Opportunities and Challenges Growing Industrial Hemp In Wisconsin

Wisconsin Land and Water Annual Conference

March 6, 2024

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Chippewa, Dunn, Eau Claire Counties

Division of Extension UW-Madison

Let’s get these out of the way

- “This session is going to be smokin’”
- “I got some good stuff from this session”
- “I wonder if he is going to talk about weed or grass control?”
- “I have such a learning high from this session”
- “I am lit after attending this session”

Plan for today

- Getting started
- Physiology
- Types of Industrial Hemp
- Growing practices
- Samples
- Local research
- Cropping system potential
- Opportunities and challenges

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Current Industrial Hemp Production

Industrial Hemp Grown in the Open – Wisconsin and United States: 2021 and 2022

	Wisconsin			United States		
	2021	2022	2022 as % of 2021	2021	2022	2022 as % of 2021
			(percent)			(percent)
All Hemp						
Area planted ..... acres	680	870	128	54,152	28,314	52
Area harvested ..... acres	580	740	128	33,480	18,251	55
Floral Hemp						
Area harvested ..... acres	110	(D)	(X)	15,980	7,105	44
Yield .....pounds per acre	780	(D)	(X)	1,235	954	77
Production ..... pounds	86,000	(D)	(X)	19,735,000	6,781,000	34
Utilized production ..... pounds	6,000	(D)	(X)	15,733,000	6,140,000	39
Harvested not sold ..... pounds	80,000	(D)	(X)	4,002,000	641,000	16
Price .....dollars per pound	136.00	(D)	(X)	39.60	29.10	73
Value of production .....dollars	816,000	(D)	(X)	623,236,000	178,900,000	29

(D) Withheld to avoid disclosing data for individual operations.
(X) Not applicable.

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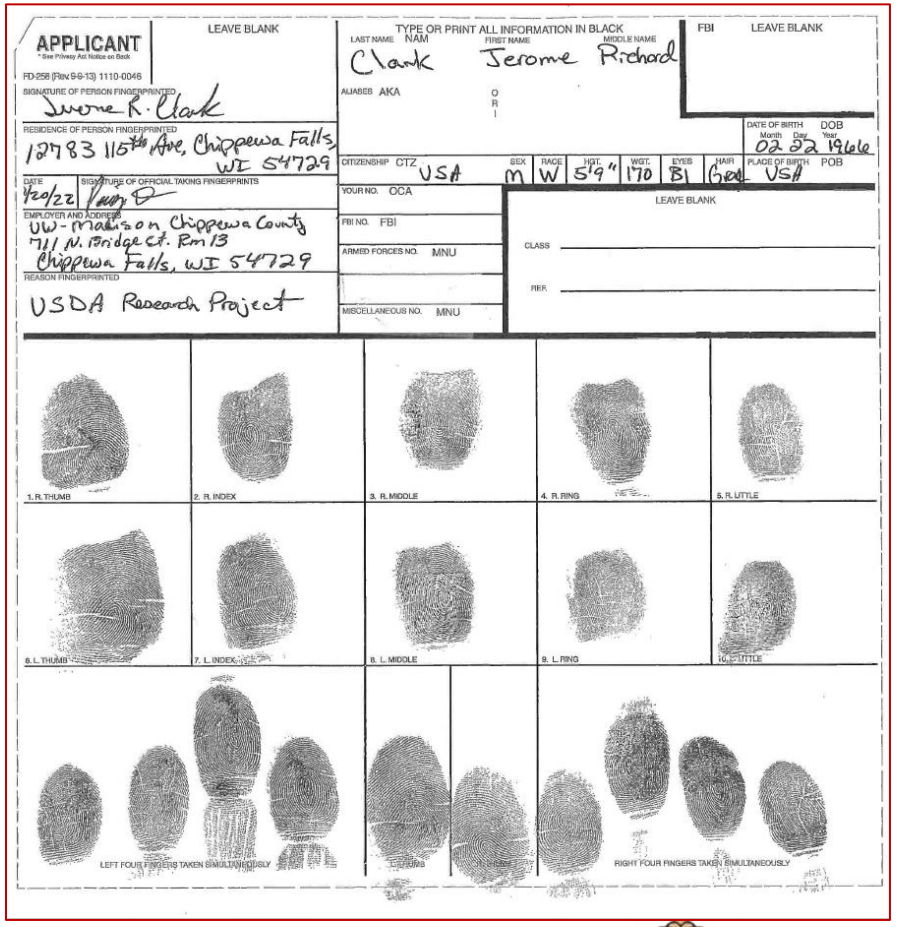
Getting started

- Wisconsin grower License
  - USDA Domestic Hemp Production Program
    - No Cost
  - FBI Background Criminal History
  - Fees
    - Sampling
    - Testing



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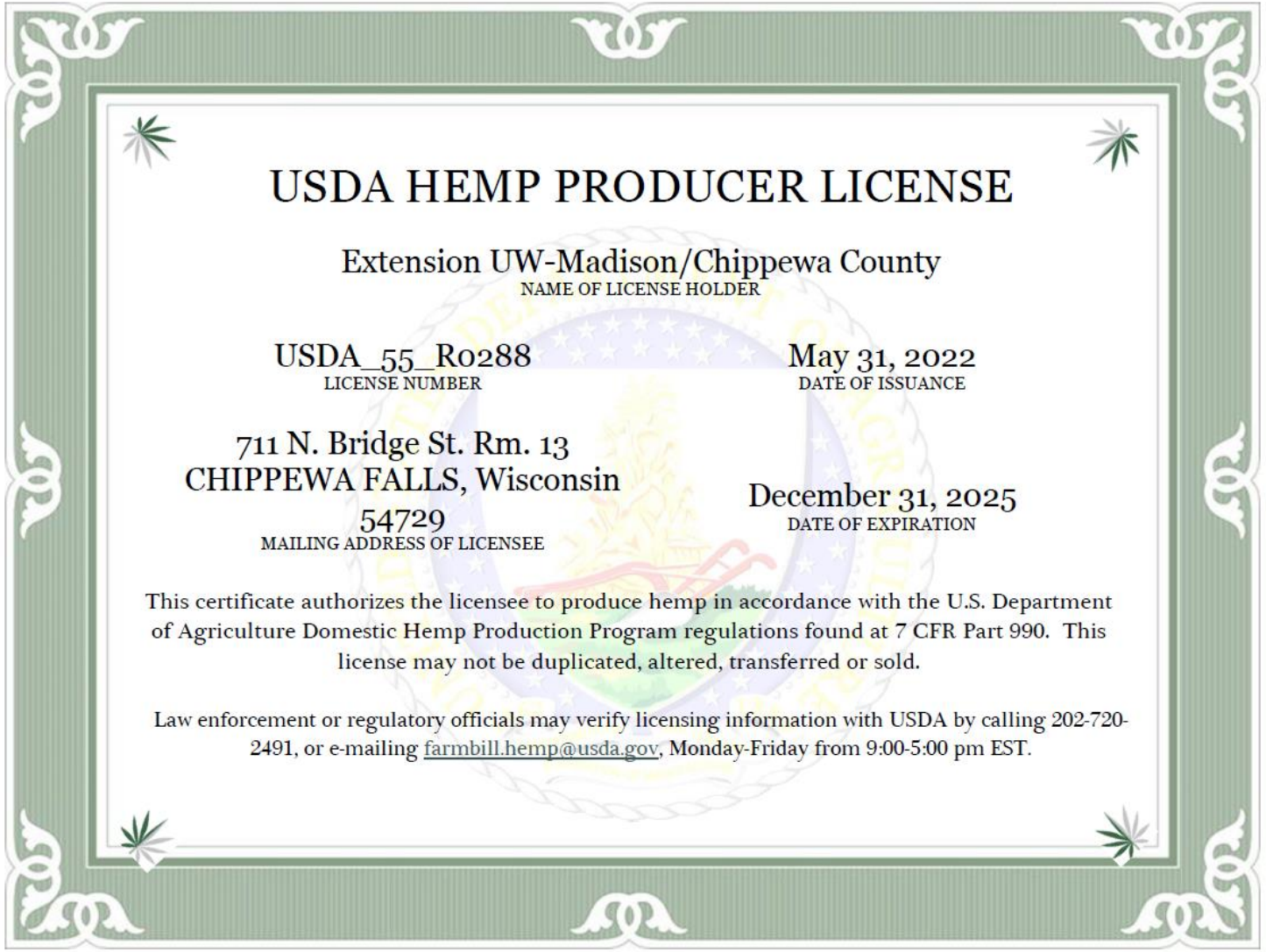
Yes…I passed.



