



2020 Wheat Variety Update

Small Grains Update

Jim Anderson/Jochum Wiersma

Hindsight

20/20 or the rear end of a cow ?

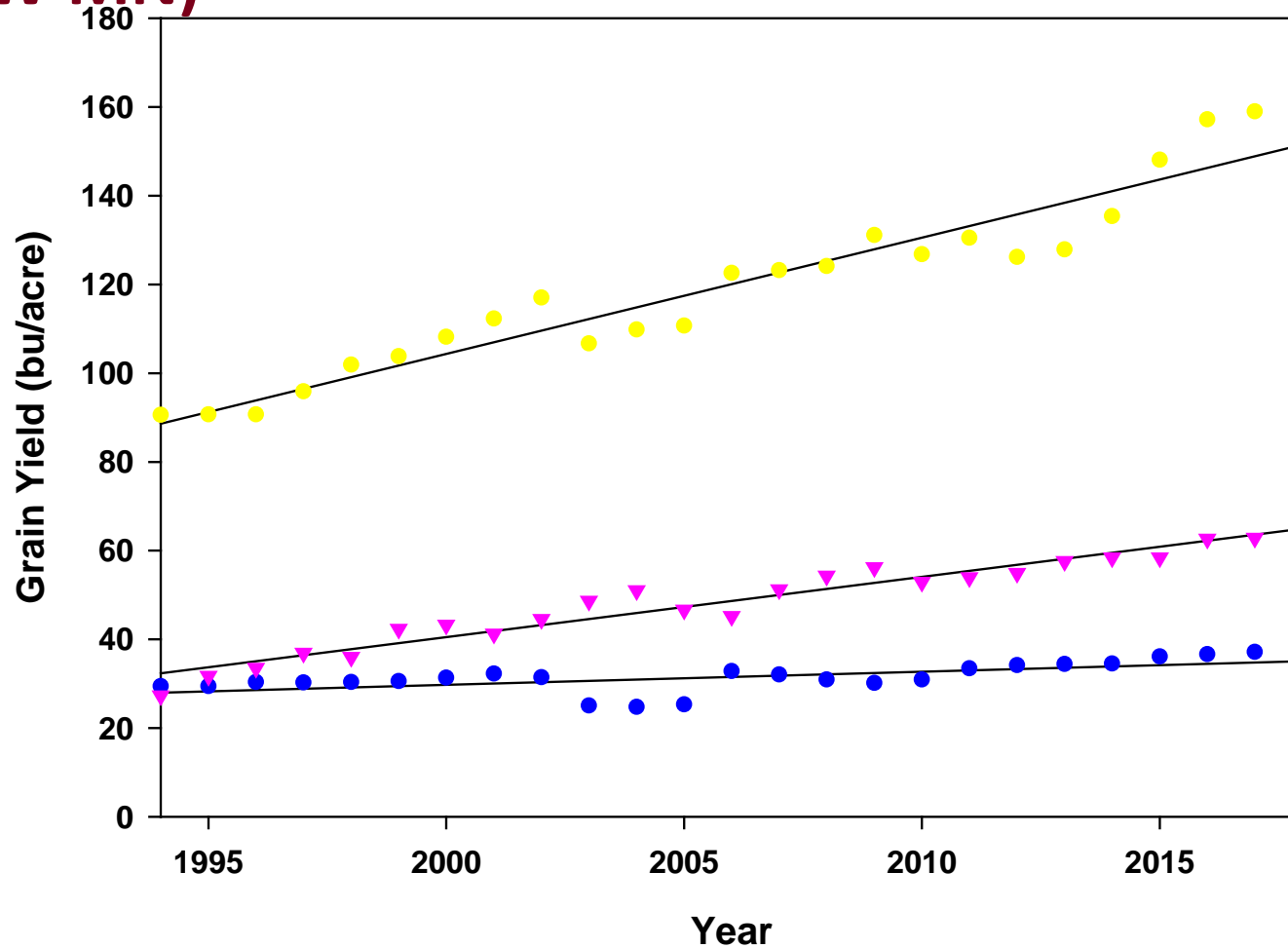
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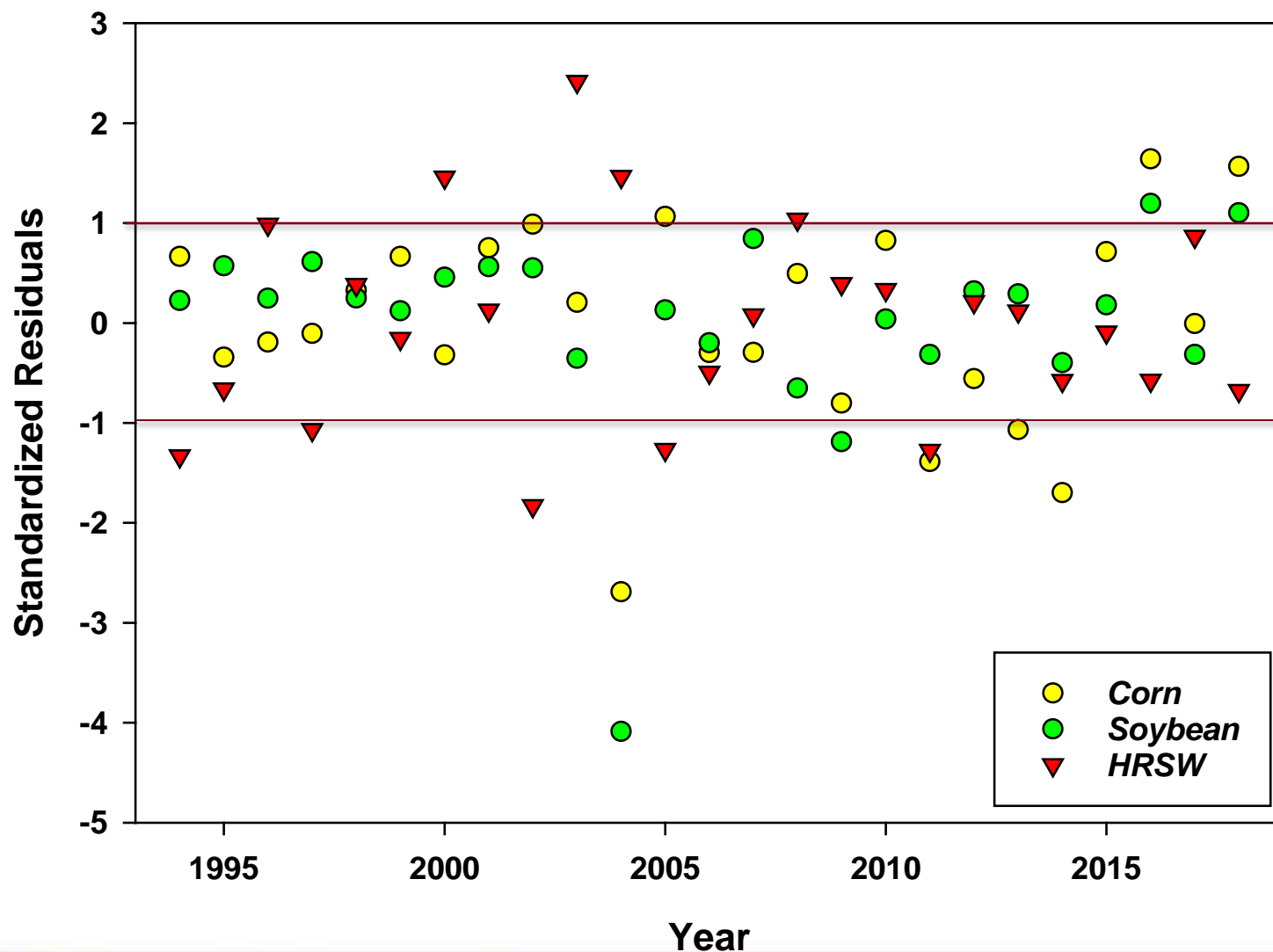
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YIELD OVER TIME

