

New Crops Screening Studies Industrial Hemp in North Dakota

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EHIA 2016

North Dakota Department of Agriculture

NDDA'S ROLE



Administer the industrial hemp program:

- Enforce law and rule
- License
- Sample
- Regulate



2016 - Host a pilot program allowing landowners to conduct research on the department's behalf

ND Research Timeline

1998	Initiated process of registration with DEA
1999	NDCC 4-41
2006	Reapplied for registration with DEA
Jan 2007	Administrative rules become effective
Feb 2007	First ND hemp licenses issued
2008	Memorandum of Agreement with DEA • Site security plot protocol for Langdon REC (\$90,000 est.) • 10 ft high chain-link fence with three strands of 4-point barbed wire angled outward; steel posts spaced every 10 feet set in concrete to 4-foot depth • Motion detectors on fence; locked main access gate • Lights along the top of the fence
2012	Funding returned APUC; Alternative funding failed
Feb 2014	Agricultural Act of 2014 (Farm Bill)
June/July 2014	Site Visit / NDSU receives DEA registration
May 2015/2016	Planted hemp variety trial at Langdon, ND

CONTROLLED SUBSTANCE REGISTRATION CERTIFICATE
UNITED STATES DEPARTMENT OF JUSTICE
DRUG ENFORCEMENT ADMINISTRATION
WASHINGTON, D.C. 20537

DEA REGISTRATION
NUMBER

RN0465888

THIS REGISTRATION
EXPIRES

10-31-2015

FEE
PAID

Exempt

SCHEDULES

1

BUSINESS ACTIVITY

RESEARCHER (I)

DATE ISSUED

07-14-2014

NORTH DAKOTA STATE UNIVERSITY, LANGDON RESEARCH CENTER
DR. BURTON JOHNSON
9280 107TH AVE. NE
LANGDON, ND 58249

Restricted to Government personnel
for official duties only

Sections 304 and 1008 (21 U.S.C. 824 and 958) of the
Controlled Substances Act of 1970, as amended, provide
that the Attorney General may revoke or suspend a
registration to manufacture, distribute, dispense, import or
export a controlled substance.

THIS CERTIFICATE IS NOT TRANSFERABLE ON CHANGE OF OWNERSHIP, CONTROL, LOCATION, BUSINESS ACTIVITY, OR VALID
AFTER THE EXPIRATION DATE.

Form DEA-223 (05/04)



INDUSTRIAL HEMP LICENSE
DEPARTMENT OF AGRICULTURE

North Dakota Department of Agriculture
600 E. Boulevard Ave., Dept 602
Bismarck, ND 58505-0020

Individual Name of Industrial Hemp Grower

Burton Lee Johnson

Address

6505 2nd St N

City

Moorhead

State

MN

Zip Code

56560

The Agriculture Commissioner grants and issues your license pursuant to North Dakota Century Code 4-41.02 from the date issued to
December 31, 2015.

This license is not transferable.

Date Issued

January 5, 2015

License Number

IH 2015-02

Agriculture Commissioner



Photo June 12, 2014 Chemical Storage Langdon REC

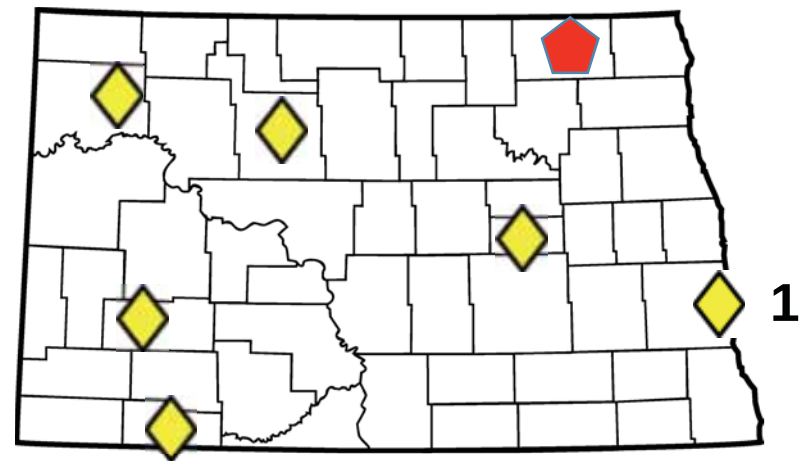
Objective

- Evaluate new crops for agronomic adaptation in North Dakota
 - Annual
 - Winter annual
 - Non-domesticated, semi-domesticated, domesticated
- Adaptation is measured by
 - Seed yield and quality
 - Maturity
 - Agronomic deficiencies