USDA HEMP PRODUCER LICENSE

Extension UW-Madison/Chippewa County
NAME OF LICENSE HOLDER

USDA_55_R0288
LICENSE NUMBER

May 31, 2022
DATE OF ISSUANCE

711 N. Bridge St. Rm. 13
CHIPPEWA FALLS, Wisconsin
54729
MAILING ADDRESS OF LICENSEE

December 31, 2025
DATE OF EXPIRATION

This certificate authorizes the licensee to produce hemp in accordance with the U.S. Department of Agriculture Domestic Hemp Production Program regulations found at 7 CFR Part 990. This license may not be duplicated, altered, transferred or sold.

Law enforcement or regulatory officials may verify licensing information with USDA by calling 202-720-2491, or e-mailing farmbill.hemp@usda.gov, Monday-Friday from 9:00-5:00 pm EST.

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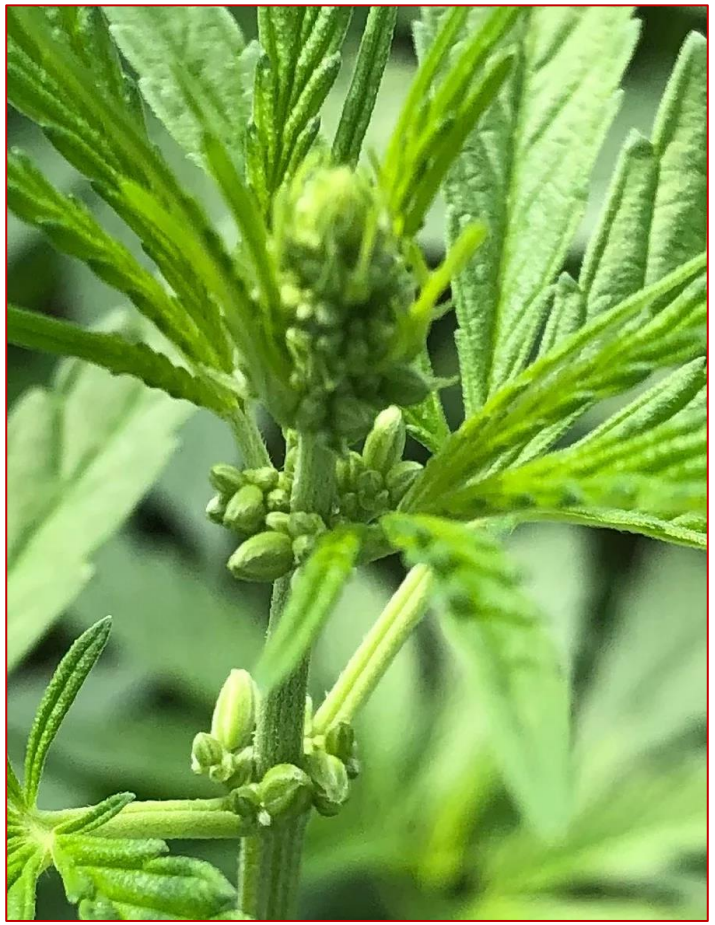
Physiology

- Short-day plant
  - Flowers < 12hrs
- Most are diecious
- Some breeding for monecious

Male



Female

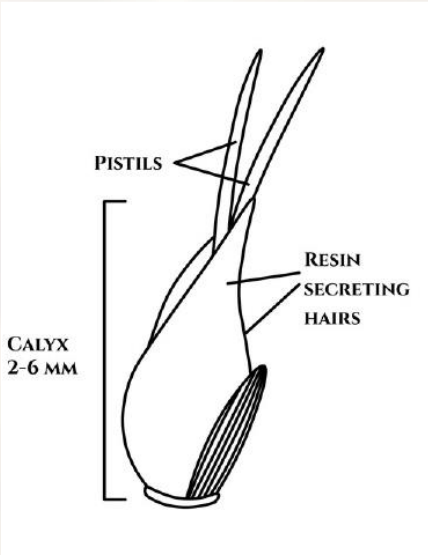
Male Plants

- 10 to 15% taller and less robust.
- Die after shedding pollen.
- Specialized for pollen dispersal by wind.
- Bees (many types) are present at flowering but do not visit female flowers.

The birds and the bees

Female Plants

- Flowers in auxillary inflorences.
- Flowers congested.
- Stigmas are long and covered with receptive papillae.



Industrial Hemp Production

- Types
  - Grain (oilseed)
  - Fiber
  - Hybrid (dual purpose, grain, fiber)
  - Essential Oils

Hemp Production

- Soil
  - High fertility
    - Similar to corn
  - Neutral pH
  - Well drained soils
- Planting date
  - Warm soil temps
  - Above 50°F
  - Planting after soybeans
- Adequate soil moisture

Hemp Grain and Fiber Production

- Seed bed prep
  - Seed is best planted at 0.75”-1.25”
  - Firm seed bed similar to alfalfa
  - Drilled at 7” rows

- Seeding rate
  - Grain (oil)
    - 25-40 lbs/acre
    - Final stand 10-15 plants/ft^2
  - Fiber
    - 40-80 lbs/acre
    - Final stand 30-35 plants/ft^2

Hemp Grain and Fiber Production

- Produced more like conventional grain and forage production
- Markets are scarce

Seeds and Plants

- Grain & Fiber – male & female seeds
- CBD
  - male & female seed
  - feminized seed
- CBD Clones
  - female plants
- CBD Starts
  - Gender typed
  - Mixed male & female plants

Hemp Seed Oil

- 30% protein, 25% starch, 30% oil
- 90% polyunsaturated oils
- High in omega-3 fatty acids
- Food, fuel, cosmetics, etc.
- Cake – used for food and animal feed

Planting Date Study

- Most success after Memorial Day

- 2023
  - Planted
  - May 15, June 1, June 15, July 1

Hemp Fibers

- Bast
  - Outer fibers
  - Textiles
  - Clothing
- Hurd
  - Inner fiber
  - Woody
  - Construction materials

Grain (seed harvest)

- Harvest
  - Modern combine
  - Top 1/3 of plant for seed
  - 70-90% seed head maturity
  - Seed at 10-20% moisture
    - Wrapping may occur at drier levels

Hemp Production

Drying

- Minimal Heat
  - 150°F first half of drying
  - 120°F for rest of drying

- Air dry
  - Recommended if at lower levels

Yield

Seed

800 to 1800 pounds/acre

Fiber

2-5 tons/acre

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Essential Oils

- 2019-2020
- Oregon State University
  - Buffalo County
- Female plants only

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Chippewa Plots – Sandy Loam Soils

