

Industrial Hemp Variety Performance in North Dakota - 2017

NDSU Langdon Research Extension Center

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An industrial hemp variety trial (*Cannabis sativa* L., THC level of 0.3% or less) was conducted at the NDSU Langdon Research Extension Center. The objective of this study was to screen varieties (Table 1) from various sources, monitor and record plant growth and development, determine grain and dry stalk yield, note pest incidence, and record agronomic traits. Variety trials were previously conducted in 2015 and 2016. The 2015 trials were the first industrial hemp evaluations, in North Dakota in over 70 years, and provided grain and fiber yield for Canadian and French varieties. The 2016 trial was lost due to herbicide drift, replanted and lost again to saturated soil conditions.

Table 1. Industrial hemp varieties and characteristics for the Langdon 2017 trial.

Variety	Country	Company†	Type	Purpose
CRS-1	Canada	HGI	Dioecious	Grain
CFX-1	Canada	HGI	Dioecious	Dual
CFX-2	Canada	HGI	Dioecious	Grain
Grandi	Canada	HGI	Dioecious	Grain
Katani	Canada	HGI	Dioecious	Grain
Piccolo	Canada	HGI	Dioecious	Grain
Canda	Canada	PIHG	Monoecious	Dual
Delores	Canada	PIHG	Monoecious	Dual
Joey	Canada	PIHG	Monoecious	Dual
X-59	Canada	Terramax	Dioecious	Grain

†HGI (Hemp Genetics International)

PIHG (Parkland Industrial Hemp Growers)

- Dual purpose varieties are bred to be used for both grain and fiber production.
- Dioecious varieties have separate male and female plants.
- Monoecious varieties have separate male and female flowers on the same plant.
- Plant height is an important consideration in determining end use of the crop. Shorter varieties tend to have less fiber and are more suited to grain production.
- Dual purpose varieties are generally taller.

Materials and Methods

Seeding date was June 1 with plants emerging five to six days later. The seeding rate was 12 pure live seeds/ft² and was adjusted for germination and 1000 kernel weight (kwt) with an additional 25 percent added to allow for seedling mortality. Planting depth was one-half inch. Plot size was 21 feet long x 4 feet wide and consisted of four 12 inch spaced rows. The experimental design was a randomized complete block with four replications. Previous crop was soybeans. The fiber dry stalk yield harvest date was August 8. Fiber harvest consisted of one linear 10 foot row cut from each plot. The plant samples were air-dried and leaves were removed prior to weighing to determine dry stalk yield. Grain harvest occurred on September 13. A small plot combine was used to harvest the plots. Samples were dried then processed to determine yield, test weight and 1000 kwt. Plant samples of all varieties, which included leaves and flowering heads, were sent for laboratory analysis of THC. All samples tested less than the 0.3% THC limit for industrial hemp classification.

Results and Discussion

There were no significant differences in pure live seed emergence (PLSE) among the varieties tested (Table 2). Pure live seed emergence values in 2017 were approximately two to three times (or more) greater than the previous four industrial hemp studies at the Langdon REC, in 2015 and 2016, where PLSE ranged from 3 to 61%. There were significant differences among varieties for seedling mortality that ranged from 20 to 41%. Seed/seedling mortality for traditional crops such as wheat, corn, and soybean commonly ranges from 10 to 15% under good/average conditions. Varieties CFX-1 (41%) and Pico (35%) had the highest seedling mortality but final plant stand not different among varieties and ranged from 9.5 to 12.9 plants/ft², which was close to the target plant population of 12 plants/ft². Fiber dry stalk yield was greatest for the dual purpose varieties which also had the greatest plant height and included the varieties CRS-1, Canda, Delores, and Joey. Canda, Delores, and Joey had significantly higher 1000 kwt compared to other varieties while X-59, Pico, Katani, and Grandi were the highest test weight varieties. Yields of industrial hemp varieties were excellent and ranged from 1685 to 2052 lb/a. Grain yield for Canadian industrial hemp varieties in 2015 ranged from 632 to 1363 lb/a. Sclerotinia Stem Rot (White Mold) common in canola, dry bean and sunflower was observed in the trial but was at a very low incidence level.



Table 2. Grain and fiber yield and various agronomic traits of Canadian industrial hemp varieties.

Variety	PLSE ¹ (%)	Seedling Mortality (%)	Plant Stand (ft ²)	Plant Height (inches)	Fiber Dry Stalk Yield (lb/a)	1000 KWT (g)	Test Weight (lb/bu)	Grain Yield (lb/a)	Grain Yield ² 2 yr Avg. (lb/a)
CRS-1	80	20	12.9	80	5914	17.9	41.3	1891	1477
CFX-1	59	41	9.5	73	4470	17.6	40.8	2052	1708
CFX-2	80	20	12.8	68	4610	17.5	40.7	1949	1569
Grandi	76	24	12.2	67	3302	16.1	41.9	1729	--
Katani	75	25	12.1	68	3733	16.0	42.1	1820	--
Piccolo	65	35	10.4	67	3291	15.8	42.1	1686	--
Canda	78	22	12.4	86	6579	20.1	41.1	2005	1634
Delores	78	22	12.6	87	5863	19.5	41.3	1959	--
Joey	63	28	10.0	85	6074	19.3	41.7	1961	--
X-59	72	28	11.6	74	4022	18.1	42.4	2022	--
Mean	73	27	11.6	75	4786	17.8	41.5	1907	
C.V. %	15.4	40.8	15.6	2.5	19.7	2.4	1.3	8.7	
LSD 5%	NS	NS	NS	2.8	1367	0.6	0.8	240	
LSD 10%	NS	13.4	NS	2.3	1135	0.5	0.6	199	

¹ Pure live seed emergence

² 2015 and 2017

Conclusions

- The industrial hemp varieties tested appear to be suitable to the Langdon region of North Dakota.
- Seed mortality is an important issue in hemp production and not well understood and requires further research for improvement.
- Additional studies to identify superior varieties plus other crop production practices are needed.

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