HI, OR, CO, ND

TN, IN, KT, VT

NDSU NORTH DAKOTA
STATE UNIVERSITY



1. 47.002 lat; -97.115 long
Elev. 284 m

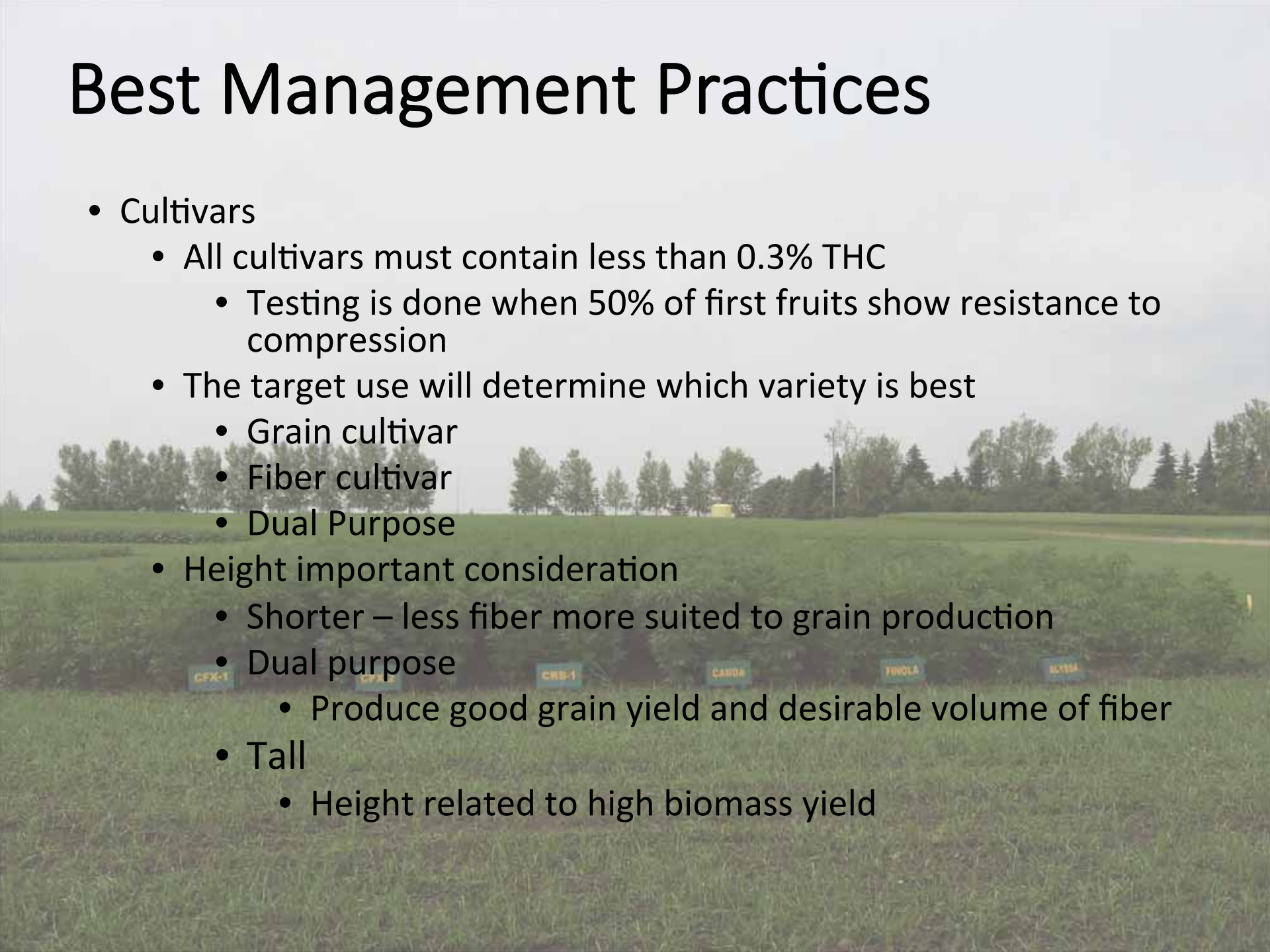
ND Industrial Hemp Research Team



Cultivar	Country	Type	Purpose	Maturity (d)	THC Seed / Plant ppm / %
CFX-1	Canada	Dioecious	Grain	105+	1.59 / 0.167
CFX-2	Canada	Dioecious	Grain	103+	1.01 / 0.125
CRS-1	Canada	Dioecious	Grain	110+	< 1 / 0.110
Alyssa	Canada	Monoecious	Dual or Grain	110+	2.08 / 0.162
Canda	Canada	Monoecious	Dual or Grain	110+	< 1 / 0.115
FINOLA	Finland	Dioecious	Grain	100+	< 1 / 0.201
Fedora 17	France	Monoecious	Fiber	120+	1.09 / 0.065
Felina 32	France	Monoecious	Fiber	120+	1.60 / 0.073
Santhica 27	France	Monoecious	Fiber	120+	< 1 / 0.029
Futura 75	France	Monoecious	Fiber	120+	1.49 / 0.106
Ferimon	France	Monoecious	Fiber	120+	1.24 / 0.100
CHG	Australia	Monoecious	Fiber	120+	1.17 / x NF

Best Management Practices

- Cultivars
 - All cultivars must contain less than 0.3% THC
 - Testing is done when 50% of first fruits show resistance to compression
 - The target use will determine which variety is best
 - Grain cultivar
 - Fiber cultivar
 - Dual Purpose
 - Height important consideration
 - Shorter – less fiber more suited to grain production
 - Dual purpose
 - Produce good grain yield and desirable volume of fiber
 - Tall
 - Height related to high biomass yield