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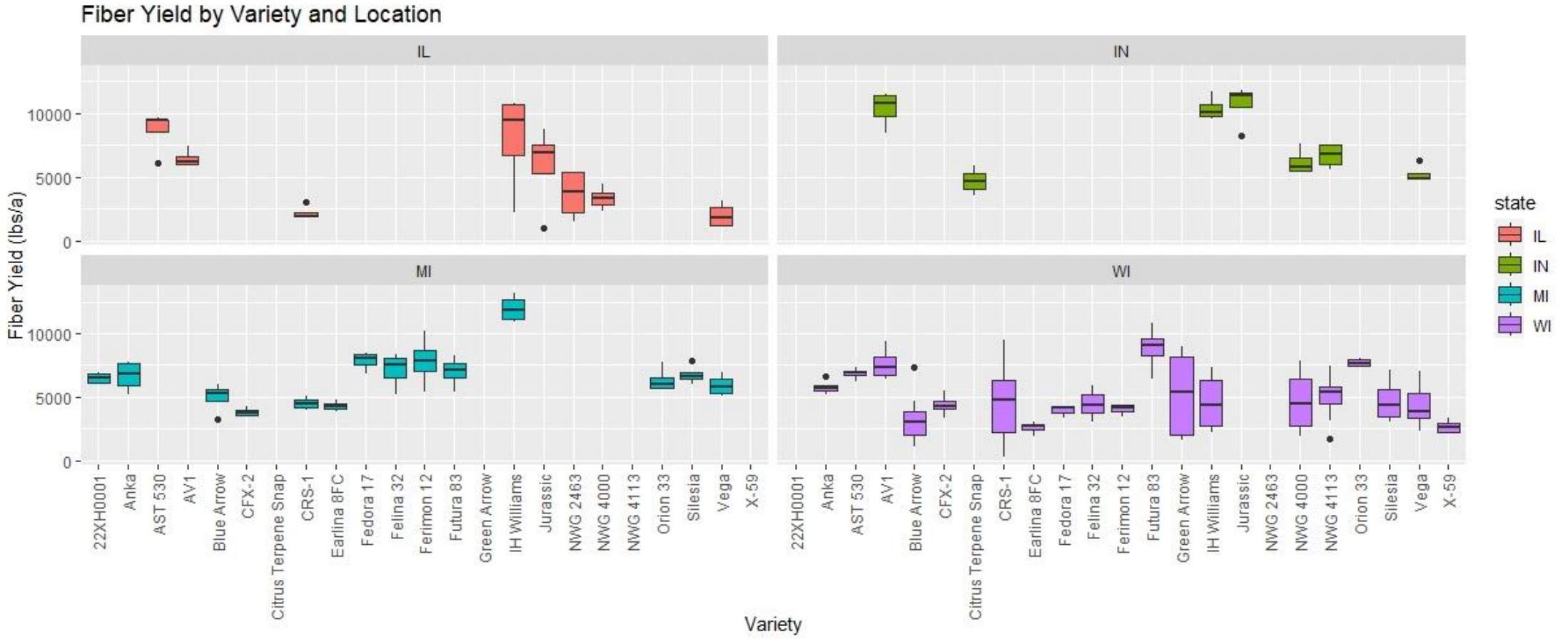
Variety differences

Variety Evaluation - Midwest



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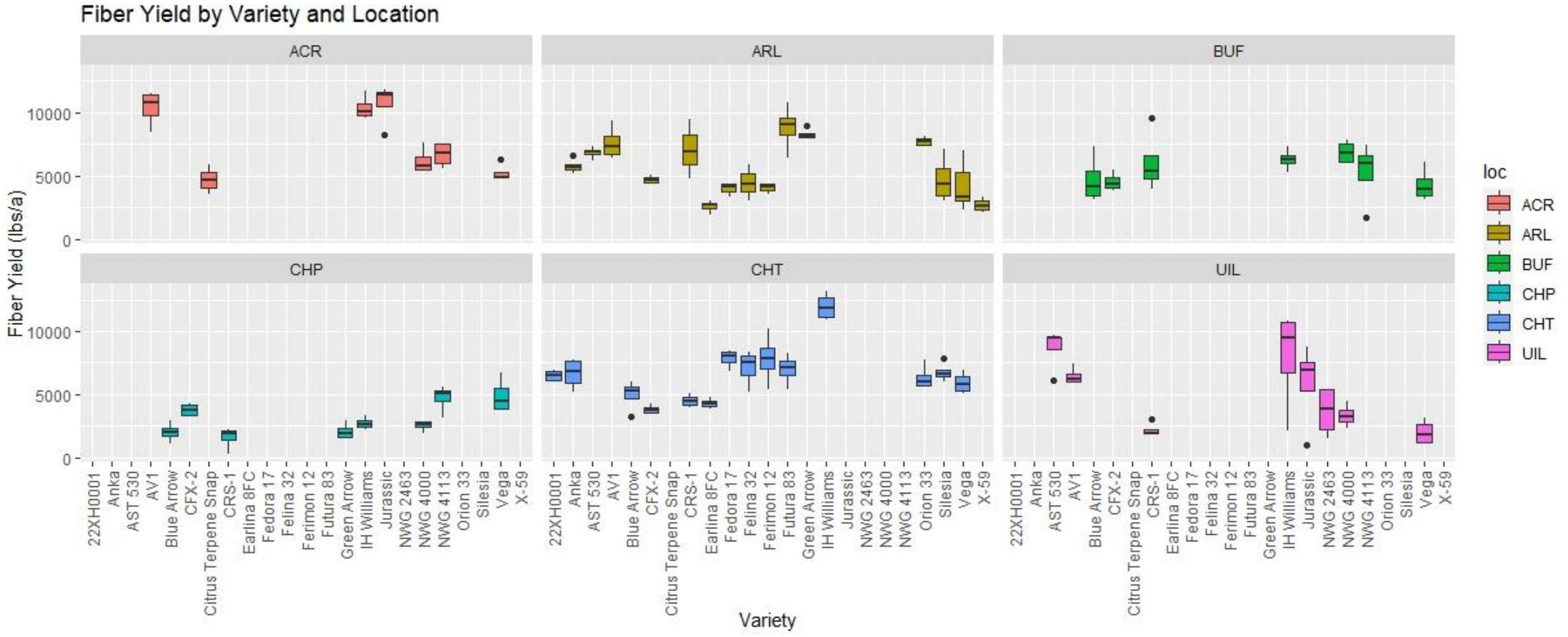
Variety Evaluation – Local data



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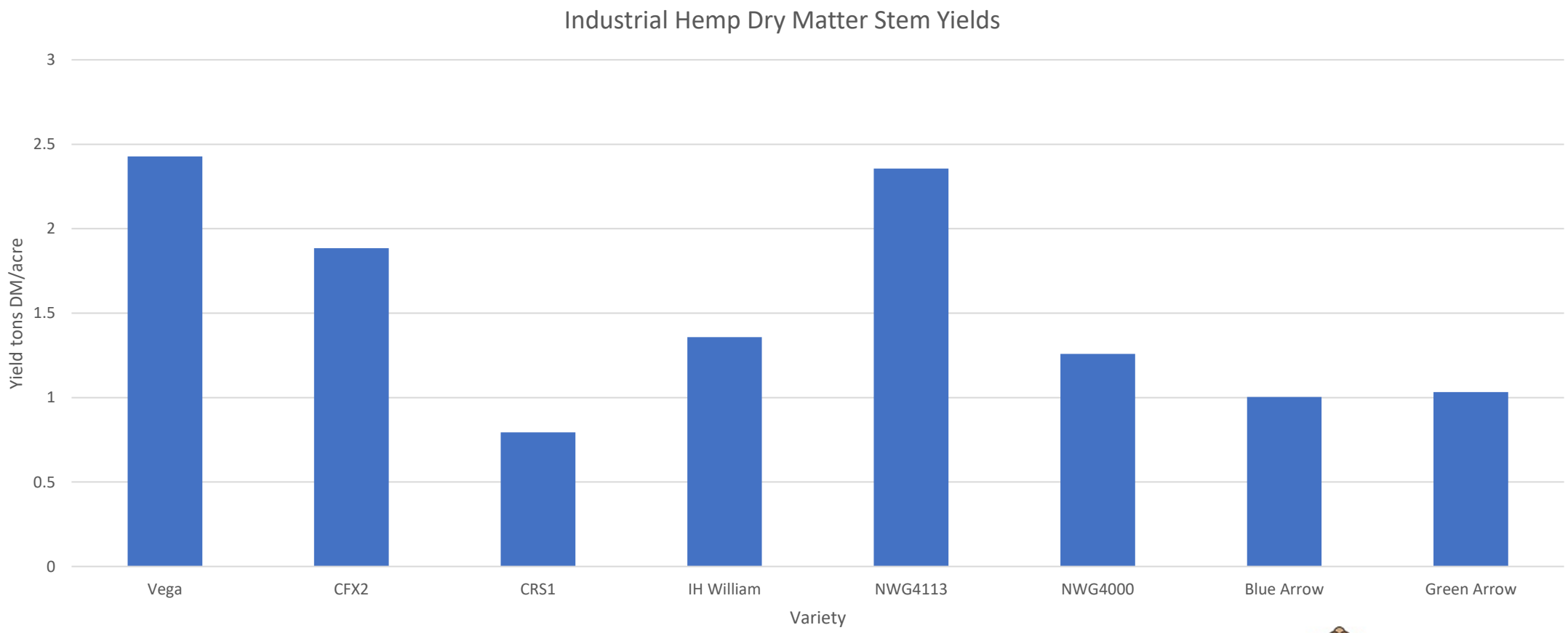
Variety Evaluation – Chippewa County Fiber Yield