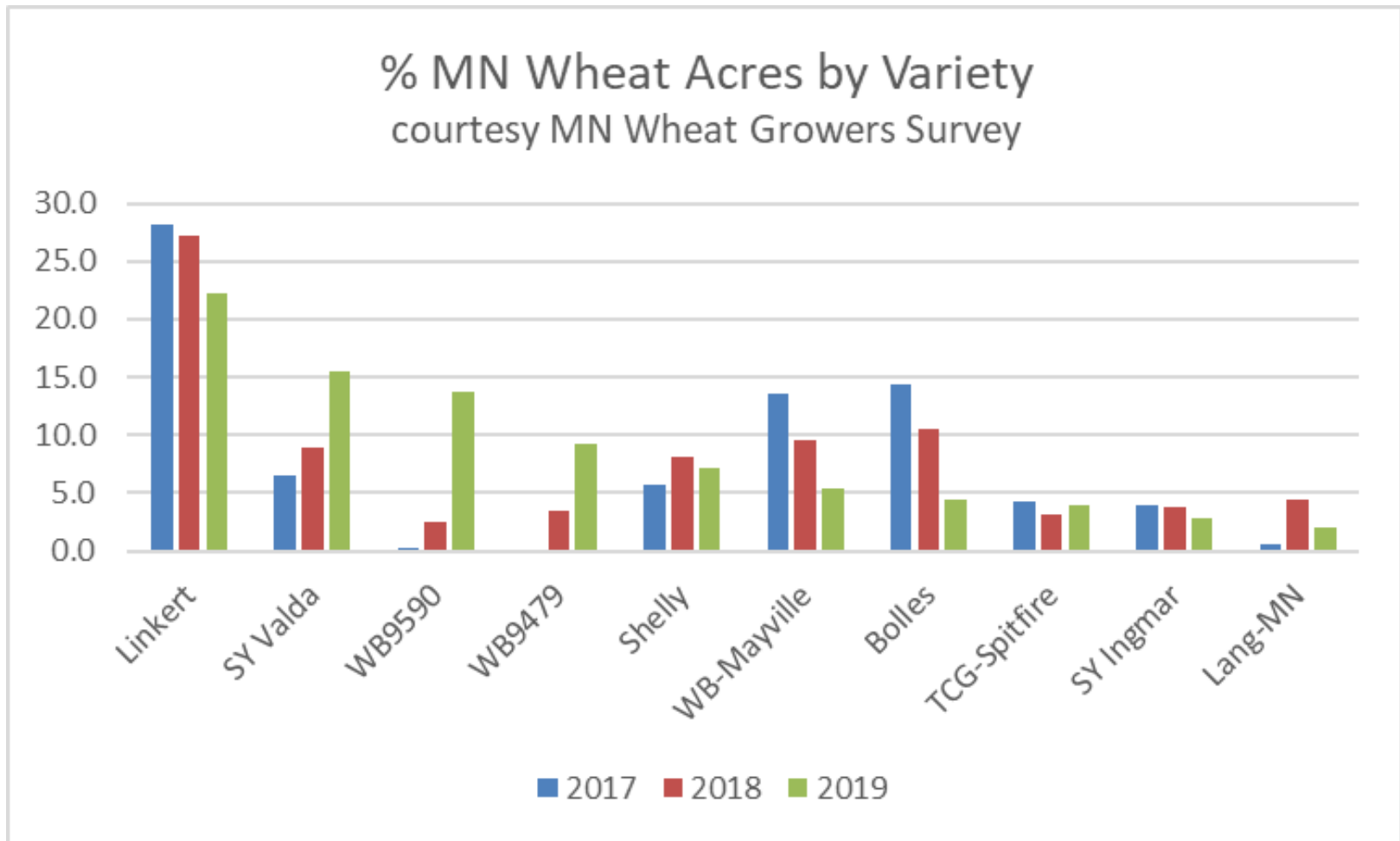
(NW MN)



BUT IS HRSW MORE VARIABLE?