Best Management Practices

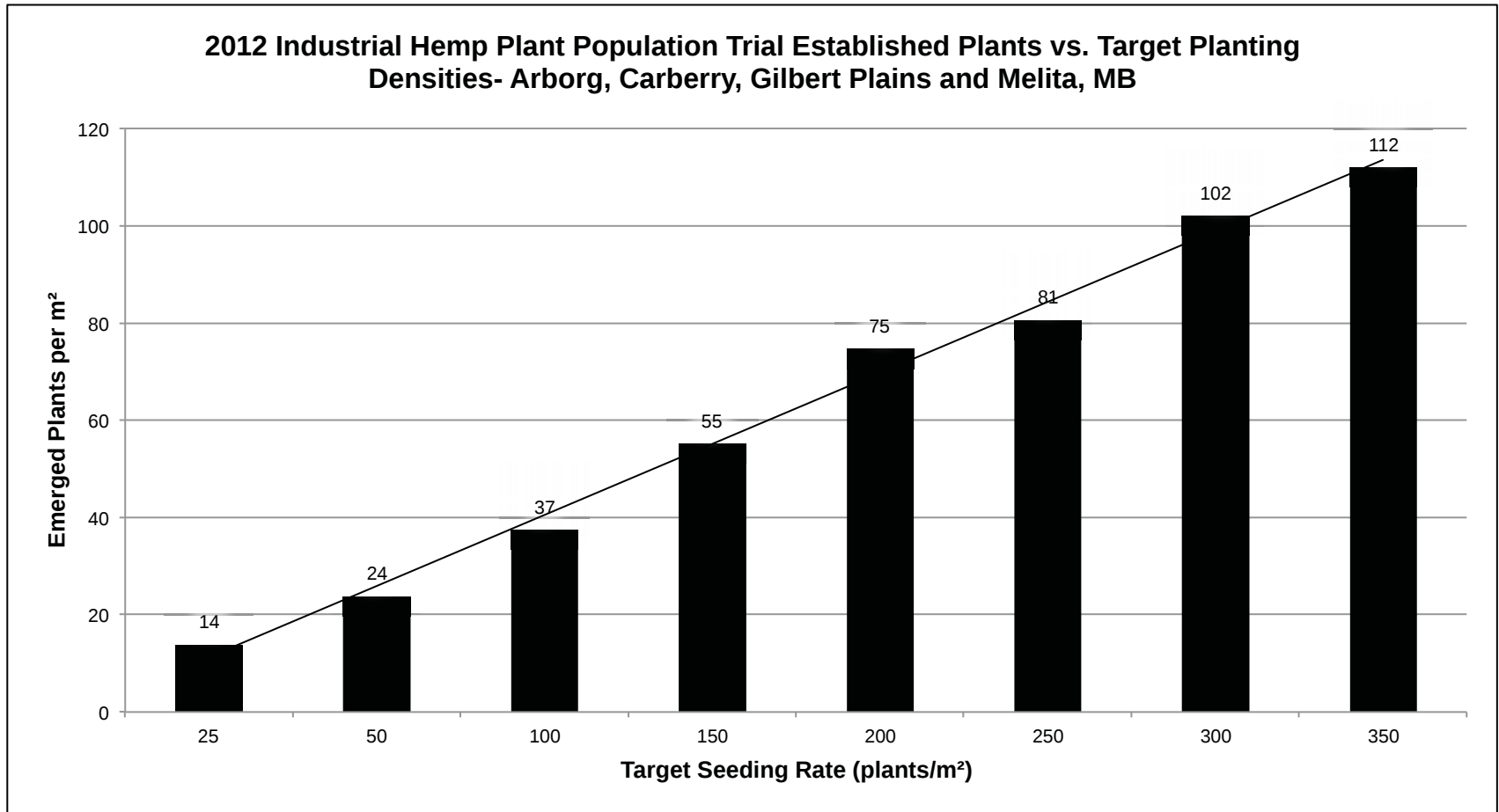
- Planting Date
 - May 15 – 1st week of June
 - Canada-May 27, French-June 5, replant June 9, Australia-June 16
- Seeding Rate
 - Grain Production – 10-12 plants/ft², 18-23 lbs/a
 - Fiber (Dual) Production – 23-28 plants/ft², 40-50 lbs/a
 - Use 30% mortality rate. Can range from 10 to 70%
 - Hemp bushel weight is 44 lbs/bu
- Seeding Depth
 - ½ to 1 inch deep
 - Soil temperature 45-50°F or higher



Plant stand and mortality of industrial hemp cultivars grown at Langdon, ND 2015

Canadian Variety	Plant Stands Plts/ft ²	Mortality %	French Variety	Plant Stands / Mortality June 5 Plts/ft ²	Plant Stands / Mortality June 9 Plts/ft ²
Alyssa	2.2	82	Ferimon	1.1/ 91	6.3/ 48
Canda	4.7	61	Fedora 17	1.0/ 93	5.7/ 52
CFX-1	5.7	53	Felina	1.2/ 90	6.3/ 48
CFX-2	6.2	48	Santhica 27	0.4/ 99	5.6/ 53
CRS-1	3.0	75	Futura 75	0.7/ 94	5.3/ 56
FINOLA	4.9	59	CHG	34% Mortality	

Seeding Rate Study



- Mortality is 50 to 70%

Source: Mb. Diversification Centers 2012

Best Management Practices

- Field selection
- Seeding equipment
 - Conventional seeding equipment
 - Air delivery systems, use caution
- Fertility
 - Rule of thumb – Similar to high yielding and high protein spring wheat production
 - More research needed
- Weed Control
 - Only Assure II is now labeled in Eastern Canada
 - Pre-seed glyphosate is only option
 - Field selection is important



