February 16, 2021 Advisory Board Meeting
NDSU-Hettinger Research Extension Center
Agronomy Update – John Rickertsen
2020 Research Projects

Variety/Hybrid Performance Trials:
Twenty one yield trials were conducted on the following crops. (average yield)

Winter Wheat (poor stand)	*Field Pea (27 bu)*	*Canola (shatter, wind)*	*Corn (54 bu)*
Spring Wheat (24 bu)	*Chickpea (540 lb)*	*Juncea (shatter, wind)*	*Hemp (birds)*
Durum Wheat (22 bu)	*Lentil (1690 lb)*	*Safflower (2093 lb)*	
Barley (42 bu)	*Dry Beans (1063 lb)*	*Sunflower (1800 lb)*	
Oats (47 bu)	*Soybean (21 bu)*	*Flax (16 bu)*	

2020 NDSU variety releases: "ND Frohberg" spring wheat, "ND Heart" oat, "ND Dickey" conventional soybean, "ND Crown" kabuli chickpea, "ND Dawn" field pea. I am currently serving on the NDSU Variety Release Committee as the western REC representative.

Off Station Yield Trials:
Trials were located at Scranton, Regent and Mandan with HRSW, durum, barley and soybean variety trials. These trials are located with farmer cooperators and with the USDA-ARS Northern Great Plains Lab at Mandan.

Plant Breeding Nurseries:
Nurseries were planted for the following breeding programs.

Program	# of nurseries
NDSU Spring Wheat	12
NDSU Winter Wheat	1
NDSU Field Pea	1
NDSU Lentil	1
NDSU Canola	1
NDSU Flax	1
NDSU RR1 Soybean	1
Syngenta Spring Wheat	1
Regional Spring Wheat	1
Regional Barley	1

Soybean Row Spacing and Population:
A study was initiated at Hettinger, ND in 2018 with nine seeding rates, 20,000 to 180,000 in 20,000 increments in both drilled (7") and row (30") configuration. In 2020, we switched to the RR1 variety ND17009GT from Proseed 30-20 used the previous two years. The results showed that seeding rates of 100,000 – 180,000 were not significantly different in yield and even the extremely low rate of 20,000 yielded 65% of the 100,000 - 180,000 seeding rates. For seed protein and oil content, as seeding rate increased, oil content decreased and protein increased. At the very lowest populations, seed size increased and test weight decreased, but there was no significant difference in the 100,000 to 180,000 rates for seed size and no significant difference in 40,000 to 180,000 rates for test weight. In 2018 and 2020, there was no difference in yield between 7" and 30" rows, while in 2019, 7" rows yielded 5.5 Bu/Acre higher than 30" rows. Over the past three years the 120,000 seeds/acre rate has been the optimal seeding rate for southwest North Dakota.

Lentil Agronomy Studies, Building a Better Lentil from the Ground Up.
A multistate study looking at lentil fertility, seed treatments and variety impact on root rot on lentil started in 2019. Fertility trial with combinations of inoculant, sulfur and potassium; seed treatment trial with ten seed

treatments and a variety trial to compare variety reaction to root rot. Both the variety trial and seed treatment trial are inoculated with *Fusarium spp.*

Management of Fusarium Root Rot of Field Peas and Wheat with Crop Rotation:
Crop rotation, combined with early planting, was an effective tool for root rot management in field peas in Carrington. When planted with a fungicide seed treatment, peas yielded 48-49 bu/ac when grown once every 6 years, 37 to 41 bu/ac when grown once every 4 years, and 39-40 bu/ac when grown every 3 years, and 28-39 bu/ac when grown every 2 years. The use of a fungicide seed treatment package targeting Pythium, Rhizoctonia and Fusarium increased yield by 4.9 to 5.4 bu/ac in 2020, and the addition of active ingredients targeting Rhizoctonia and Fusarium to a base seed treatment targeting Pythium increased yield by 0.8 to 4.0 bu/ac in 2018. The addition of Intego Solo (targeting Aphanomyces) had a variable impact on yield.

Crop rotation was also an effective tool for reducing root rot severity in field peas in Hettinger. By 2020, the seventh year of this study, significant differences in root rot severity were observed across rotational treatments, with root rot severity decreasing with increased crop rotation interval, but root rot severity was not yet a yield-limiting constraint.