HRSW VARIETY SURVEY



The Data

RECENT U OF M RELEASES

Variety	Year of Release	2019 MN Acreage (%)
Linkert	2013	22.3
Bolles	2015	4.4
Shelly	2016	7.1
Lang-MN	2017	1.9
MN-Washburn	2019	0.3

THE NEWEST STUFF (2019)

Variety	Origin	Legal Status
CP3910	CROPLAN by WinField	Patent pending
CP3915	CROPLAN by WinField	Patent pending
CP3939	CROPLAN by WinField	Patent pending
Dyna-Gro Commander	Dyna-Gro	PVP (94) (pending)
Dyna-Gro Velocity	Dyna-Gro	PVP (94) (pending)
MN-Washburn	MN	PVP (94) (pending)
SY 611 CL2	AgriPro/Syngenta	PVP (94) (pending)
SY Longmire	AgriPro/Syngenta	PVP (94) (pending)
SY McCloud	AgriPro/Syngenta	PVP (94) (pending)
TCG-Heartland	21st Century Genetics	Patent pending

THE LONG(ER) VIEW

If it's wasn't for a record wet fall, sprout damage, and Hagberg falling numbers we would now only be talking Bacterial leaf streak, Fusarium head blight (scab) and deoxynivalenol (vomitoxin)

Lang-MN	3	Dyna-Gro Ballistic	4–5
ND-VitPro	3	SY McCloud	4–5
Rollag	3	CP3910	4–6
LCS Trigger	3–4	CP3915	4–6
SY 611 CL2	3–4	Dyna-Gro Commander	4–6
Bolles	4	LCS Cannon	4–6
Boost	4	LCS Breakaway	5
CP3530	4	Linkert	5
Dyna-Gro Ambush	4	MS Chevelle	5
LCS Rebel	4	TCG-Spitfire	5
MN-Washburn	4	CP3888	5–6
Prosper	4	Dyna-Gro Velocity	5–6
Shelly	4	MS Barracuda	5–6
Surpass	4	TCG-Heartland	5–6
SY Ingmar	4	Dyna-Gro Caliber	7
SY Valda	4	MS Camaro	7
TCG-Climax	4	SY Longmire	7–8
CP3939	4–5	WB-Mayville	8

FHB

- Best fungicides (Caramba & Prosaro) are reducing damage by ~70%; Miravis Ace is new
- Optimum timing is still Feekes 10.51 (beginning of anthesis) but window has been opened up to F10.51 + 5 days)



BLS

- No control options
- Varieties rated 2-3 have shown minimal damage, but there is variation due to environment



Boost	2	CP3939	4-5
LCS Trigger	2	Bolles	5
CP3915	2-3	Dyna-Gro Ambush	5
SY Longmire	2-4	Linkert	5
Dyna-Gro Ballistic	3	SY McCloud	5
Lang-MN	3	CP3888	5-6
LCS Rebel	3	TCG-Heartland	5-6
MN-Washburn	3	LCS Breakaway	6
ND-VitPro	3	LCS Cannon	6
Surpass	3	MS Chevelle	6
SY Ingmar	3	Shelly	6
SY Valda	3	TCG-Climax	6
TCG-Spitfire	3	MS Barracuda	7
CP3530	4	MS Camaro	7
Dyna-Gro Caliber	4	Rollag	7
Dyna-Gro Commander	4	WB-Mayville	7
Prosper	4	CP3910	6-7
SY 611 CL2	4	Dyna-Gro Velocity	6-7

2017-2019 Releases are **bolded**

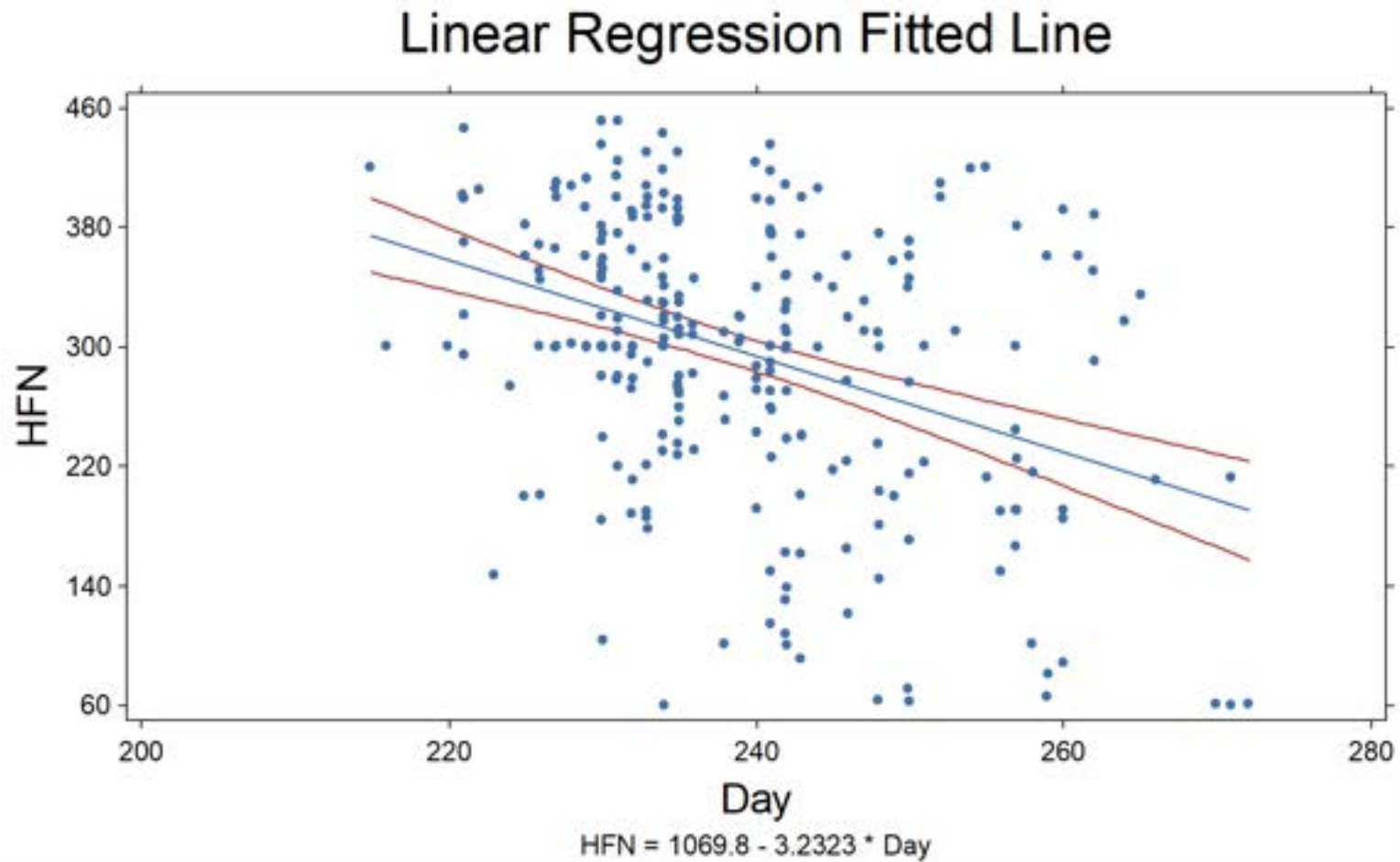
Bolles	1	CP3939	2*
CP3915	1	SY 611 CL2	2*
Dyna-Gro Commander	1	SY Longmire	2*
Lang-MN	1	SY McCloud	2*
Linkert	1	CP3910	3
MN-Washburn	1	LCS Cannon	3
ND-VitPro	1	MS Barracuda	3
Prosper	1	TCG-Climax	3
Shelly	1	WB-Mayville	3
Surpass	1	Dyna-Gro Ambush	3*
CP3530	2	Dyna-Gro Ballistic	3*
CP3888	2	Dyna-Gro Caliber	3*
Dyna-Gro Velocity	2	TCG-Spitfire	3*
LCS Breakaway	2	MS Chevelle	4
LCS Trigger	2	Boost	5
MS Camaro	2	LCS Rebel	5
Rollag	2		
SY Ingmar	2		
SY Valda	2		
TCG-Heartland	2		