June 4



June 11

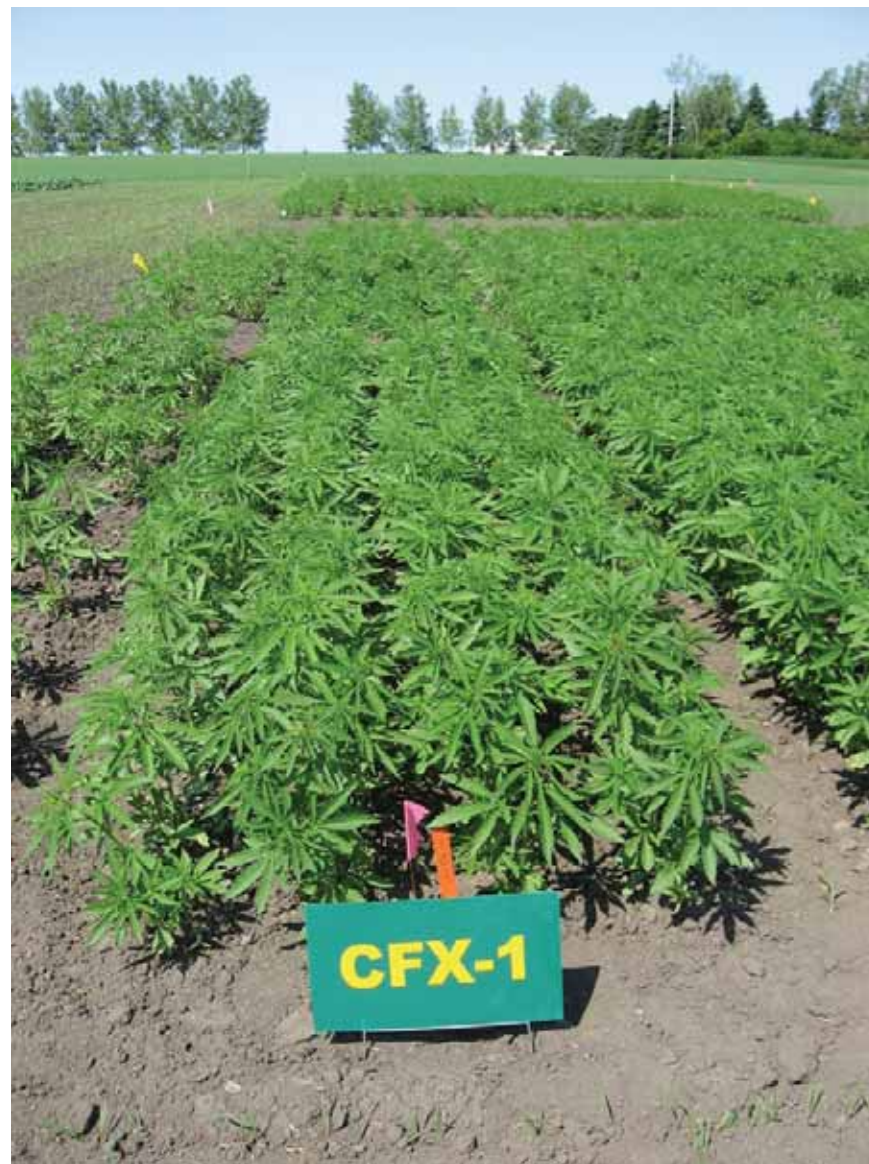




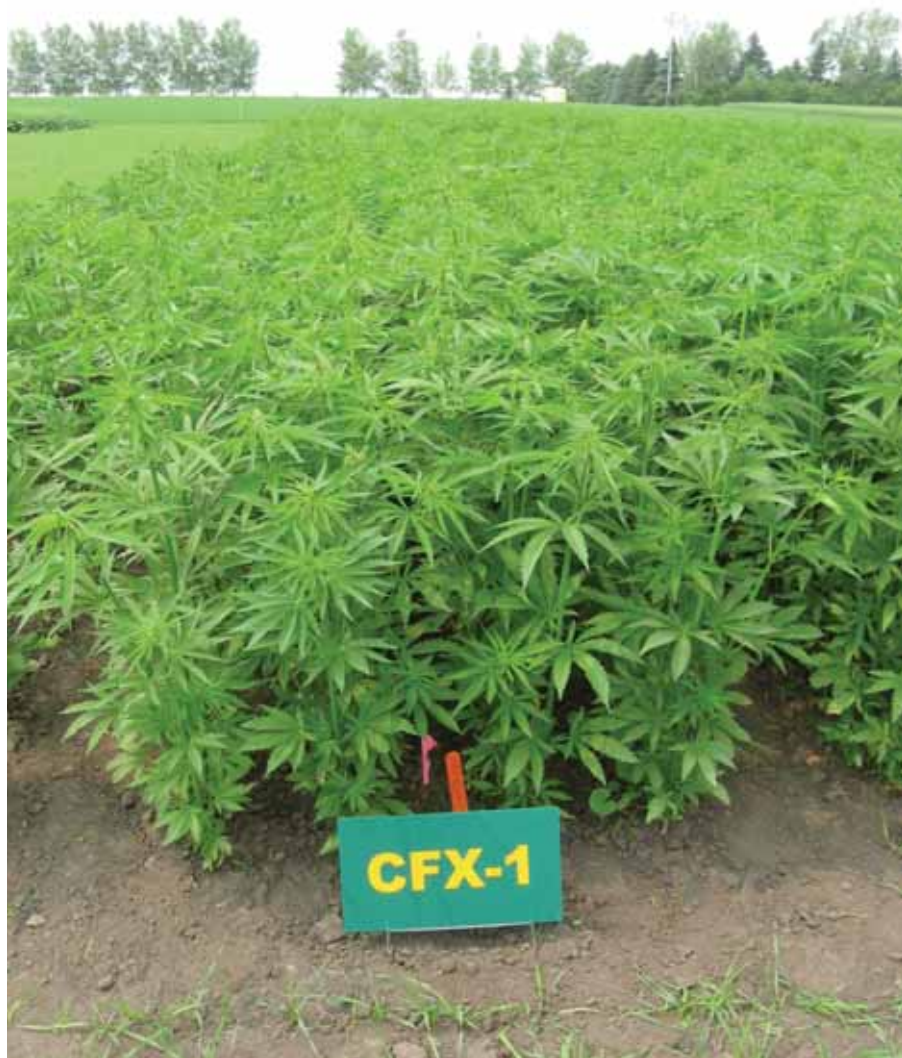




June 17



June 25



July 2



July 9



CFX-1

CFX-2

CRS-1

CAND

FINOLA

ALYSSA



Best Management Practices

- Insects
 - No insecticides registered in Canada
 - Bertha Armyworm, Cutworms, Grasshoppers, European Corn Borer, Lygus Bugs
- Diseases
 - No fungicides registered in Canada
 - Sclerotinia Stem Rot, Botrytis
- Other Concerns
 - Hail and strong winds in early plant development stages
 - Excessive rainfall and saturated soil conditions
 - Stalk Breakage