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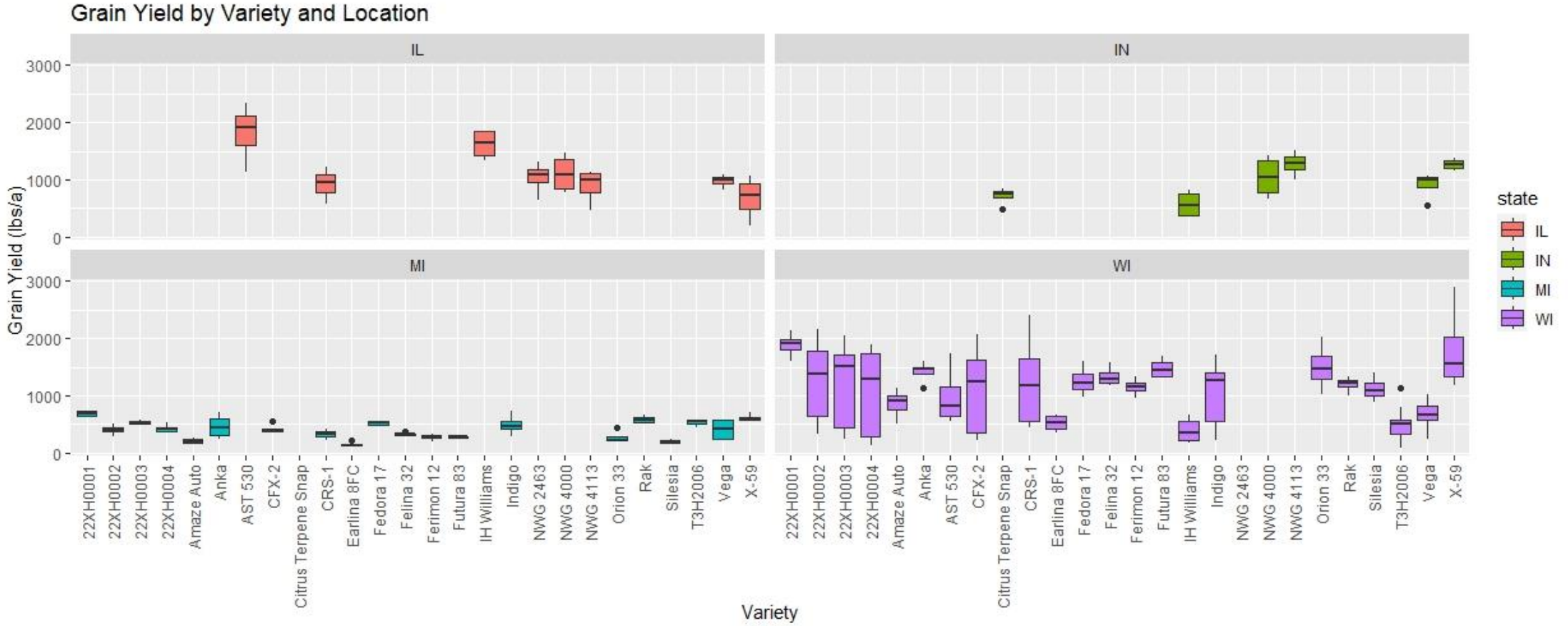
Variety Evaluation – Midwest



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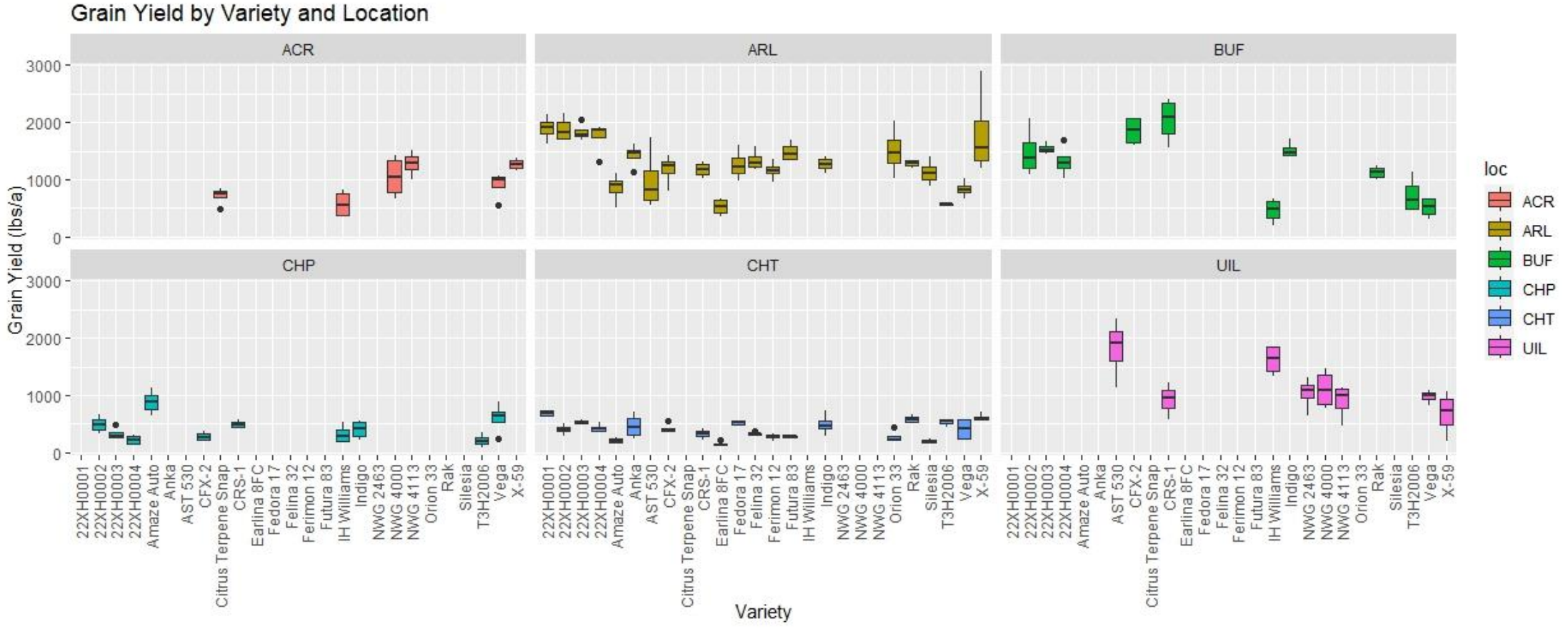
Variety Evaluation – Local data



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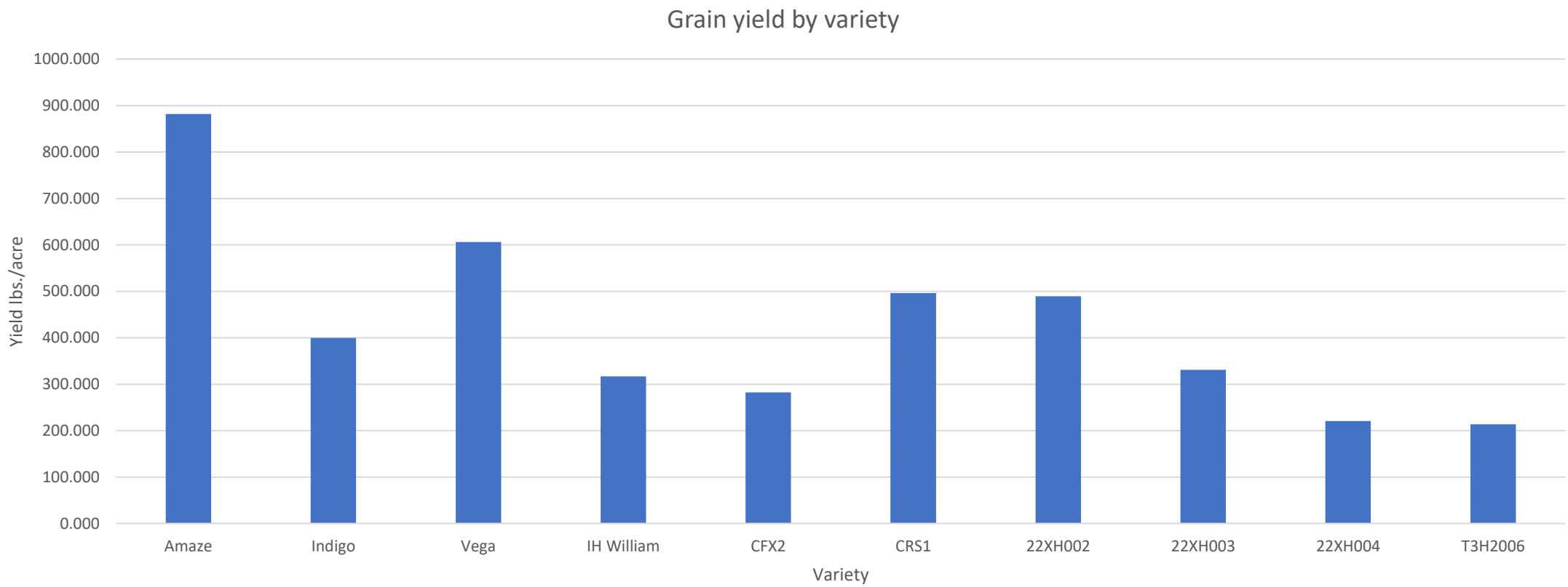
Variety Evaluation – Chippewa County Grain (2023)



