

# 2020 GRAIN & FIBER HEMP VARIETY TRIAL

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Researchers at Bay Mills Community College, Michigan State University, Lake Superior State University and Ziibimijwang Farm received funding from USDA-NIFA to conduct a grain and fiber hemp variety trial at three locations in 2020. Fourteen varieties of grain and fiber hemp were planted in Brimley, Hyde and Carp Lake, MI. Here we report information regarding the trials conducted in Hyde and Carp Lake only due to the crop being lost to weeds at Brimley. Hemp varieties were sourced from seed companies in 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.

1,000 lbs. per acre of 10-0-4 feather meal was incorporated pre-plant at both locations. The trials were direct-drilled May 23<sup>rd</sup> (Carp Lake) & 26<sup>th</sup> (Hyde) at 25 plants/ft<sup>2</sup> 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. The plots were hand hoed once for weed control in mid-June. Observations of stand establishment, flowering date and height at flowering were recorded (Tables 1 & 2). Aggregate flower samples were collected at harvest and submitted to MDARD for THC analysis.

Plots were harvested Aug. 13<sup>th</sup> – Oct 8<sup>th</sup> based on maturity and bird damage. Significant songbird damage at Hyde required the abandonment of the earliest grain variety, Amaze Auto, and premature harvest of later maturing varieties. We hand cut and separated flowers and stems from two 1 M<sup>2</sup> quadrats per plot. Flowers were threshed wet using an Almaco small bundle thresher. Dirty grain was oven dried at 90 degrees F. Seed was then cleaned using a Clipper seed cleaner, weighed and tested for moisture. Clean grain yields reported here are adjusted to 9% moisture. Grain samples were analyzed for total fatty acid based on weight loss. Stems were bundled and left on turf for 4-6 weeks to ret. Stems were then oven dried at 140 degrees F and weighed. Fiber yields are reported here at 0% moisture to reflect retted dry matter (Tables 3 & 4).

## Results and Discussion

The average clean grain yield was 511.49 lbs/ac at Carp Lake and 271.20 lbs/ac at Hyde. Grain yields were significantly reduced by wild buckwheat competition, lodging from European corn borer (ECB) damage and songbird damage. ECB damage is evident in Harvest Stand data below, measured as the percentage of emerged seedlings remaining at harvest (expecting 100% in monoecious, 50% in dioecious). Earlier maturing varieties appeared to be more susceptible to both ECB and bird damage this year. Bird damage was more prevalent at the Hyde location, and is visible in the grain Harvest Index data below. Varieties with large, dense floral clusters (e.g. X-59) appeared to fare better under heavy bird pressure. All varieties, except "Anon. B" at Hyde, were THC compliant (THC <0.40%), although Rigel approached the threshold at both locations. The Highest yielding grain varieties were CRS-1 (Carp Lake) and X-59 (Hyde). The highest yielding fiber varieties were Vega (Carp Lake) and Rigel (Hyde). Many thanks to our funders, suppliers and partners!

## TRIAL DETAILS

### PURPOSE:

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

### TRIAL LOCATIONS:

MSU Forestry Innovation Center – Hyde, MI  
Ziibimijwang Farm – Carp Lake, MI

### EXPERIMENTAL DESIGN:

Randomized complete block design with four replications.

### TRIAL MANAGEMENT:

- Planted May 23 & 26 at 25 plants/ft<sup>2</sup>
- Plots 4' X 16' with 7 in. row spacing
- Borders and alleys planted to minimize edge effect
- 1,000 lbs/acre of 10-0-4 feather meal applied at planting
- Hoed once for weed control

### TAKE AWAYS:

- Later-maturing monoecious varieties performed best in 2020.
- European corn borer & songbirds significantly reduced grain yields, especially in earlier-maturing varieties.