July 13



July 21

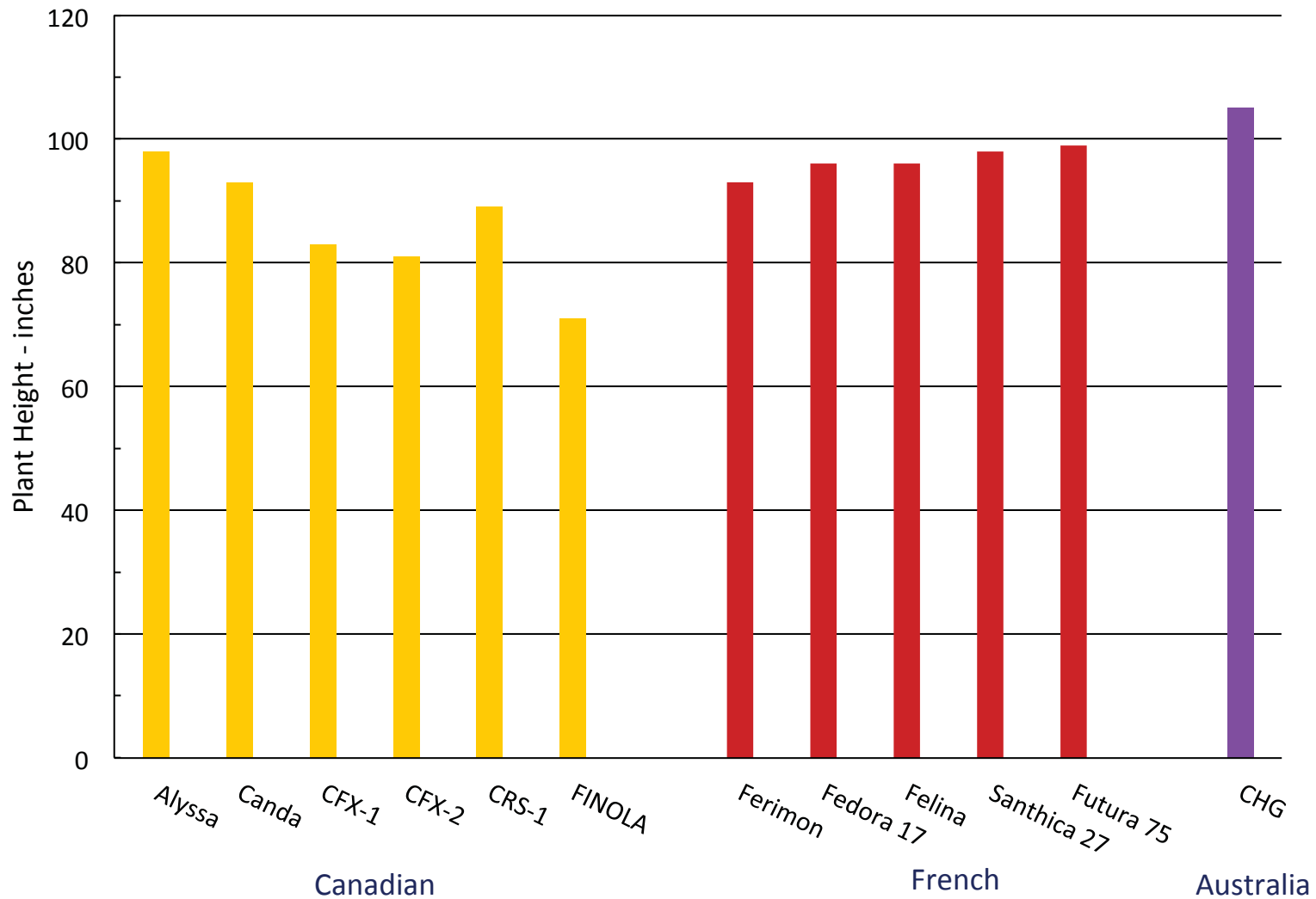




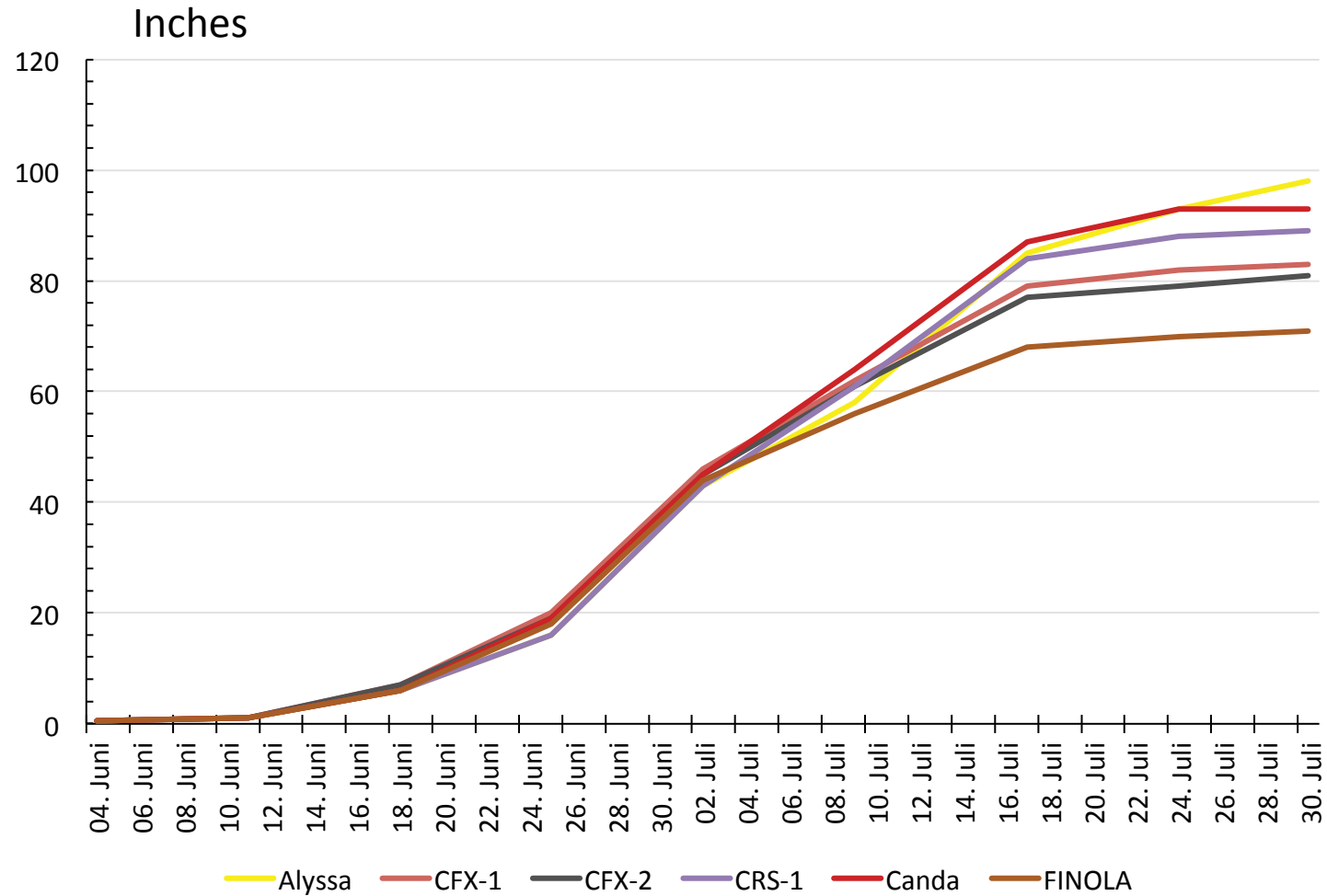


July 31

Mean plant height of Canadian, French and Australian industrial hemp cultivars grown at Langdon, ND, 2015



Canadian industrial hemp cultivar plant height progression grown at Langdon, ND 2015



Best Management Practices

- Fiber Harvest
- Harvest Date – Canadian –Aug 4, French-Aug 29, Australian – Sept 30
- Dual purpose
 - Straw is dropped and allowed to rett in field
 - Baled in fall or following spring
- Fiber only