		HETTINGER, ND (2018) field with no field pea production prior to 2014			CARRINGTON, ND (2018) field with a long history of field pea production		
		PLANT POPULATION 4-5 nodes	ROOT ROT SEVERITY early bloom	YIELD	PLANT POPULATION 6 nodes	ROOT ROT SEVERITY 10 nodes	YIELD
		UNTREATED SEED			AVERAGE RESULTS, TREATED & UNTREATED SEED		
Crop rotation	Years peas planted	plants/ac	%	bu/ac	plants/ac	%	bu/ac
2-YEAR ROTATION: WHEAT / FIELD PEA	2014, 2016, 2018	143,264 a*	2 a*	32 a*	223,076 ab*	53 b*	28 b**
4-YEAR ROTATION: WHEAT / WHEAT / WHEAT / FIELD PEA	2014, 2018	141,715 a	1 a	36 a	240,209 a	44 ab	37 ab
4-YEAR ROTATION: WHEAT / CANOLA / WHEAT / FIELD PEA	2014, 2018	143,070 a	2 a	32 a	219,901 b	39 a	38 a
4-YEAR ROTATION: WHEAT / FLAX / WHEAT / FIELD PEA	2014, 2018	148,878 a	2 a	33 a	222,930 ab	44 ab	NO DATA
	CV:	9.1	30.3	10.7	9.3	12.6	25.1

		HETTINGER, ND (2020) field with no field pea production prior to 2014			CARRINGTON, ND (2020) field with a long history of field pea production		
		PLANT POPULATION	ROOT ROT SEVERITY early pod-fill	YIELD	PLANT POPULATION 3-5 nodes	ROOT ROT SEVERITY 4-7 nodes	YIELD
		UNTREATED SEED			AVERAGE RESULTS, TREATED & UNTREATED SEED		
Crop rotation	Years peas planted	plants/ac	%	bu/ac	plants/ac	%	bu/ac
2-YEAR ROTATION: WHEAT / FIELD PEA	2014, 2016, 2018, 2020	354,481 a*	36 c*	31 b*	193,503 a*	26 b*	36 b*
3-YEAR ROTATION: WHEAT / WHEAT / FIELD PEA	2014, 2017, 2020	328,348 a	27 b	34 a	196,504 a	19 b	38 ab
6-YEAR ROTATION: WHEAT / BARLEY CANOLA / WHEAT / CORN / FIELD PEA	2014, 2020	319,286 a	20 a	32 ab	192,051 a	8 a	47 a
	CV:	13.6	14.6	7.6	8.0	18.0	5.0

* Within-column means followed by different letters are significantly different ($P < 0.05$; Tukey multiple comparison procedure).

** Within-column means followed by different letters are significantly different ($P < 0.10$; Tukey multiple comparison procedure).

Other Agronomy Studies:
HRSW seed treatment.

New Research for 2021:
Chickpea planting date, funded by Northern Pulse Growers.
Fungicide trials applied at flowering on spring wheat and durum wheat for scab control.
Off station advanced yield trials for the white wheat breeding project.

Project updates:

- New John Deere 5090R to work with new plot drill was delivered in August, new drill was used to plant winter wheat trials in fall 2020. With installation of RTK GPS base station, everything for new plot drill will be in place. $215,600 total investment.
- New tractor and plot drill owned by spring wheat breeding project, that is housed at HREC for use on spring wheat breeding nurseries.
- Purchased elevator quality moisture tester (Dickey-john GAC 2500-UGMA) to better calibrate combine weigh systems.

Presentations and Outreach:

- County Crop Improvement meetings at New Englund and Taylor. February 2020.
- Western Crop & Pest School, virtual. March 2020.
- Hettinger REC Crop Tour. July 2020.
- SW North Dakota virtual crop tour. July 2020
- Variety plot tours at Scranton & Regent. July 2020.

Grants:

- Development of hard white specialty spring wheat breeding program, Ardent Mills. $36,250.
- Evaluation of spring wheat at Hettinger and Rugby, Syngenta Crop Protection. $9,879.
- Building a better lentil from the ground up, USDA-SCRI (3 year grant). $37,948.
- Pulse crops breeding, Northern Pulse Growers. $1,000
- North Dakota flax variety trials, Ameriflax. $1,250.
- Juncea variety evaluation, BASF. $4,130.
- Evaluation of Fungicide Seed Treatments, ND Wheat Commission. $3,200.
- Management of root rots of field peas with crop rotation, Northern Pulse Growers. $5,890.
- Public Variety Trial entry fees. $30,000.

Hettinger REC summer crop tour will be on July 13, 2021