PHS

- Many locations suffered damage due to PHS
- Ratings of 1-2 considered most resistant, 3 and higher more susceptible
- Susceptibility to PHS correlates with Low Falling Number

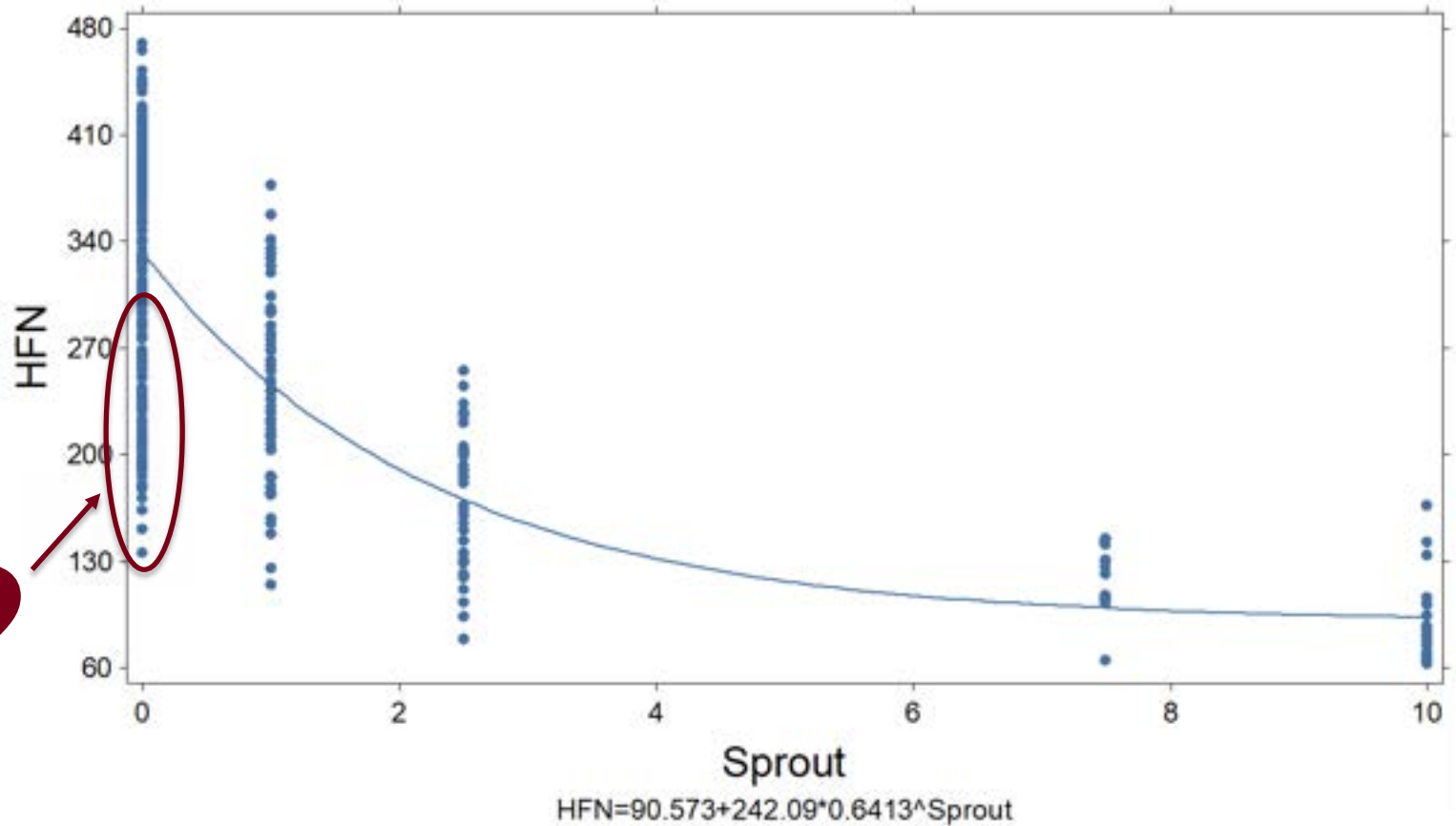
* These varieties had lower than expected falling numbers based on their rating.

