

# Prairie Grains

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## THE SPACES BETWEEN 2022 VARIETY TRIALS

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## ABOUT PRAIRIE GRAINS

Prairie Grains magazine is published six times annually and delivered free of charge to members of these grower associations, and to spring wheat and barley producers in Minnesota, North Dakota, South Dakota and Montana. To subscribe or change address, please write or call our circulation department.

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November-December 2022 | Issue 190

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## Cover Story

*This yearly special edition of Prairie Grains highlights the results from the 2022 Variety Trials. Take a deeper dive into data from each trial. Photo by North Dakota State University researcher Clair Keene.*





# Against the Grain

## Meeting season means meaningful work

Well folks, with a lot of hard work and a little bit of luck, we've made it through another harvest. As we close the books on the 2022 season and reflect on the year, I hope everyone is taking a well-deserved breath. In the coming months, there is still plenty of work on the docket, but rest assured, there is a healthy dose of excitement, too.

At the top of that list is the Prairie Grains Conference. Falling on Dec. 7 and 8, the Minnesota Association of Wheat Growers, North Dakota Grain Growers Association and Minnesota Barley are putting the final touches on the agenda, and I have no doubt that it will be two days stacked with content that you won't want to miss.

Every year, I look forward to this conference for multiple reasons. The speaker lineup is always impressive, and this year is no different. Paul Gerdes, Crop Nutrients Director of Sales at CHS Inc.; Mark Jirik, Director of Northern Crops Institute; and Daryl Ritchison, Meteorologist and Director of NDAWN with North Dakota State University are just a few of the speakers slated for this

year's conference.

Another integral aspect of the conference is the networking opportunities with industry partners. The conversations that occur nurture business and personal relationships, strengthening our organizations.

The final, and arguably most important, reason that I eagerly await the Prairie Grains Conference each year is getting to spend time with all of you. Without you, and your membership, MAWG wouldn't be the organization that it is today.

With that being said, I highly encourage all members to attend the conference. There is something for everyone with breakout sessions, exhibits, speakers and commodity organization meetings. Remember, meal tickets are guaranteed for those who register by Nov. 22. Registration, and other vital information, can be found



Mike Gunderson

on the Minnesota Wheat website.

As always, we are in frequent communication with the National Association of Wheat Growers (NAWG). By the time this issue has arrived in your mailboxes, NAWG's fall conference will have come and gone. As I'm writing this, it remains to

be seen whether I will be in attendance because, as all of you can relate, farm work dictates my schedule. Either way, the content produced at the conference will set the stage for the coming year and with the 2023 Farm Bill approaching, it's more important than ever to remain vigilant in protecting Minnesota wheat growers.

As we transition into the new year, I am eager to embrace whatever challenge is thrown our way and tackle issues on your behalf.

But, before then, I hope that everyone's holiday season is filled with family, friends and an unreasonable amount of holiday treats. We'll see you in 2023. 🌾





# TAMING THE BULLS



BY BETSY JENSEN



& BEARS

## Pretending to understand

I should update my resume. To pretend I have any educated advice on the commodity markets, I should add something about logistics, Russian politics, South American geography, the Federal Reserve bank and interest rates, and an expert on all things China. Maybe then I would have a little credibility about commodity prices.

Presently, I feel lost and confused.

I was once a commodity broker and wrote the opening and closing commentary. It was easy. Big export sale to Country X, rain in one area, dryness in another, fund buying, article done. If I was lucky there was a USDA report to summarize.

That helped fill the required word count. We had the standard fundamentals we watched, add a sprinkle of technical indicators like resistance and moving averages, and that was our market summary.

Now a big market mover is Russian or North Korea military action. Recession fears, inflation, supply chain issues and unemployment rates end up in the wheat headlines. Commodity brokers need to know more than just USDA report days and crop progress ratings.

Instead of pretending to understand Russian military strategies, I am going to focus on what I do know. I do know interest rates have risen significantly and it makes holding grain much more

expensive. We have been spoiled by several years of low interest rates and that changed this year. If you have a line of credit, it has probably risen by 4% during 2022. Use your new interest rate in your grain storage calculators and it adds up quickly.

I also know we are walking a tightrope of profitability. So far our high commodity prices are outpacing our high inputs costs, but someday the party will end. Input costs, including land values, will stay high longer than our commodity prices. There will be a correction and a few tough years. I cannot avoid the tough years, but I would like to minimize them. I expect to sell wheat below \$7 again. I hope I can raise my average by making some forward sales. Survive the tough years so I can celebrate when the good years reappear.

This is an impossible time to make commodity market projections. USDA releases a supply and demand report, but it is ignored when North Korea launches a missile or Russia bombs a grain port. We are well beyond the volatility of some dry weather in the winter wheat belt or delayed soybean plantings in South America.

As you make your plans for 2023, I hope you will peek at 2023 prices right now. Can you make money at these levels? Why not take advantage of a profitable opportunity? Once upon a time I considered soybeans a low input crop, but

rising seed and chemical expenses have increased our per acre expenses. There is so much at risk for 2023. Spring wheat prices for 2023 are already \$2 off the high we made in May 2022. Let me repeat that: September 2023 spring wheat prices are two dollars lower than they were in May 2022. Please do not think that we have any kind of price floor or profit guarantee. The only guarantee we have is volatility.

I hope you attend many crop marketing update meetings this winter. I hope to see you at some of the events – including the Prairie Grains Conference in December – where I will be on stage pretending I understand supply chain issues. As market analysts, we are doing our best. If you hear someone claiming to know the answers, proceed with caution. This is a volatile time.