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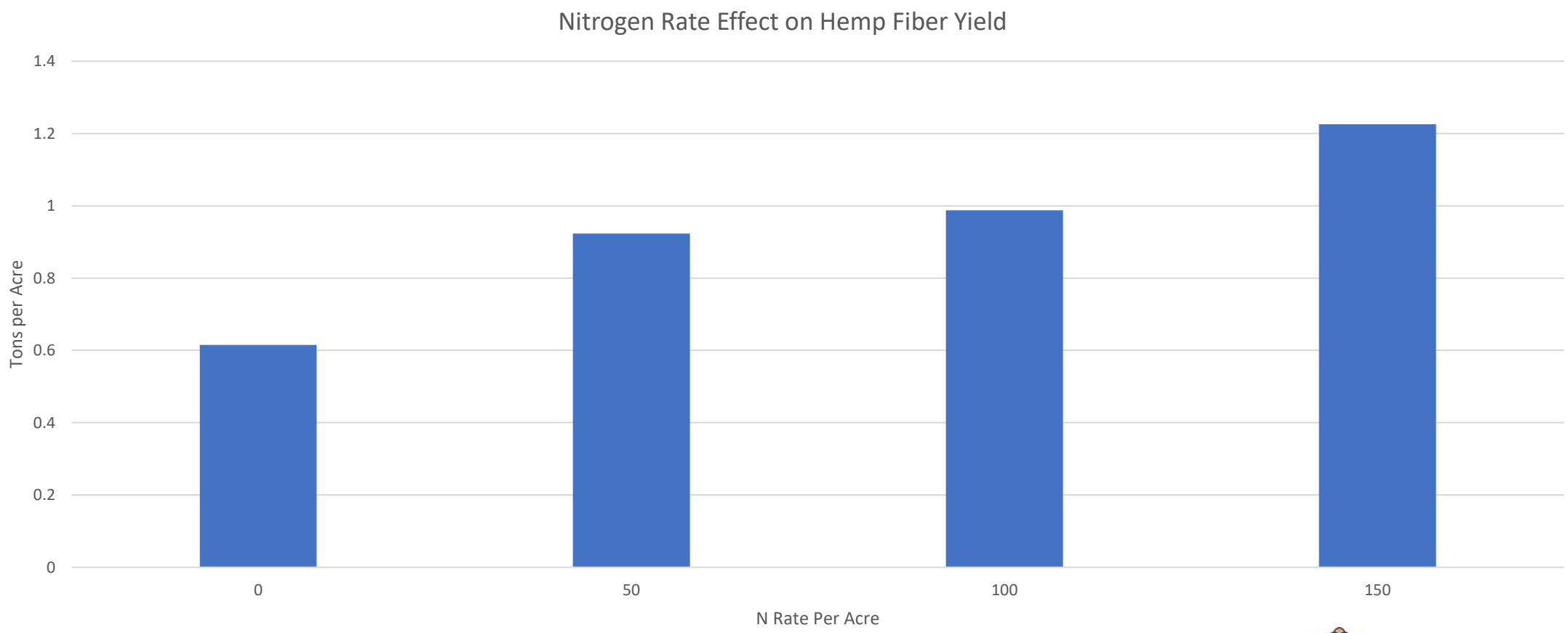
Nitrogen Trial

Nitrogen Rate Effect on Hemp Fiber Yield



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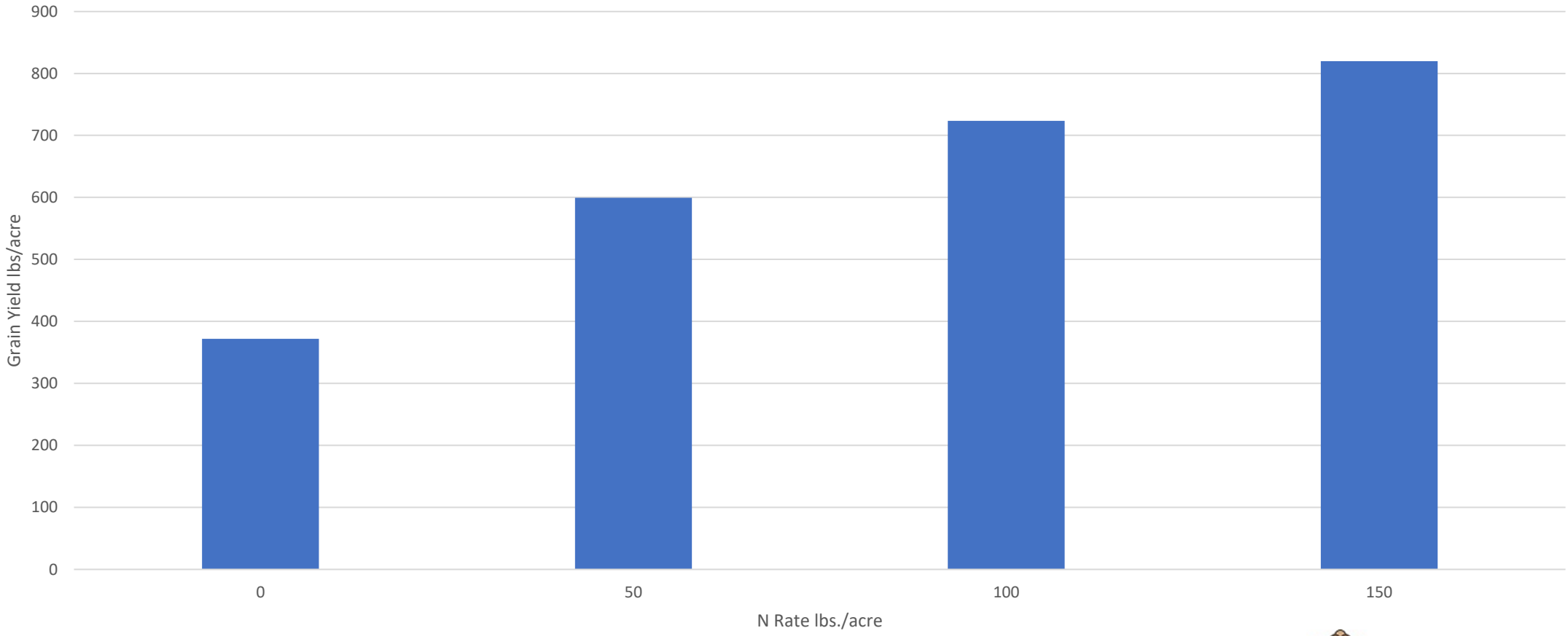
Nitrogen Rate Effect on Hemp Grain Yield



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Hemp as Forage Ingredient

- Popular cattle feed
- Short growing season
- Planned or emergency forage
- Generally harvested at flower

