

IMPROVING INDUSTRIAL HEMP YIELD AND QUALITY

WHAT WE LEARNED ABOUT SPACING, FERTILIZER, AND ENVIRONMENTAL CONDITIONS

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OVERVIEW

Industrial hemp is becoming more popular in the United States, but the best way to grow it for fiber is still unclear. There is an urgent need to develop agronomic practices that are specifically adapted to the local soil and climates.

Hemp yield and fiber quality vary based on soil type, fertilizer use, plant variety, spacing, and weather conditions. This means farmers need specific recommendations for their fields.

We studied how different row spacings (19 cm vs. 38 cm) and fertilizer treatments (no fertilizer, blood meal with 12% nitrogen at two rates: 100 and 200 lb per acre, and compost at 26 tons per acre) affected hemp yield and quality over two growing seasons (2019–2020).

HIGHLIGHTS



Planting hemp closer together resulted in more plants per area and higher bast fiber yield compared to wider spacing.



Using compost helped plants absorb nutrients but also increased heavy metal levels (like lead) in plant and grain tissues.



Adding blood meal boosted fiber and hurd yields while reducing heavy metal buildup and increasing plant carbon.

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TABLE 1.

Effects of row spacing, fertilizer and studied year on different parameters of fiber hemp production.

Source of variation	Plant height cm	Hemp Biomass	Bast fiber weight lb per acre	Hurd weight	Grain weight	Grain Crude Protein	Grain Crude Fiber	Grain Crude Fat
							%	
Spacing, cm								
19	121.44	2246.1	434.36	1520.26	558.95	22.06	33.26	28.45
38	120.62	1594.93	291.83	1021.42	387.48	22.05	33.29	28.64
Fertilizer								
Control	117.89	1726.02	322.85	1129.98	441.27	21.88	33.13	29.11
BM100	121.23	2111.38	404.83	1416.89	533.56	21.18	33.31	27.87
BM200	120.59	1930.8	364.7	1276.44	470.38	21.9	33.28	28.55
Compost	124.41	1913.87	360.01	1260.04	447.66	23.27	33.38	28.66
Year								
2019	119.3	856.85	135.83	534.26	120.85	21.16	33.28	29.35
2020	122.77	2984.18	596.84	2088.92	825.58	22.95	33.27	27.75

Note: Fertilizer treatments include four levels: no fertilizer (control), blood meal at two rates—100 lb per acre (BM100) and 200 lb per acre (BM200), and compost at 26 tons per acre. Detailed description of Table is included in the original article.

- **Narrower row spacing (19 cm) gave more bast fiber yield but thinner stems, which may affect processing efficiency.**
- **Biomass yield in 2020 was higher than in 2019 due to improved soil moisture, warmer late-season, and longer growing time.**
- **Narrow row spacing improved bast fiber content, while compost application improved grain nutrition.**
- **Compost application improved plant growth and increased hemp yield.**



KEY TAKEAWAY

Our results showed that narrower row spacing (19 cm) improved fiber yield. However, optimal crop performance depends on both weather conditions and agronomic practices.



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