

2021 GRAIN & FIBER HEMP VARIETY TRIALS

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Intro and Methods

Researchers at Bay Mills Community College, Michigan State University and Lake Superior State University received funding from USDA-NIFA to conduct grain and fiber hemp variety trials at three locations in 2021. Fifteen varieties of grain hemp were tested in Brimley, Hyde and Carp Lake, MI. An additional five varieties of fiber hemp were tested at Hyde, MI. Here we report information regarding the trials conducted in Hyde and Brimley only due to the crop being lost to weeds at Carp Lake. Hemp varieties were sourced from seed companies in Europe, Canada and the Northern US under the assumption that conditions there would be similar to Northern Michigan, particularly in terms of day length and temperature.

The trial at Hyde was managed conventionally, while the Brimley trial used organic practices. 300 lbs/ac 0-14-42 fertilizer blend, plus 217 lbs/ac 46-0-0 urea was applied pre-plant at Hyde. 1,000 lbs. per acre of 10-0-4 feather meal was applied pre-plant at Brimley. The trials were drilled May 27th (Hyde) & June 18th (Brimley) at 25 plants/ft² for grain varieties and 50 plants/ft² for fiber, adjusting for germination and seed size. The experimental design was a RCBD with four replications. Plots were 4 ft. X 16 ft. with 7 inch row spacing. One pt/ac of Broclean, plus 10 oz/ac of Assure herbicide was applied at Hyde for weed control on June 22nd. Plots at Brimley were hand weeded once for weed control on July 20th. Observations of stand establishment, flowering date, white mold severity, and height at harvest were recorded.

Fiber plots at Hyde were harvested August 16th once all varieties were actively flowering. Whole plots were cut with a Jari sickle bar mower and weighed green. Two grab samples were collected from each plot for 1) direct oven drying for moisture determination, and 2) field retting. Stem diameter measurements were taken on 12 stems per plot. Bundled samples were weighed, retted on turf for five weeks, oven dried and re-weighed. Fiber dry matter yields are reported here at 0% moisture. Aggregate flower samples (unreplicated) were collected at harvest and submitted to LSSU for cannabinoid analysis.

Grain plots were harvested Aug. 23rd – Oct 28th based on maturity. We hand cut whole plants from one (Brimley) or two (Hyde) 1 M² quadrats per plot. Plants were air dried and threshed using an Almaco small bundle thresher. Grain stems were weighed after threshing and not retted. Grain was cleaned using a Clipper seed cleaner and weighed. Clean grain was oven dried at 120 degrees F and reweighed to determine moisture content. Clean grain yields reported here are adjusted to 9% moisture. Aggregate flower samples (unreplicated) were collected at harvest, air dried, and held in storage before submission for cannabinoid analysis.

PURPOSE:

Compare performance of available grain and fiber hemp varieties, under Northern MI conditions.

TRIAL LOCATIONS:

MSU Forestry Innovation Center – Hyde, MI

Waishkey Bay Farm – Brimley, MI

EXPERIMENTAL DESIGN:

Randomized complete block design with four replications.

TRIAL MANAGEMENT:

- Planted May 27 (Hyde) & June 18 (Brimley) at 25/50 plants/ft²
- Plots 4' X 16', 7 in. rows
- Borders and alleys planted to decrease edge effect
- 300 lbs/ac 0-14-42, plus 217 lbs/ac 46-0-0 at Hyde
- 1,000 lbs/ac of 10-0-4 feather meal at Brimley
- 1 pt/ac of Broclean, 10 oz/ac of Assure at Hyde
- Hand weeding at Brimley
- Fiber Harvest Aug 16th
- Grain Harvest Aug 23rd- Oct 28th based on maturity

TAKE AWAYS:

- All varieties were THC compliant, except Bialobrzeskie at fiber harvest.
- Herbicide injury likely decreased fiber yield and increased grain yields.
- Tiborszallasi produced the highest fiber yields.
- Bialobrzeskie and NWG 4113 produced the highest grain yields.



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Results and Discussion

Significant differences were observed in fiber hemp stand, herbicide injury, flower date, retted dry matter yield and stem diameter at Hyde, MI (Tables 1 & 2). The average retted fiber dry matter yield was 5,569.30 lbs/ac with the lowest yielding variety, Bialobrzeskie, producing 4,508.81 lbs/ac and the highest yielding variety, Tiborszallasi, producing 7,006.75 lbs/ac. Bialobrzeskie, Futura 75 and Kompolti experienced significant herbicide injury, which stunted plants and likely reduced both stand and fiber yield. All varieties were THC compliant, except Bialobrzeskie at 0.63% total THC.

