock, and Field Crops Program

Acknowledgements

Work to date has benefitted from

- the contributions of: Jodi Letham, Field Crops Specialist, Cornell University/NWNY Dairy, Livestock and Field Crops Program and others from the Cornell University Industrial Hemp Research and Extension Group; and unnamed farm business owners
- funding from NYS Department of Agriculture and Markets, NYS Empire State Development Corporation, and others

Summary

- Variable costs of production estimates for 2017 are \$282, \$268, and \$269 per acre for industrial hemp for fiber only, fiber and seed, and seed only, respectively
- Fixed costs of production estimates for 2017 are \$145, \$183, and \$160 per acre for industrial hemp for fiber only, fiber and seed, and seed only, respectively
- Total costs of production estimates for 2017 are \$427, \$451, and \$429 per acre for industrial hemp for fiber only, fiber and seed, and seed only, 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

Analysts worked with Cornell University specialists, producers and others to develop economic analysis designed to answer the four 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, 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).

Results

Estimates of individual variable, and fixed costs differ by system, while total costs of producing industrial hemp are \$427, \$451 and \$429 per acre for industrial hemp for fiber only, fiber and seed production, and seed production only, respectively (Table 3). Seeds & Plants costs vary due to differences in seeding rates by scenario with the fiber and seed scenario having the lowest seeding rate (30 lbs. per acre) followed by seed 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 seed, grain. Labor and machinery costs (variable and fixed) vary among scenarios due to differences in harvesting tasks, including equipment required.

These results add to the analyses reviewed by Thayer and others, 2017.

Future Work

Current plans are to publish highlights of this work with an emphasis on Table 3 results in the July 2018 issue of Ag Focus, a monthly newsletter of the NWNYS Dairy, Livestock, and Field Crops Program. This full report will be posted to the team's website at <nwnyteam.cce.cornell.edu>

Initially, to date, costs of production estimates received emphasis. When analysts are comfortable with price and yield expectations based upon research in NYS, they will combine costs of production with output prices and yields for industrial hemp for fiber and seed to develop enterprise budgets under various conditions. Enterprise budgets comprise: value of production, revenue; costs of production (variable and fixed inputs); and returns, for example, return above variable costs, and return above total costs.

Discussions with members of the industrial hemp research and extension groups will determine other steps for the economic analysis. Possible options to consider include: 1) developing enterprises budgets for future years, possibly with comparisons to competing crops; 2) economic analysis of changes in practice, resource use.

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.

Lazarus, William F. 2017. Machinery Cost Estimates, May 2017. 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>

Plastima, Alejandro and others. 2017. 2017 Iowa Farm Custom Rate Survey. Ames, Iowa: Iowa State University Extension and Outreach. Ag Decision Maker File A3-10. www.extension.iastate.edu/agdmstore.extension.iastate.edu/

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, 2017.

Scenario	Selected Characteristics
Hemp fiber only	Chisel plow, disk, drill, cut, rake, 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 Letham, 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, 2017.

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

Sources: Sources, Table 1; Lazarus, 2017.

Table 3. 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	6.53	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.
- This analysis excludes a charge for management inputs.