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Variety	Habit	Seeds/lb	Pop. (1 ft <sup>2</sup> )	Stand Est. (%)	Flower Date	Harvest Date	Harvest Ht. (in)
Altair	Mono	26,092	8.67 a	34.67 a	10-Jul b	16-Sep	48.67 ab
Rigel	Mono	25,222	9.67 a	38.67 a	10-Jul b	13-Aug	48.31 ab
Vega	Mono	24,149	9.50 a	38.00 a	8-Jul b	13-Aug	46.75 ab
Anka	Mono	28,025	6.67 a	26.67 a	10-Jul b	16-Sep	52.25 a
CFX-1	Dio	29,103	9.58 a	38.33 a	27-Jun a	16-Sep	39.50 bc
CFX-2	Dio	27,853	6.42 a	25.67 a	27-Jun a	13-Aug	31.75 cd
Grandi	Dio	27,683	<b>9.83 a</b>	<b>39.33 a</b>	25-Jun a	16-Sep	27.75 d
Katani	Dio	31,972	5.75 a	23.00 a	25-Jun a	13-Aug	31.56 cd
Picolo	Dio	28,025	5.83 a	23.33 a	25-Jun a	13-Aug	29.69 cd
CRS-1	Dio	26,706	8.75 a	35.00 a	2-Jul a	13-Aug	49.38 bc
X-59	Dio	22,587	6.00 a	24.00 a	30-Jun a	16-Sep	36.75 cd
Amaze Auto	Dio	52,791	5.33 a	21.33 a	<b>25-Jun a</b>	13-Aug	27.63 d
Anon. A	Dio	32,662	6.92 a	27.67 a	12-Jul b	22-Sep	<b>54.50 a</b>
Anon. B	Dio	34,472	8.83 a	35.33 a	9-Jul b	16-Sep	47.25 ab

Table 1: Grain Hemp Varieties and In-Season Observations at Carp Lake, MI

Variety	Habit	Seeds/lb	Pop. (1 ft <sup>2</sup> )	Stand Est. (%)	Flower Date	Harvest Date	Harvest Ht. (in)
Altair	Mono	26,092	8.67 abc	34.67 abc	11-Jul d	4-Sep	<b>64.38 a</b>
Rigel	Mono	25,222	10.33 abc	41.33 abc	13-Jul d	4-Sep	59.25 ab
Vega	Mono	24,149	<b>12.33 a</b>	<b>49.33 a</b>	11-Jul d	4-Sep	53.50 bc
Anka	Mono	28,025	5.25 bc	21.00 bc	11-Jul d	11-Sep	60.25 ab
CFX-1	Dio	29,103	8.83 abc	35.33 abc	29-Jun abc	4-Sep	43.13 de
CFX-2	Dio	27,853	7.75 abc	31.00 abc	29-Jun abc	4-Sep	43.88 de
Grandi	Dio	27,683	7.92 abc	31.67 abc	28-Jun abc	3-Sep	34.38 f
Katani	Dio	31,972	5.17 bc	20.67 bc	27-Jun ab	4-Sep	37.13 ef
Picolo	Dio	28,025	7.00 abc	28.00 abc	28-Jun abc	4-Sep	41.38 ef
CRS-1	Dio	26,706	10.42 abc	41.67 abc	2-Jul c	4-Sep	49.63 cd
X-59	Dio	22,587	11.25 ab	45.00 ab	1-Jul bc	4-Sep	51.75 c
Amaze Auto	Dio	52,791	4.42 c	17.67 c	<b>26-Jun a</b>	<b>NA</b>	19.33 g
Anon. A	Dio	32,662	6.08 abc	24.33 bc	19-Jul e	8-Oct	63.00 a
Anon. B	Dio	34,472	7.50 abc	30.00 abc	14-Jul d	8-Oct	60.50 ab