Significant differences were observed in grain hemp stand, herbicide injury, flower date, height, disease, grain yield and fiber yield at Hyde, MI (Tables 3 & 4). The average clean grain yield was 990.18 lbs/ac with the lowest yielding variety, Hlesiia, producing 378.35 lbs/ac and the highest yielding variety, Bialobrzeskie, producing 1,267.19 lbs/ac. The average un-retted fiber dry matter yield from grain varieties at Hyde was 2,964.45 lbs/ac with the lowest yielding variety, Picolo, producing 1,181.81 lbs/ac and the highest yielding variety, Bialobrzeskie, producing 5,485.39 lbs/ac. Bialobrzeskie, NWG 4000, NWG 4113, Henola and Amaze Auto experienced significant herbicide injury. However, in the case of grain varieties, herbicide injury was correlated with higher grain yields. All varieties were THC compliant, but concentrations were generally lower than expected, perhaps due to sample degradation in storage.

Significant differences were observed in grain hemp stand, height, grain yield and fiber yield at Brimley, MI (Table 5). The average clean grain yield at Brimley was 603.13 lbs/ac with the lowest yielding variety, Hlesiia, producing 279.17 lbs/ac and the highest yielding variety, NWG 4113, producing 1040.78 lbs/ac. The average un-retted fiber dry matter yield from grain varieties at Brimley was 1134.76 lbs/ac with the lowest yielding variety, Picolo, producing 181.48 lbs/ac and the highest yielding variety, Bialobrzeskie, producing 2561.59 lbs/ac. All varieties were THC compliant, but concentrations were generally lower than expected, likely due to sample degradation in storage.

See our hemp plots for yourself in videos produced during the 2021 growing season:

[Hemp Planting at Hyde, MI on May 27th](#)

[Fiber Hemp Harvest at Hyde, MI on Aug. 16th](#)

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Table 1. Fiber Hemp Observations at Hyde, MI

Variety	Seeds/lb	Plant Date	Stand (1 ft ²)	Herbicide Injury (0-5)	Flower Date	Height (in)	Male (%)
Bialobrzeskie	34,091.85	27-May	19.13 bc	3.75 a	25-Jul bc	78.50 a	Mono
Futura 75	24,854.36	27-May	20.13 bc	3.00 a	28-Jul b	79.25 a	Mono
Henola	30,961.91	27-May	11.63 c	1.25 bc	21-Jul c	67.75 a	Mono
Kompolti	25,354.50	27-May	21.00 b	2.50 ab	10-Aug a	83.25 a	46.00 a
Tiborszallasi	24,452.40	27-May	31.38 a	0.25 c	25-Jul bc	78.75 a	53.00 a
Average	27,943.00	27-May	20.65	2.15	28-Jul	77.50	49.50



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Table 2. Fiber Hemp Yield at Hyde, MI

Variety	Harvest Date	Unretted DM Yield (lbs/a)	Retted DM Yield (lbs/a)	Stem Diameter (mm)	CBD (%)	THC (%)
Bialobrzeskie	16-Aug	6,974.29 a	4,508.81 b	6.24 a	NA	NA
Futrura 75	16-Aug	8,622.40 a	5,951.70 ab	6.07 ab	6.10	0.29
Henola	16-Aug	7,496.44 a	5,002.25 ab	5.98 ab	4.57	0.23
Kompolti	16-Aug	7,103.28 a	5,377.01 ab	6.10 ab	4.01	0.20
Tiborszallasi	16-Aug	8,556.77 a	7,006.75 a	5.12 b	6.27	0.30
Average	16-Aug	7,750.64	5,569.30	5.90	5.03	0.33

Table 3. Grain Hemp Observations at Hyde, MI

Variety	Seeds/lb	Plant Date	Stand (1 ft ²)	Herbicide Injury (0-5)	Flower Date	Height (in)
Altair	27,423.94	27-May	8.00 abc	0.25 c	19-Jul bc	77.25 bc
Amaze Auto	39,999.29	27-May	9.50 ab	2.00 abc	1-Jul d	36.00 e
Anka	30,752.00	27-May	3.25 d	0.00 c	20-Jul bc	84.88 ab
Bialobrzeskie	34,091.85	27-May	11.25 a	3.75 a	26-Jul a	91.63 a
CFX-2	28,103.59	27-May	8.75 abc	0.75 bc	4-Jul d	52.75 d
Grandi	28,965.01	27-May	7.25 a-d	0.75 bc	3-Jul d	51.13 de
Henola	30,961.91	27-May	8.00 abc	2.00 abc	18-Jul c	68.75 c
Hlesia	28,331.79	27-May	6.25 bcd	0.25 c	21-Jul bc	82.88 ab
Hliana	25,255.68	27-May	4.75 cd	0.50 c	21-Jul bc	86.13 ab
Katani	32,169.65	27-May	6.25 bcd	0.50 c	1-Jul d	48.38 de
NWG 2463	31,390.45	27-May	7.75 a-d	1.25 bc	23-Jul ab	74.38 bc
NWG 2730	36,287.36	27-May	9.75 ab	1.25 bc	26-Jul a	79.63 abc
NWG 4000	30,462.86	27-May	7.50 a-d	3.00 ab	22-Jul ab	76.00 bc
NWG 4113	30,898.64	27-May	8.00 abc	3.00 ab	26-Jul a	79.00 bc
Piccolo	29,358.71	27-May	4.25 cd	0.50 c	4-Jul d	46.50 de
Average	30,963.52	27-May	7.37	1.32	15-Jul	69.02