HFN SURVEY RESULTS



SPROUT DAMAGE & HFN

Nonlinear Regression Fitted Curve

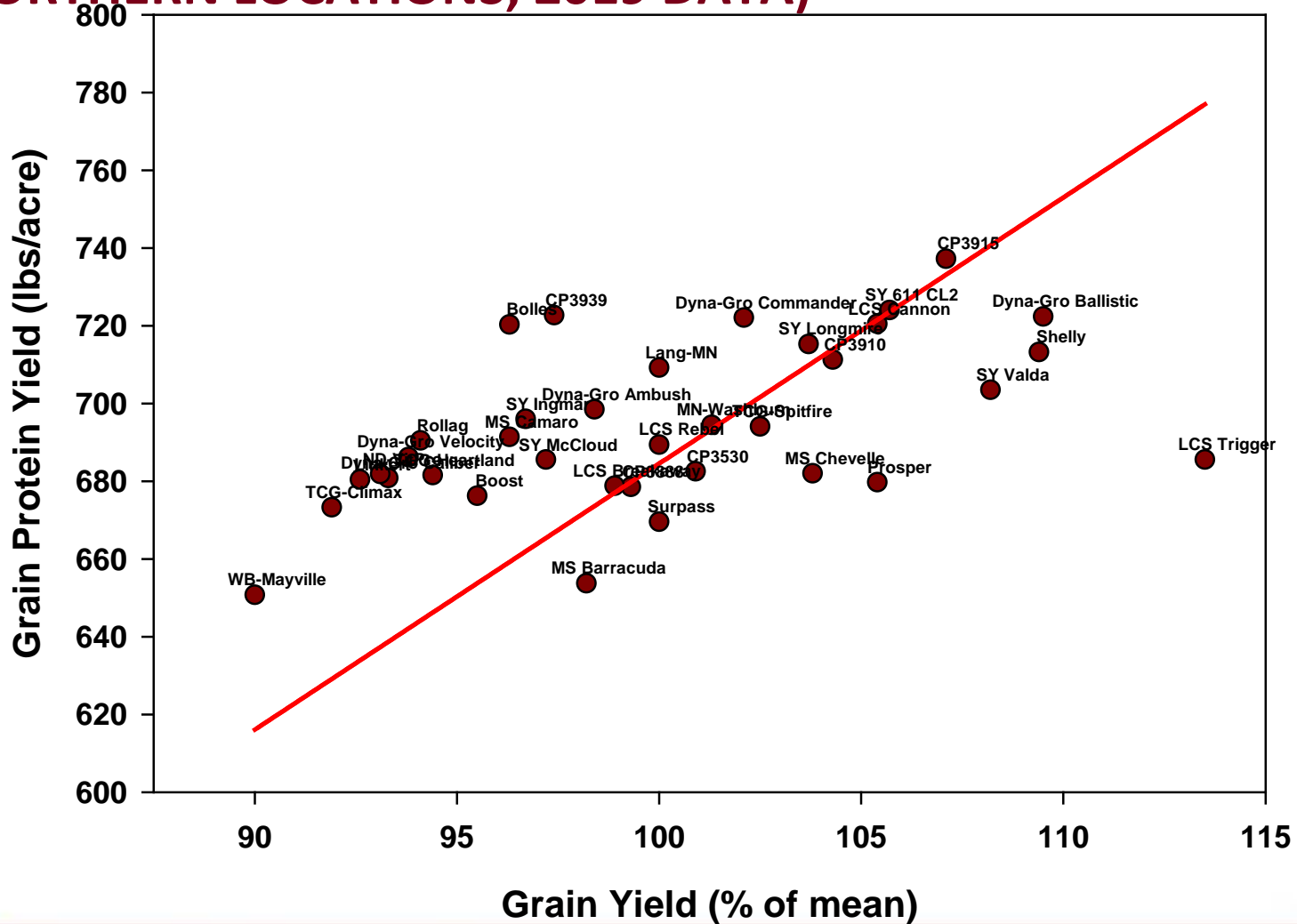


LATE MATURITY α -AMYLASE

- Synthesis of free α -amylase in aleurone layer during second half of grainfill period in specific varieties that is triggered by a cold snap ($T_{\min} < 50^{\circ}\text{F}$):
 - Grain with sound appearance
 - No starch damage
 - High α -amylase activity
 - Results in low to very low HFN