Locations

Chippewa

Buffalo

Ho Chunk Nation

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Preliminary data

- Three locations
  - Chippewa County
  - Buffalo County
  - Ho-Chunk Nation

2021

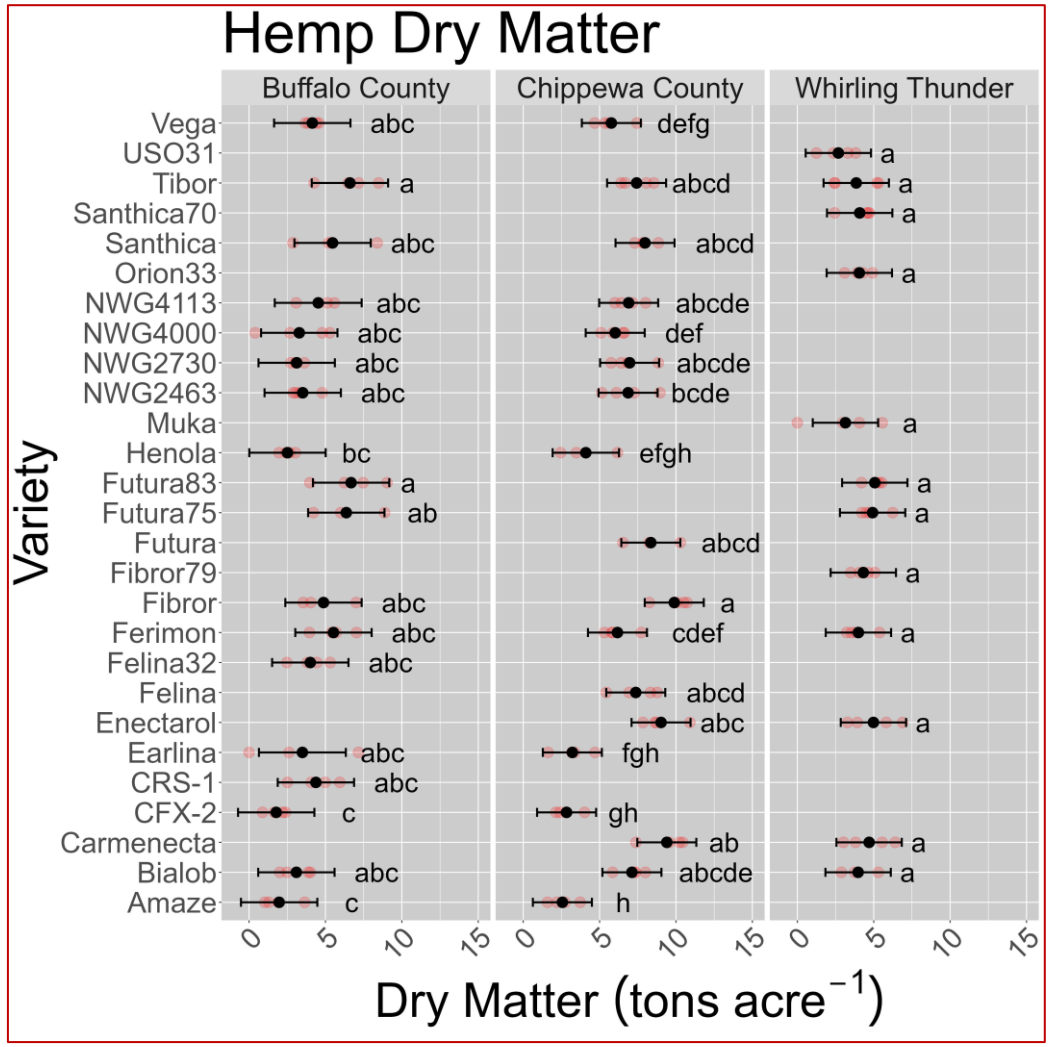
- One replication at each location
- Some varieties more mature than others

Variety	Height (inches)	% DM	DM/ acre (tons)	Crude Protein (%)	TDN (%)
Futura 75					
Buffalo	63	24.34	2.6	NA	NA
Chippewa	50	19.47	3.1	17.56	58.00
Monroe	88	20.20	4.9	20.25	58.81
Tiborszallasi					
Buffalo	80	21.25	3.5	NA	NA
Chippewa	65	21.11	3.8	18.45	60.04
Monroe	86	20.98	6.5	14.50	56.41
Secuieni Jubileu					
Buffalo	65	23.18	2.5	NA	NA
Chippewa	43	23.32	2.0	20.36	61.02
Monroe	92	21.68	2.4	15.70	56.85
Felina 32					
Buffalo	58	20.78	2.8	NA	NA
Chippewa	47	20.99	3.5	22.69	62.35
Monroe	72	21.73	4.0	15.80	55.66
Henola					
Buffalo	57	23.50	2.4	NA	NA
Chippewa	40	24.47	2.8	19.04	60.00
Monroe	78	20.49	1.8	15.10	54.64
Bialobrzeskie					
Buffalo	64	22.28	2.2	NA	NA
Chippewa	48	22.01	2.6	17.71	58.90
Monroe	77	22.06	4.1	17.20	56.76
Ferimon					
Buffalo	63	21.72	2.7	NA	NA
Chippewa	49	19.47	2.5	21.10	58.47
Monroe	72	22.67	3.9	12.2	55.23
Fibror 79					
Buffalo	77	19.33	2.1	NA	NA
Chippewa	45	16.58	2.1	19.67	57.43
Monroe	79	17.04	3.3	20.2	55.40

2022 Planting and Harvest Dates

Location	Planting Date	Forage Harvest Date	Days to Harvest
Buffalo	June 18	August 5	48
Chippewa	June 14	August 1	48
Whirling Thunder	June 21	August 2	42

2022 Forage Yield



- 27 varieties
- Drier soil conditions
- Three locations

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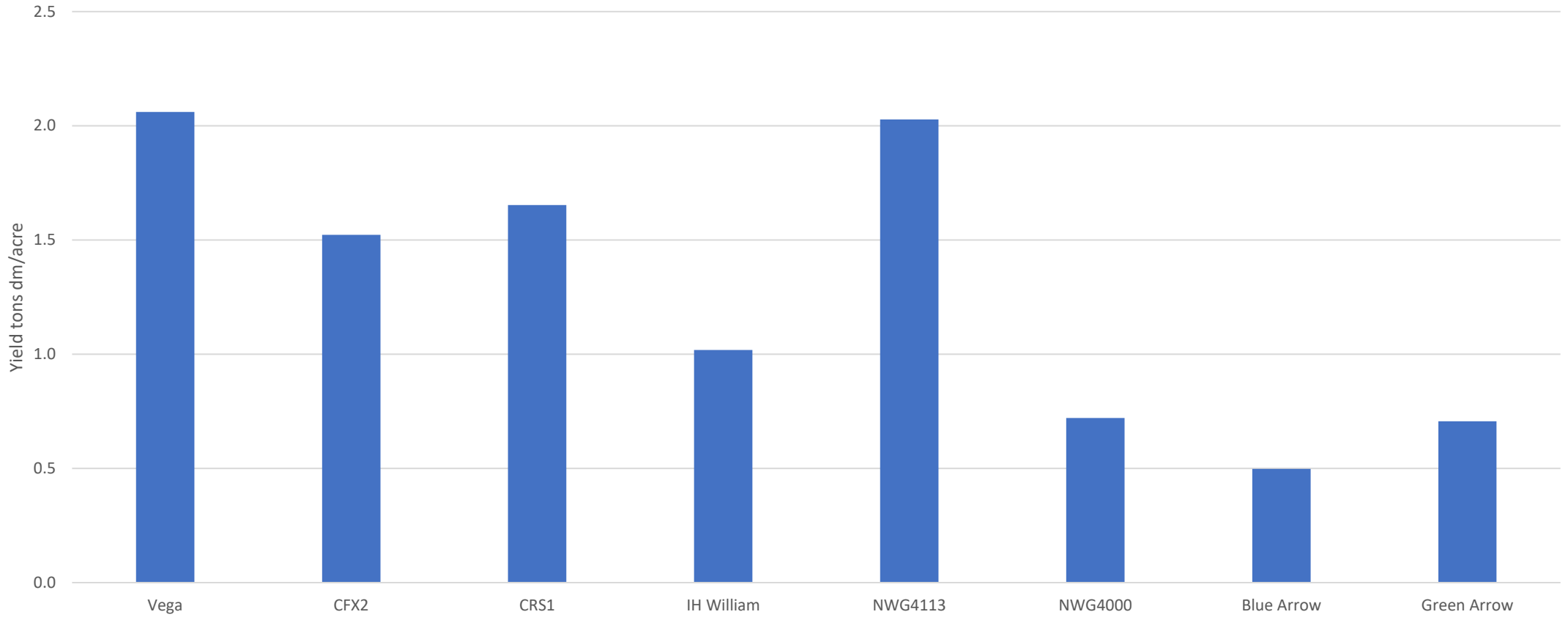
2022 Forage Quality