Table 2: Grain Hemp Varieties and In-Season Observations at Hyde, MI



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Variety	Harvest Stand (%)	Fiber Yield (DM lbs/a)	Grain Yield (lbs/a @ 9%)	Harvest Index (%)	CBD (%)	THC (%)	Fatty Acid (%)
Altair	54.80 abc	1192.76 bc	544.98 cde	7.88 cd	0.71	0.10	37.75 ab
Rigel	64.31 ab	1436.60 ab	732.79 bc	8.57 cd	0.72	0.21	36.54 ab
Vega	<b>76.14 a</b>	<b>1557.70 a</b>	960.90 ab	9.45 cd	0.46	0.10	36.31 ab
Anka	40.68 bcd	1024.48 cd	559.44 cde	9.02 cd	0.80	0.11	36.68 ab
CFX-1	16.53 d	320.89 e	321.33 de	13.88 b	0.77	0.10	38.92 ab
CFX-2	36.10 cd	250.93 e	401.58 cde	14.31 b	0.75	0.10	39.89 ab
Grandi	18.13 d	141.67 e	166.35 e	11.77 bc	0.78	0.13	36.45 ab
Katani	19.40 d	198.49 e	333.91 de	13.86 b	0.66	0.14	38.43 ab
Piccolo	38.37 bcd	271.20 e	629.45 cd	<b>17.52 a</b>	0.51	0.11	38.62 ab
CRS-1	43.33 bcd	973.79 cd	<b>1089.24 a</b>	14.50 b	0.86	0.10	<b>42.26 a</b>
X-59	27.32 cd	368.44 e	251.89 de	9.71 cd	0.66	0.10	36.21 ab
Amaze Auto	43.14 bcd	213.88 e	491.78 cde	14.67 b	0.64	0.10	32.42 b
Anon. A	29.91 cd	971.42 cd	387.42 cde	6.55 d	<b>3.05</b>	0.12	37.29 ab
Anon. B	25.67 cd	684.70 d	379.49 cde	8.24 cd	1.17	0.29	39.86 ab

Table 3: Yield and Quality Observations at Carp Lake, MI

Variety	Harvest Stand (%)	Fiber Yield (DM lbs/a)	Grain Yield (lbs/a @ 9%)	Harvest Index (%)	CBD (%)	THC (%)	Fatty Acid (%)
Altair	60.33 b	2095.53 a	385.68 b	3.68 bc	1.61	0.13	34.76 bcd
Rigel	<b>81.48 a</b>	<b>2183.49 a</b>	319.75 bc	2.59 bc	1.61	0.39	37.07 abc
Vega	56.64 bc	1711.17 ab	289.36 bcd	2.72 bc	2.16	0.11	32.88 d
Anka	49.83 bcd	1388.13 bc	236.78 bcd	3.28 bc	1.92	0.22	33.76 cd
CFX-1	38.94 cde	624.54 d	248.14 bcd	4.39 b	1.69	0.10	36.82 abc
CFX-2	33.14 cde	522.45 d	212.51 bcd	4.41 b	1.63	0.10	39.68 a
Grandi	39.03 cde	356.80 d	166.18 cd	4.17 b	1.15	0.14	<b>40.40 a</b>
Katani	41.64 b-e	331.07 d	164.46 cd	4.45 b	1.10	0.14	38.99 a
Piccolo	27.20 de	361.44 d	155.73 cd	3.39 bc	1.28	0.18	37.67 ab
CRS-1	34.28 cde	795.20 cd	257.81 bcd	4.46 b	2.05	0.10	37.34 ab
X-59	34.86 cde	1104.10 cd	<b>672.58 a</b>	<b>7.86 a</b>	1.13	0.10	32.23 d
Amaze Auto	NA	NA	NA	NA	0.96	0.13	NA
Anon. A	26.44 de	954.43 cd	291.12 bcd	2.22 c	<b>4.17</b>	0.17	37.07 abc
Anon. B	24.10 e	1003.57 cd	125.46 d	1.01 d	2.50	0.54	37.85 ab

Table 4: Yield and Quality Observations at Hyde, MI





European corn borer damage and wild buckwheat vine



Variety trial plots at Hyde in late June



European corn borer larva



Songbird damage to grain hemp



European corn borer damage to stems



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