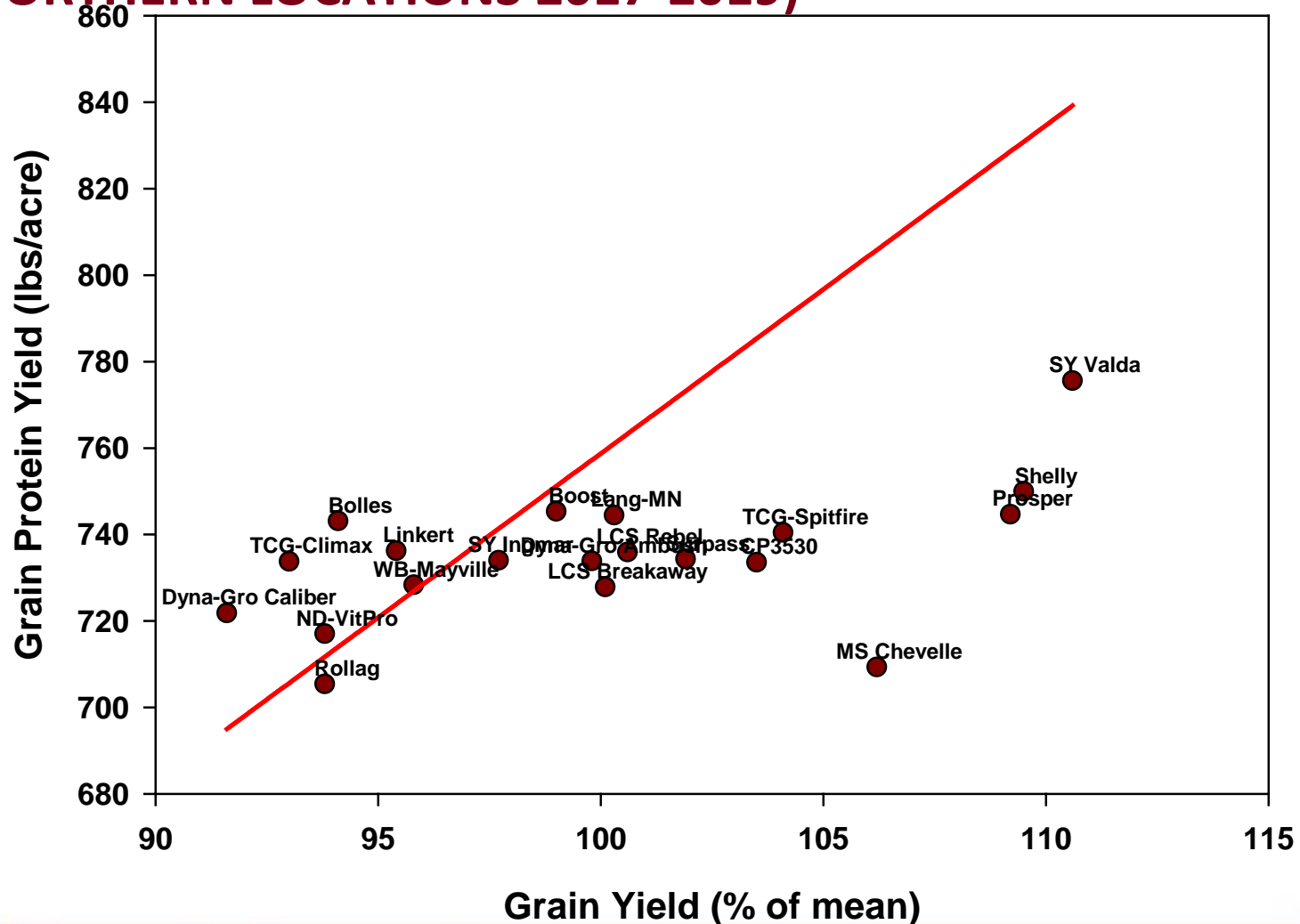
YIELD AND PROTEIN BIPLLOT

(NORTHERN LOCATIONS, 2019 DATA)



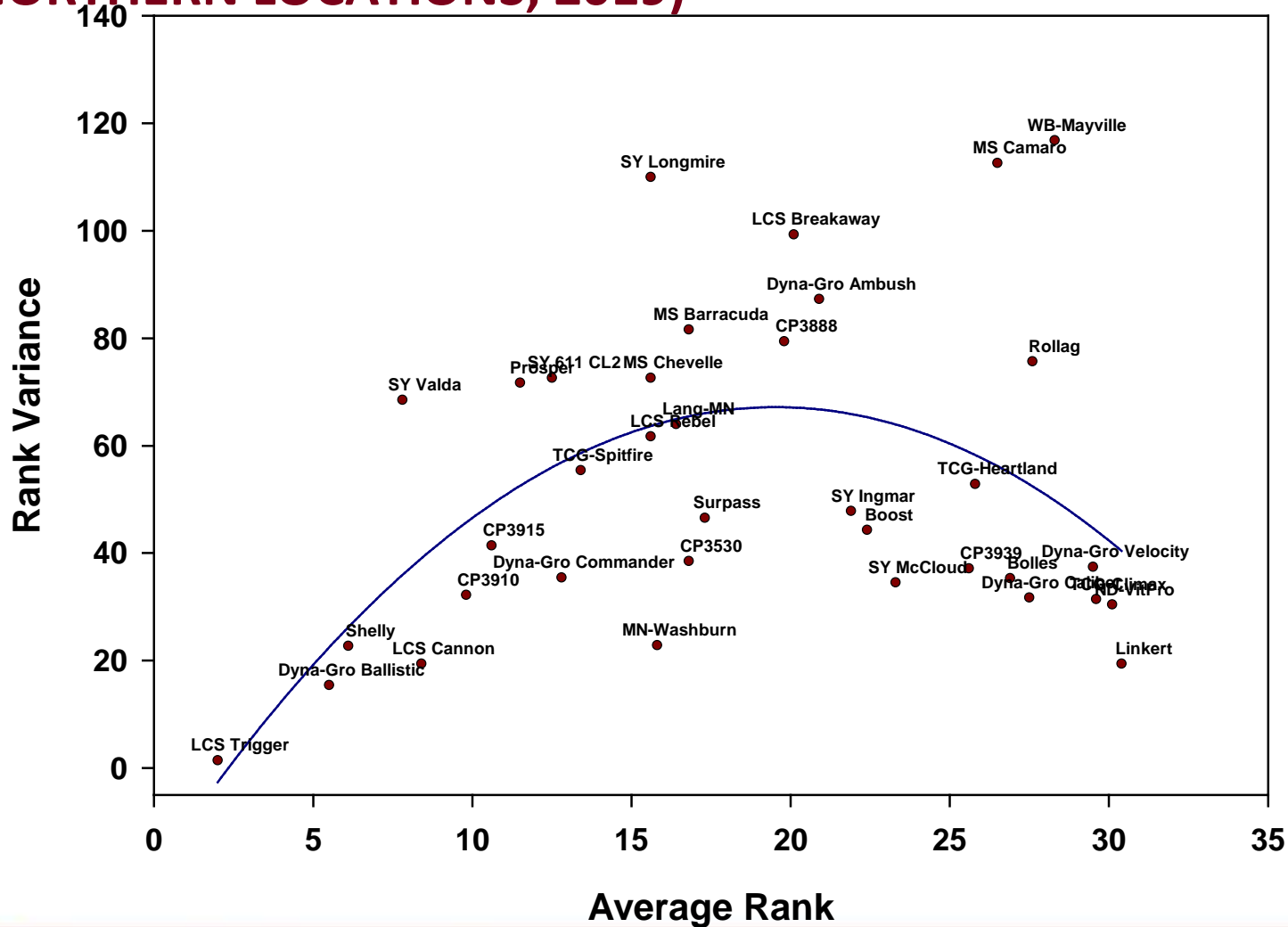
YIELD AND PROTEIN BIPLLOT

(NORTHERN LOCATIONS 2017-2019)