Variety	Yield Tons d.m./acre	Crude Protein %	ADF %	aNDFom %	NDFD30	TDN-ADF %	RFQ
Bialobrzeske							
Buffalo	2.7	12.4	48.2	50.3	45.6	51.3	110
Chippewa	1.2	11.3	45.6	50.2	44.9	53.4	109
Wh. Thunder	1.7	14.9	46.7	50.3	51.9	52.5	122
Carmenecta							
Chippewa	1.3	15.1	43.3	47.9	40.3	55.2	108
Wh. Thunder	1.7	17.7	38.7	41.5	46.5	58.8	139
CRS-1							
Buffalo	3.0	11.2	48.2	51.8	43.19	51.4	95
Earlina 8FC							
Buffalo	3.0	12.2	48.7	51.0	41.9	50.9	87
Chippewa	1.1	17.7	30.1	33.1	40.1	65.4	178
Enectarol							
Chippewa	1.2	14.1	42.2	48.6	42.3	56.0	109
Wh. Thunder	2.0	13.8	39.6	45.0	48.4	58.1	131
Felina 32							
Buffalo	3.5	14.8	47.6	51.2	44.7	51.9	105
Chippewa	0.9	12.5	38.7	45.4	43.2	58.8	122
Wh. Thunder	1.4	14.9	47.0	49.0	51.2	52.3	125
Ferimon							
Buffalo	2.7	9.9	52.0	53.8	42.5	48.4	95
Chippewa	1.1	9.6	44.3	49.5	42.3	54.4	107
Wh. Thunder	1.7	12.2	47.6	53.7	46.6	51.8	104
Fibror 79							
Buffalo	2.1	14.6	49.2	49.9	46.9	50.6	112
Chippewa	0.8	14.3	44.7	49.3	45.5	54.1	113
Wh. Thunder	1.0	14.8	44.1	47.9	48.3	54.6	123
Futura 75							
Buffalo	4.7	10.3	51.9	56.5	45.2	48.5	91
Chippewa	1.2	11.1	43.1	48.9	38.7	55.4	101
Wh. Thunder	1.5	18.4	42.2	45.6	51.1	56.0	135
Futura 83							
Buffalo	4.6	18.4	42.4	45.7	45.3	55.9	120
Wh. Thunder	2.1	22.6	37.6	37.6	57.7	59.6	183
Henola							
Buffalo	2.1	12.0	46.5	49.2	45.9	52.7	110
Chippewa	0.4	16.0	30.3	35.2	46.4	65.3	179

Variety	Yield Tons d.m./acre	Crude Protein %	ADF %	aNDFom %	NDFD30	TDN- ADF %	RFQ
Henola							
Buffalo	2.1	12.0	46.5	49.2	45.9	52.7	110
Chippewa	0.4	16.0	30.3	35.2	46.4	65.3	179
NWG2463							
Buffalo	2.5	11.3	46.4	47.7	30.8	52.7	83
Chippewa	1.2	12.7	41.5	47.1	49.7	56.6	135
NWG2730							
Buffalo	2.9	11.0	48.0	50.6	13.1	51.5	47
Chippewa	0.9	16.5	40.1	45.2	37.8	57.7	114
NWG4000							
Buffalo	2.8	15.8	46.2	48.3	24.6	52.9	73
Chippewa	1.0	11.8	39.7	44.2	31.8	58.0	108
NWG4113							
Buffalo	4.7	18.5	43.7	50.5	42.0	54.9	104
Chippewa	1.0	12.2	34.4	44.2	39.3	58.9	120
Orion 33							
Wh. Thunder	1.1	22.9	36.4	36.6	52.0	60.6	175
Santhica 70							
Buffalo	2.7	14.0	50.9	54.1	41.6	49.2	86
Wh. Thunder	1.3	13.8	50.7	54.9	49.0	49.4	102
Tiborszallasi							
Buffalo	3.1	13.0	51.6	55.4	40.3	48.7	84
Chippewa	1.0	14.8	43.3	47.3	42.0	55.2	115
Wh. Thunder	1.3	17.9	42.5	46.1	47.3	55.1	125
USO 31							
Wh. Thunder	1.2	17.9	42.5	43.6	48.0	55.8	135
Vega							
Buffalo	2.1	10.9	49.1	50.9	43.5	50.6	101
Chippewa	1.0	12.2	34.4	38.6	25.5	62.1	114

2023 Chippewa County Hemp Forage Yield



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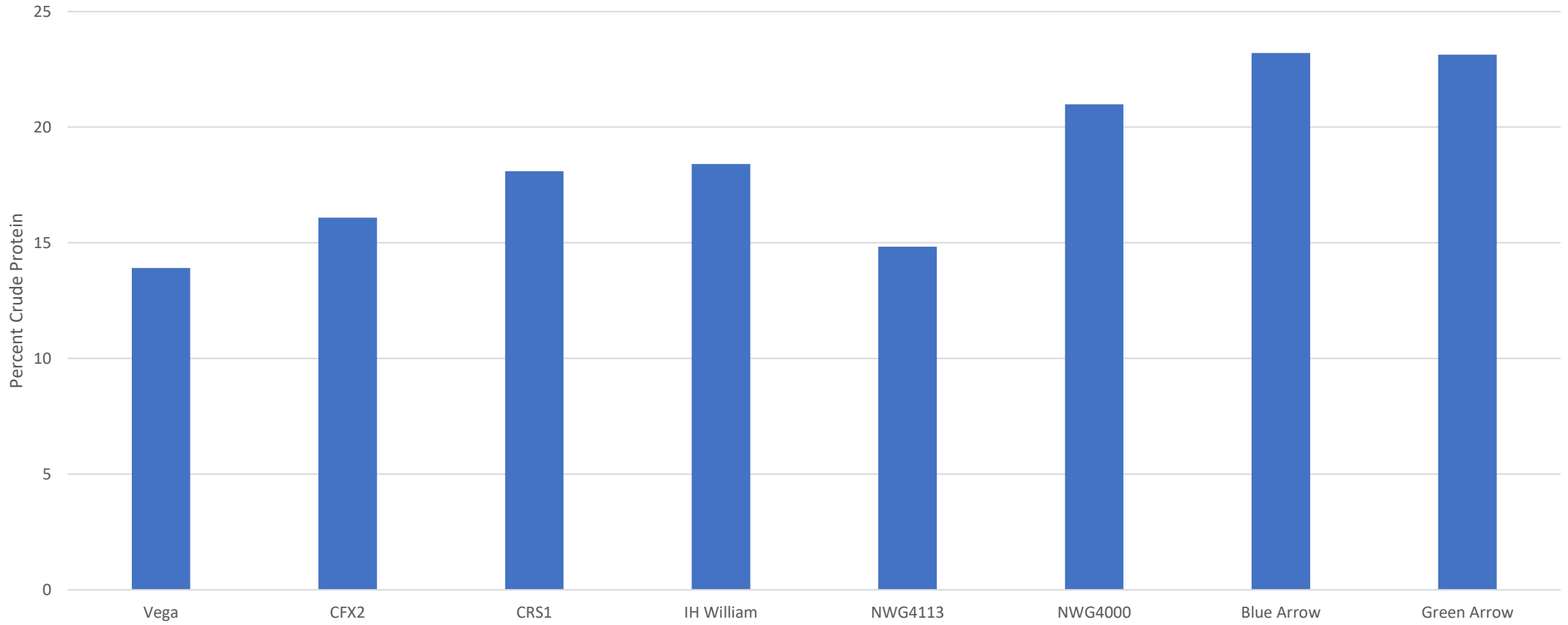
2023 Chippewa County Hemp Forage Crude Protein Content