 - Geared toward high biomass
 - Straw cut male plants in full bloom, typically mid-August
 - Allowed to rett 4-6 weeks
 - Baled





Best Management Practices

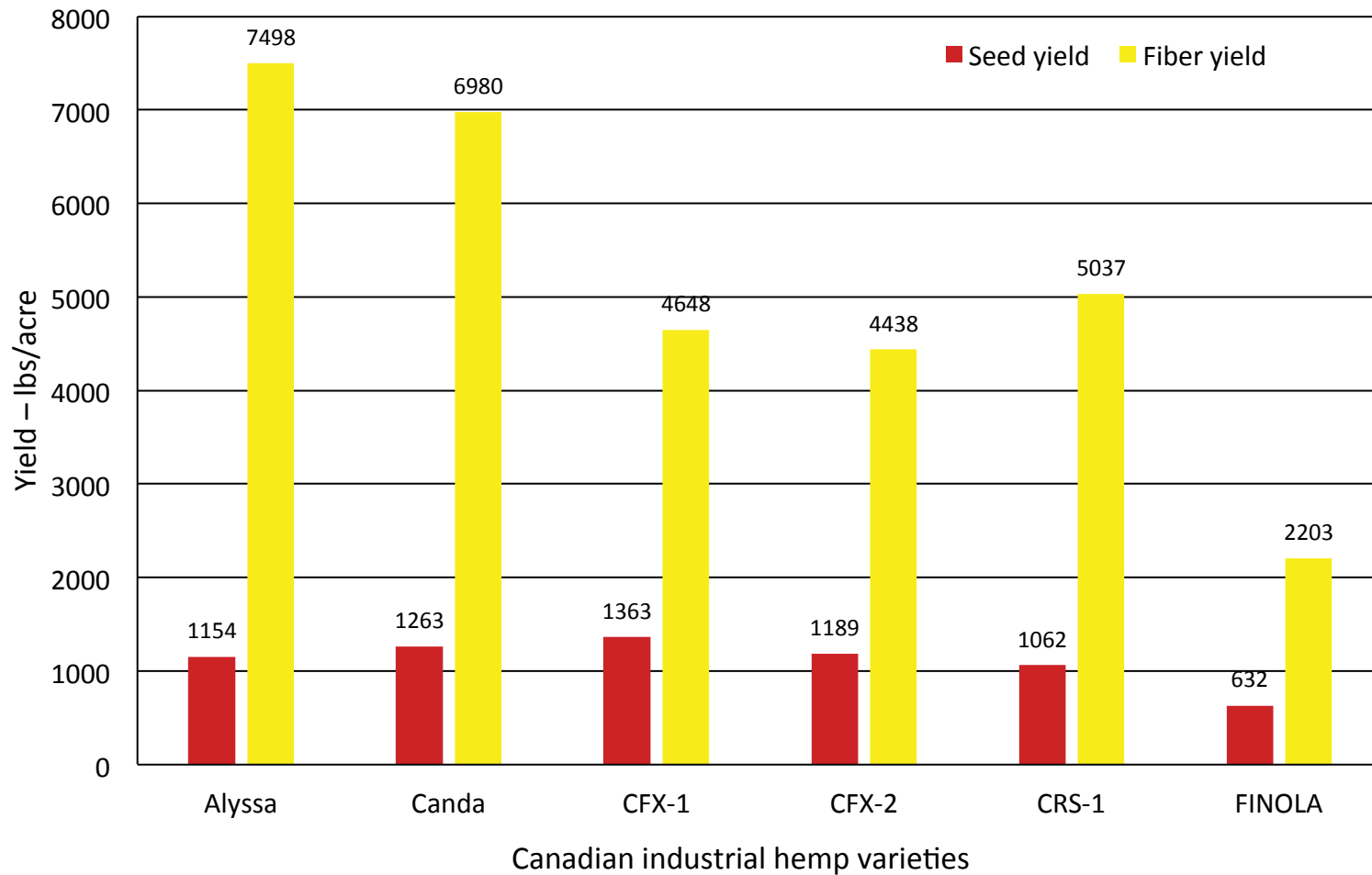
- Grain Harvest
- Canadian-Finola-Aug 27, All others – Sept 3
 - French – September 28
 - Australian – Did not mature
- Straight harvest
- New combines better suited, may need modification
- Seed moisture 10% to 18%
- Bracts surrounding seed desiccate
- Grain drying required, dry below 10%
- Significant portion of plant material with seed
- No grading standards