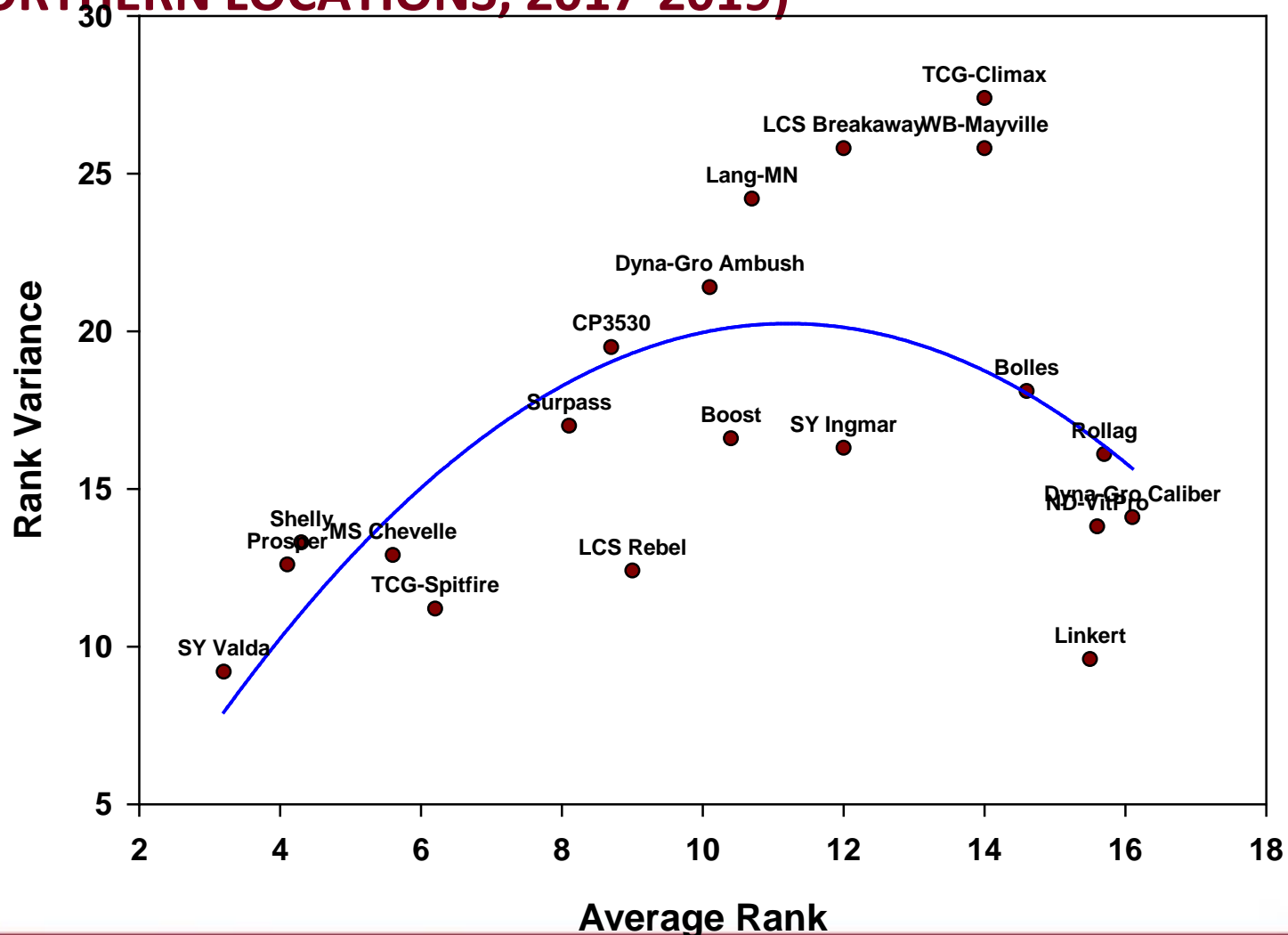
RANK STABILITY

(NORTHERN LOCATIONS, 2019)



RANK STABILITY

(NORTHERN LOCATIONS, 2017-2019)



The Bottomline

PHILOSOPHY

- I am a lousy meteorologist
- And all I know is that the markets will pay a premium for what I don't have

MIX & MATCH

FALSE SENSE OF SECURITY

(we too get lulled into complacency)

PICKS (2019)

VARIETY	PLUSES	MINUSES
Bolles	Protein	TWT
CP3530	Yield, Balanced	
Lang-MN (0.7x)	Balanced, FHB	
Linkert	Balanced, Strong	FHB (5)
Shelly	Yield	Protein
MN-Washburn	Strong	Protein
SY Ingmar	Balanced, BLS	
SY Valda	Yield, BLS	Protein, Quality

MN14105-7

- MN14105-7 (Sabin/01S0377-6//Linkert) has shown high yields, especially in southern MN along with medium protein levels. Disease resistance is good, among the best for bacterial leaf streak (rate 3 on 1-9 scale) and moderately resistant to scab (4). Straw strength is moderate, better than Shelly and Lang-MN, but not as strong as MN-Washburn or Linkert.