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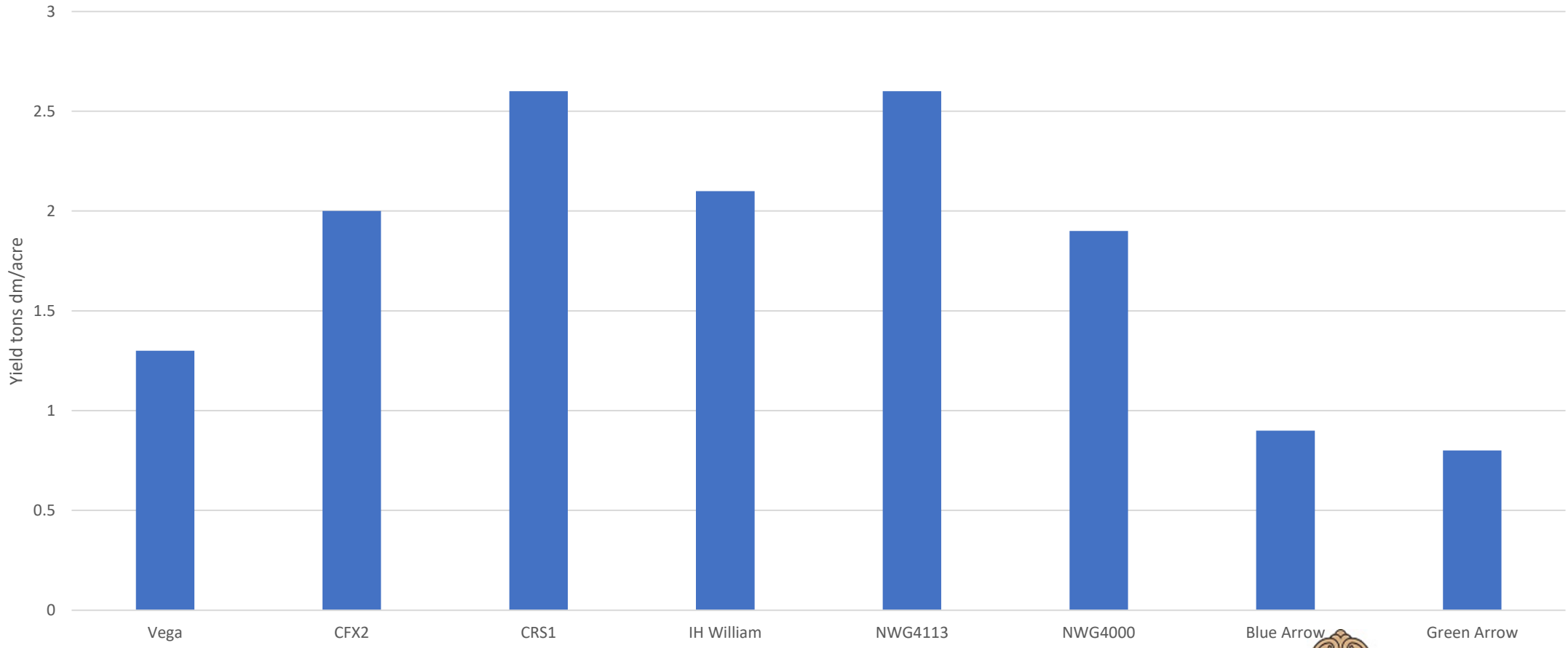
2023 Buffalo County Hemp Forage Yield



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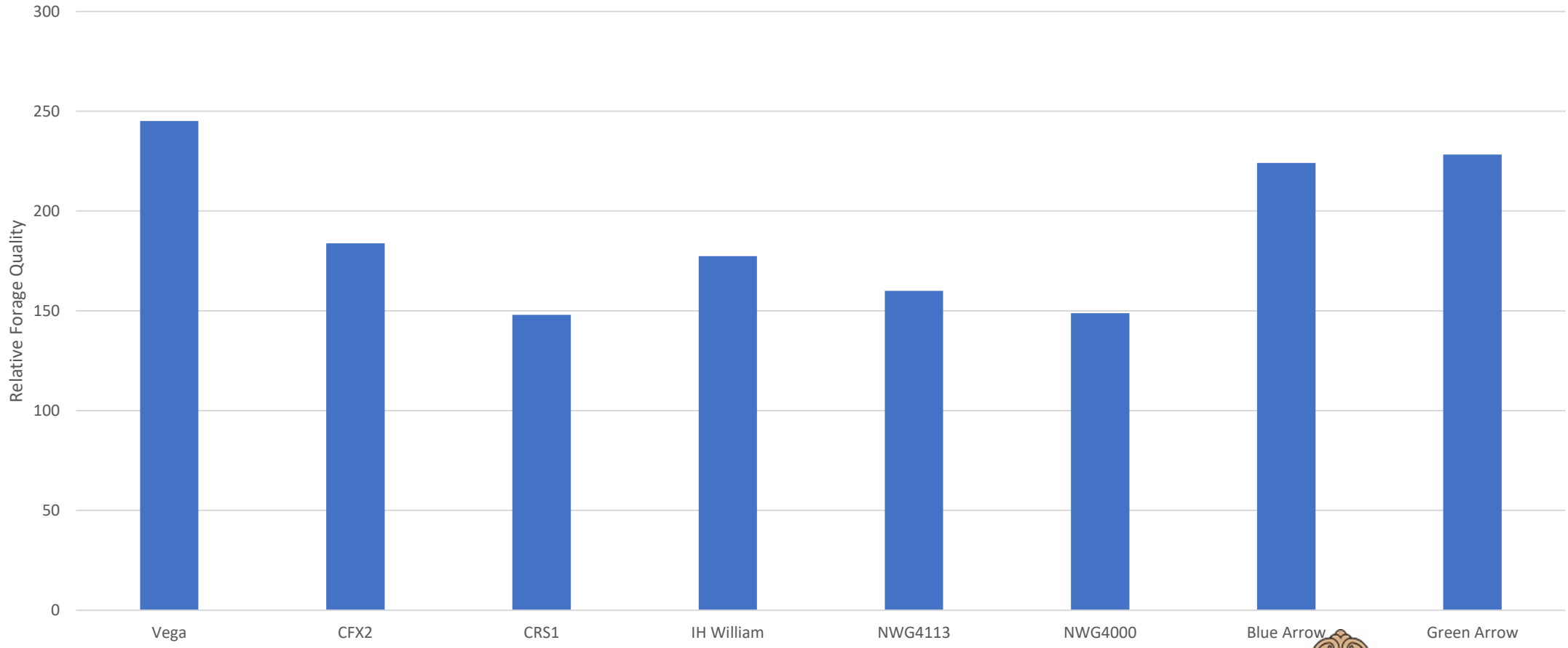
2023 Buffalo County Hemp Variety Forage Quality



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Enterprise Budget Estimate (Fiber)

Expenses	Conventional	Organic
Fertilizer	$101.90	$339.25
Seed	$220.00	$220.00
Pesticides	$6.00	$0.00
Other (land rent, soil testing, permit, etc.)	$159.45	$159.45
Total Production Costs	**$437.35**	**$718.70**
Field Preparation and Planting	$45.00	$78.00
Harvest	$162.25	$162.25
Storage and Hauling	$32.50	$32.50
Total Costs (no return to management)	**$677.10**	**$991.45**
Breakeven Cost Per Ton (based on 5 ton per acre yield)	**$135.42**	**$198.29**

Opportunities

- Grows well in Wisconsin
- All types
  - Grain, Fiber, Essential oil
- Pollinator friendly
- Forage potential
- Fast growing
  - Early soil cover
  - Early fiber harvest
  - Cover crop friendly

Challenges

- Market for fiber
- Seed oil market
- Essential oil
  - Market flooded in 2020
- Forage
  - Needs to be legal

- Keeping THC below 0.03%
  - Varieties
  - Late harvest
  - Weather

If above 0.03% THC…….

Support and Sponsors

North Central Region Sustainable Agriculture and Research Education Partnership Grant

- Triple T Farms
- Ho-chunk Nation
- Joe Bragger
- Chippewa and Buffalo Counties

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Questions?

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Chippewa, Dunn, Eau Claire

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