Fig. 1 Fiber hemp at Hyde, MI on July 21, 2021



Fig. 2 Harvesting fiber hemp at Hyde, MI on Aug. 16, 2021



Table 4. Grain Hemp Yield at Hyde, MI

Variety	Harvest Date	White Mold (%)	Grain Yield (lbs/ac)	Fiber DM Yield (lbs/ac)	CBD (%)	THC (%)
Altair	15-Oct	8.13 ab	854.63 abc	4,848.64 ab	0.49	<0.05
Amaze Auto	23-Aug	NA	1,174.07 ab	1,497.97 e	0.23	0.05
Anka	15-Oct	4.00 ab	1,063.70 abc	3,635.85 bc	1.04	<0.05
Bialobrzeskie	21-Sep	8.63 ab	1,267.19 a	5,485.39 a	0.72	0.05
CFX-2	9-Sep	23.13 ab	1,089.60 abc	2,098.68 de	0.44	<0.05
Grandi	9-Sep	15.63 ab	1,071.63 abc	1,371.51 e	0.94	0.33
Henola	21-Sep	5.25 ab	1,063.46 abc	3,620.04 bc	0.62	<0.05
Hlesiia	21-Sep	1.38 b	378.35 c	4,758.22 ab	<0.05	<0.05
Hliana	21-Sep	11.50 ab	451.79 bc	3,905.22 bc	<0.05	<0.05
Katani	9-Sep	22.50 ab	1,111.22 ab	1,887.48 de	0.69	0.12
NWG 2463	15-Oct	28.75 a	1,082.66 abc	1,939.96 de	5.43	0.21
NWG 2730	15-Oct	15.00 ab	1,104.78 abc	3,382.92 bcd	2.58	0.05
NWG 4000	15-Oct	25.75 ab	1,047.02 abc	2,450.25 cde	1.98	<0.05
NWG 4113	15-Oct	23.75 ab	1,144.20 ab	2,402.82 cde	5.56	0.21
Picolo	9-Sep	10.63 ab	948.34 abc	1,181.81 e	0.08	<0.05
Average	25-Sep	14.57	990.18	2,964.45	1.60	0.07

Table 5. Grain Hemp Yield at Brimley, MI

Variety	Plant Date	Stand (1 ft ²)	Height (in)	Harvest Date	Grain Yield (lbs/ac)	Fiber DM Yield (lbs/ac)	CBD (%)	THC (%)
Altair	18-Jun	6.55 ab	38.25 ab	28-Oct	760.38 ab	1571.99 ab	0.40	<0.05
Amaze Auto	NA	NA	NA	NA	NA	NA	NA	NA
Anka	18-Jun	1.77 b	53.00 ab	28-Oct	481.29 ab	1356.57 ab	0.16	<0.05
Bialobrzeskie	18-Jun	5.97 ab	51.00 ab	13-Oct	772.87 ab	2561.59 a	0.58	<0.05
CFX-2	18-Jun	3.00 ab	27.25 b	8-Sep	415.58 ab	593.76 b	<0.05	<0.05
Grandi	18-Jun	3.39 ab	23.25 b	8-Sep	545.61 ab	307.95 b	0.46	<0.05
Henola	18-Jun	4.16 ab	36.50 ab	13-Oct	711.65 ab	1151.48 ab	0.08	<0.05
Hlesiia	18-Jun	4.58 ab	42.50 ab	13-Oct	279.17 b	1376.59 ab	<0.05	<0.05
Hliana	18-Jun	7.39 a	40.00 ab	13-Oct	525.04 ab	1702.25 ab	<0.05	<0.05
Katani	18-Jun	2.53 ab	25.50 b	8-Sep	589.94 ab	340.83 b	0.62	<0.05
NWG 2463	18-Jun	2.60 ab	49.67 ab	28-Oct	640.14 ab	1351.51 ab	0.88	<0.05
NWG 2730	18-Jun	2.49 ab	56.25 a	28-Oct	823.81 ab	1439.19 ab	1.30	<0.05
NWG 4000	18-Jun	2.58 ab	40.50 ab	28-Oct	552.96 ab	661.42 b	4.82	0.15
NWG 4113	18-Jun	2.55 ab	43.75 ab	28-Oct	1040.78 a	1289.96 ab	3.13	0.05
Picolo	18-Jun	1.81 b	21.00 b	8-Sep	304.64 ab	181.48 b	0.06	<0.05
Average	18-Jun	3.67	39.17	9-Oct	603.13	1134.76	1.21	0.01