Variety ¹	Release Yr.	% MN Acreage	Grain yield			HD d	HT in.	Straw	TWT	Prot.	Baking	PHS 1-9	Leaf	Stripe	Bact.	Scab 1-9
			% of mean	2019	2 Yr			3 Yr	Str.	lbs/bu	(%)		Qual.	Rust 1-9	Rust 1-9	
SY-Valda	2015	15.5	109	109	111	54.6	31.3	5	60.0	14.0	6	2	1	2	3	4
Prosper	2011	1.9	104	107	108	56.5	33.1	6	59.7	13.7	5	1	6	5	4	4
Shelly	2016	7.1	106	106	107	57.4	29.5	5	59.4	14.1	5	1	3	1	6	4
TCG-Spitfire	2016	3.9	107	106	107	57.9	31.3	3	58.7	13.9	2	3	5	–	3	5
MN14105-7	–	–	106	105	105	56.2	31.3	4	59.9	14.8	5	2	3	–	3	4
MN-Washburn	2019	0.3	101	100	103	56.8	30.0	3	59.8	14.0	3	1	1	2	3	4
Lang-MN	2018	1.9	102	102	101	57.3	32.7	5	60.6	14.8	3	1	1	1	3	3
SY Ingmar	2014	2.8	99	100	99	55.8	29.2	4	60.1	15.1	2	2	2	2	3	4
WB-Mayville	2011	5.4	97	96	98	52.7	28.0	3	59.8	15.4	2	3	3	3	7	8
Bolles	2015	4.4	96	94	95	57.8	32.3	4	59.2	16.1	1	1	2	1	5	4
Linkert	2013	22.3	93	92	95	55.2	28.5	2	59.9	15.4	1	1	3	1	5	5

Wheat Breeding Research Team

Dept. of Agronomy and Plant Genetics

Jim Anderson

Susan Reynolds

Nate Stuart

Yahya Rauf

Jennifer Flor

Brett Heim

Kayla Altendorf

Katherine Frels

Emily Conley

Cyrus Kimani Ndung'u

Prabin Bajgain

Max Fraser

ROCs/Sites:

Crookston

Jochum Wiersma

Houston Lindell

Joe Wodarek

Robert Bouvette

Mark Hanson

Morris

Curtis Reese

Roseau

Donn Vellekson

Dave Grafstrom

Lamberton

Steve Quiring

Waseca

Matt Bickell

Tom Hoverstad

Dept. of Plant Pathology

Ruth Dill-Macky

Brian Steffenson

Dept. of Food Science & Nutrition

George Annor

Pam Ismail

USDA-ARS

Jim Kolmer

Matt Rouse

Linda Dykes

Yue Jin

Shiaoman Chao

Justin Faris

Wheat Variety and Sourdough Product Analysis for Anti-Nutrient Levels Related to Digestibility

Project Partners:



Background

- Gluten, Celiac, Wheat Sensitivity
- Wheat also contains triggers of IBS
 - ATI & FODMAPs

Efforts to reduce the discomforts resulting from the consumption of wheat-based products is critical in improving the health of consumers and increasing the profitability of wheat farmers



What are FODMAPS and ATIs?



- **ATI** – Amylase Trypsin Inhibitors
- **FODMAPS** – fermentable oligo-di-monosaccharides and polyols
- Digestive health interest
- Short-chain carbohydrates – fruits, vegetables, grains, dairy, etc.
- Not absorbed well and attract water and bacteria
- Pest resistant molecules in wheat
- Believed to fuel inflammation and immune reactions



Goals

- Reduce wheat sensitivity through the identification of wheat varieties with naturally low “anti-nutrient” levels for breeding purposes
- Explore fermentation as a processing technique to reduce FODMAPs.



Objectives

- Characterize variation and identify genetic markers for FODMAPs and ATI activity in ancient, heritage and modern wheat varieties from different growing environments **(Year 1)**
- Explore the use of fermentation as a technique to reduce FODMAPs and ATI activity in wheat food products **(Year 1)**
- Establish a pathway to implement research outcomes to industry. (In cooperation with UMN Regional Sustainable Development Partnership) **(Year 2)**



Wheat Materials for FODMAP Evaluation

Material	No. lines
Heritage wheats:	46
Modern wheats:	142
Durum:	5
Einkorn:	10
Emmer:	11
Synthetic hexaploids:	16
Total:	230



Evolution of Wheat



Triticum monococcum
AA (einkorn wheat)

X
~10,000 BC



Aegilops speltoides
BB (goatgrass)



Triticum turgidum
AABB (emmer wheat)
cultivated starting ~9,000 BC
(aka Durum wheat)

X
~8,000 BC



Ae. tauschii
DD (wild goatgrass)



Triticum aestivum
AABBDD (common wheat)



Project Team

- Charlie Vogel
 - New Executive Director
- Melissa Geiszler
 - On-Farm Research Coordinator
- Shannon Schlecht
 - Executive Director
- Becky Philipp
 - Project Manager
- Harold Stanislawski
 - Project Development Director



Project Team

- Dr. George Annor (Principal Investigator)
 - Department of Food Science and Nutrition
- James Anderson (Co-Principal Investigator)
 - Department of Agronomy and Plant Genetics
- Sarah Swan Ray (Collaborator)
 - Supply Chain Development Specialist, Regional Sustainable Development Partnerships
- Brian LaPlante (Research Collaborator)
 - Back When Foods, CEO



Several Supporters

- **Financial/Funding Support**



- MN Dept of Ag
 - The Agricultural Growth, Research & Innovation (AGRI) Crop Research Grant program
- **Letters of Support**
- University of MN, MN Wheat Council, Back When Foods
- Bay State Milling, Ardent Mills, North Dakota Mill, Sunrise Flour Mill
- ND Wheat Commission, KS Wheat Commission
- US Wheat Associates, National Association of Wheat Growers, **Wheat Foods Council**
- Northern Crops Institute
- Bremer Bank
- Multiple Producers and several others –
- 37 letters of support overall