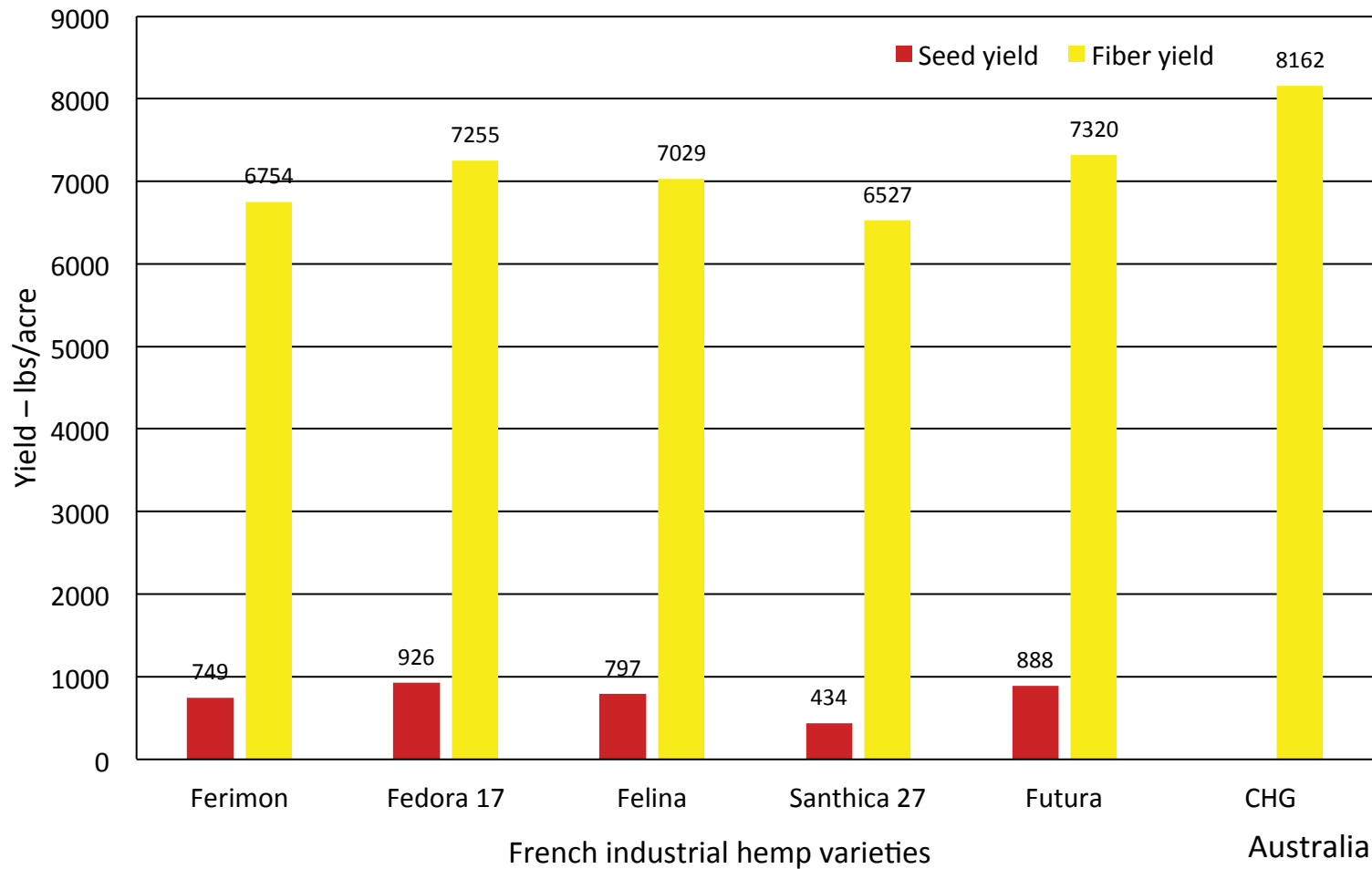




Mean seed and fiber biomass yield for six Canadian industrial hemp cultivars grown at Langdon, ND, 2015



Mean seed and fiber biomass yield for five French industrial hemp cultivars grown at Langdon, ND, 2015



Test Weight and KWT of industrial hemp cultivars grown at Langdon, ND 2015

Canadian Variety	TW lbs/bu	KWT g	French Variety	TW lbs/bu	KWT g
Alyssa	40.5	19.6	Ferimon	42.2	14.9
Canda	41.5	20.5	Fedora 17	42.2	16.5
CFX-1	41.9	19.0	Felina	42.3	15.2
CFX-2	42.5	17.5	Santhica 27	40.6	15.5
CRS-1	42.5	18.4	Futura 75	41.4	17.0
FINOLA	42.3	15.0			



Conclusions

- Most industrial hemp cultivars tested appear to be suitable to the Langdon region of ND.
- Grain and fiber yields were comparable to research data from Southern Manitoba, Canada.
- French cultivars, planted 10 days later, had lower grain yields, but higher fiber yields than Canadian and Finland cultivars. The Australian cultivar planted on June 16 was the tallest and had the greatest fiber yield of all cultivars tested even though it was harvested in the vegetative stage as compared to the end of flowering stage for the other cultivars.
- Seed mortality is an important issue in hemp production -not well understood requires further research.
- Additional studies to identify superior cultivars plus other crop production practices are needed.

Acknowledgements

Appreciation is extended to

Hemp Genetics International Inc., Canada;

Parkland Industrial Hemp Growers, Canada;

FINOLA and Hemp Oil Canada, Inc;

Cooperative Centrale des Producteurs de Semences de Chanvre, France;

and

Ecofibre Industries Operations Pty, LTD, Australia;

for their interest in the study and providing the seed.

Parkland Crop Diversification Foundation

The Ridge International Cannabis Consulting

North Dakota State University & The Langdon Research Station Team

H E M P

A CHANGING HORIZON

CHTA 2016

14th Annual Convention

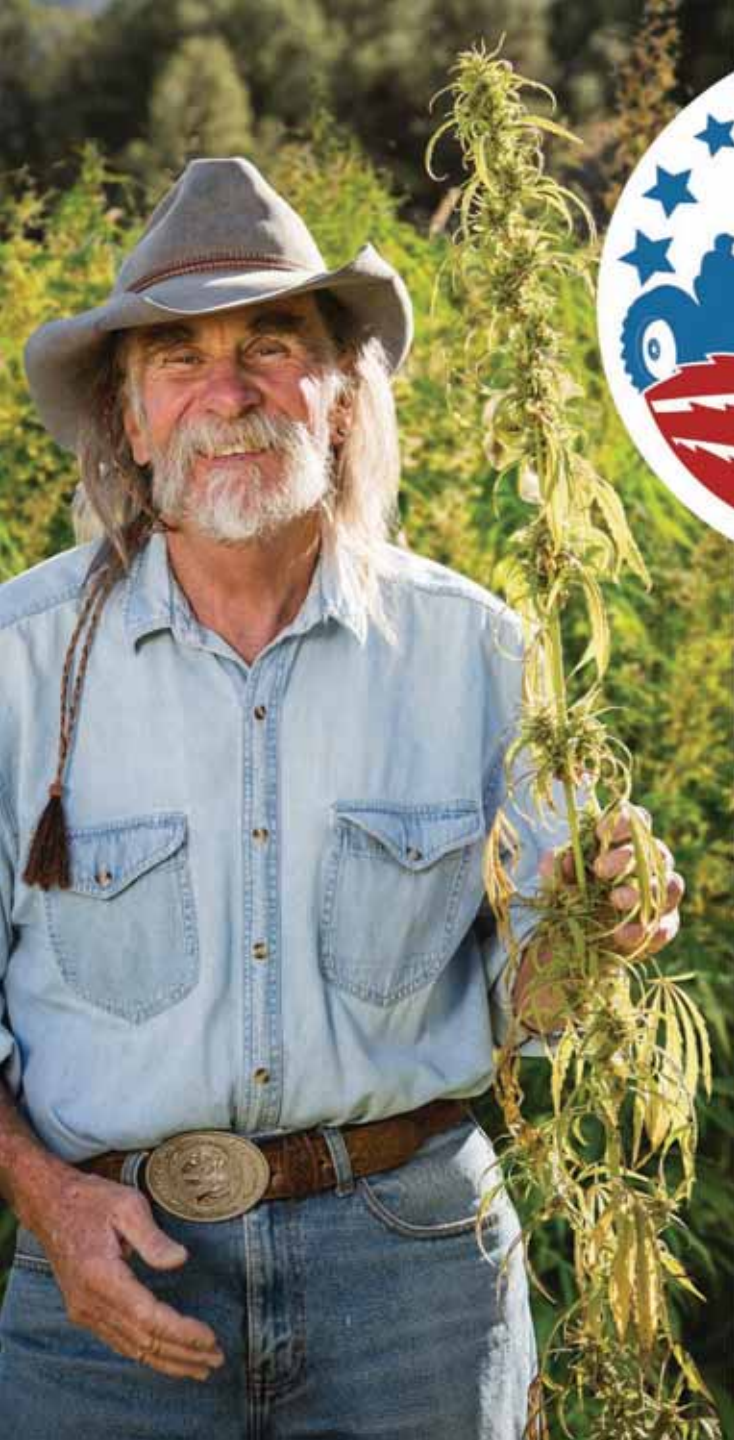
Saskatoon, Saskatchewan

November 14 AGM Members Only
and 15-17 Convention/Tradeshow

Salon Batouche Room

Delta Bessborough, Saskatoon





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Join the largest national grassroots effort to renew strong support for hemp farming in the U.S. and beyond!

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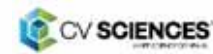


Photo left: Scott Perez, Colorado Hemp Farmer



Hemp State UPDATE



** Info May 2016*

-  States expected to grow hemp in 2016. (10 states)
-  States that grew hemp in 2015. (8 states)
-  States with enacted hemp legislation. (29 states)
-  States that introduced amendments or new hemp legislation in 2016. (26 states)



**HEMP INDUSTRIES
ASSOCIATION**

2016 CONFERENCE

Denver Colorado

SAVE THE DATE | SEPT. 18-20

Have a Hemptastic Day!