I have watched a few YouTube videos about the Mississippi River levels and listened to some podcasts about interest rates. Not sure that is a credible reason to add “logistics and macroeconomic expertise” to my resume, but I am trying to understand the impacts on commodity markets. I will keep my focus on making money and minimizing risk. If you are in the audience while I’m presenting, keep the questions simple. I remember the good old days when the hardest question was about protein discounts and not Russian military strategy. Welcome to 2023. 🌾

# MAWG candidates talk impact of advocacy

## Osowski, Petry, Germolus up for reelection



By Sydney Harris

Ag Management Solutions

Organizations need strong leaders at the helm to guide them through the waters – both rough and calm. The Minnesota Association of Wheat Growers (MAWG) is no different.

Serving three-year terms, the MAWG Board of Directors comprises seven members – two representing District 1; a pair representing District 2; and three at-large positions serving the entire state. Farmer-directors meet six times annually to discuss important projects and policies.

Along with board meetings, directors can participate in lobbying trips to St. Paul and Washington, D.C., attend the MAWG Annual Convention during the Prairie Grains Conference and travel to National Association of Wheat Growers (NAWG) meetings. Though there are endless involvement opportunities, MAWG embraces that family and farming are top priorities for directors, meaning the time commitment outside of regular board meetings is up to each individual board member.

This year, three directors are running for reelection: Justin Osowski, Tate Petry and Austen Germolus.



### Justin Osowski – District 1

Lucky for Minnesota wheat growers, Justin Osowski, who is running for reelection as a MAWG Director, isn't afraid of stepping up to the plate.

"I like to be involved and I have an interest in politics," said Osowski, who farms in Kittson County. "As Minnesota wheat growers, we need to have a voice that is heard and people who will give input on issues that will impact growers and their farming operations."

Osowski and his wife, Jamie, are currently partaking in the Minnesota Emerging Leadership program, developing attributes that will help grow his role as a MAWG director.

"I'm excited to hone my leadership skills and apply that to the organizations that I'm involved in, especially MAWG," said Osowski, who graduated with an

associate's degree in John Deere Agricultural Technology from NDSCS Wahpeton.

While farmers are busy raising their crops and livestock, lawmakers are busy creating legislation. Fortunately, after long days, Minnesota wheat growers can rest assured that MAWG has their back at the Capitol.

"Farm policy is ongoing," said Osowski, who has three children with his wife – Lucas, Madison and Lauren. "There is always something new coming up, so it's important to have somebody going to bat for you. We have to work together as a group to have an impactful voice."

### Tate Petry – At-Large

Look inside any farmers' toolbox and you'll find every tool under the sun. Wrenches, screwdrivers, hammers, the list goes on and on. It might not be found on the back of their service truck, but some of the most important tools that farmers have are legislative policies. Tate Petry knows the worth of having a group dedicated to protecting those tools, which is why he is running for reelection as a MAWG director.

"I want to continue representing Minnesota wheat growers to ensure that state and federal policy has a strong voice of agriculture," said Petry, who farms near Ada and represents Minnesota on the NAWG board. "We need to make sure we retain a lot of the important tools that we need when we're farming, so we are paying close attention to the 2023 Farm Bill."

After graduating from NDSU with a degree in Agricultural and Biosystems Engineering, Petry returned to the farm, where he grows corn, soybeans and wheat with his wife and parents. It didn't take him long to recognize the value of MAWG.

"Membership ensures that we have the resources to protect farmers when it comes to policy making," Petry said. "MAWG makes sure that our needs are addressed, and policy isn't written that can hurt our bottom line without at least having a say in it."

Petry and his wife, Katherine, have two children – Charlotte and Oliver.





## AUSTEN GERMOLUS



### Austen Germolus – At-Large

Growing wheat, barley, corn and soybeans and raising 30 head of registered British white cattle has made Austen Germolus appreciate agriculture's holistic nature. This mindset is what guides him, especially as he runs for reelection as a MAWG director.

"Everything in agriculture affects other aspects of agriculture – whether it's direct or indirect," said Germolus, who farms near Borup in Norman County. "That trickles into legislation. We look at the whole picture, whether that be animal welfare, commodity prices or foreign relationships."

With the 2023 Farm Bill at the forefront of minds, Germolus, who graduated from NDSU with a degree in Agricultural Economics and a Masters in Meat Science, is ready to protect Minnesota wheat growers.

"The biggest thing on the docket is the Farm Bill," Germolus said. "Our number one priority is preserving what we currently have in the Farm Bill, including crop insurance. Thanks to MAWG and membership investments, we have boots on the ground in St. Paul and Washington, D.C., ensuring that we have a seat at the table in these discussions."

Along with serving as a MAWG Director, Germolus is vice president of the Norman County Corn and Soybean Growers, sits on the Perley Community Co-op board and is active in Norman County Farm Bureau. Germolus and his wife, Amy, have three sons – Oden, Thorin and Ronan.

*To become a candidate and place your name on the ballot, call the Minnesota Wheat office at 218-253-4311 by Dec. 7.* 🌾

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MGGGA's Annual Convention features dozens of speakers and panelists across three days.

## MGGGA Annual Convention welcomes new participants

By Sydney Harris

*Ag Management Solutions*

Every year, people wait in anticipation for the holiday season, dreaming of nostalgic traditions. With the giving season knocking on the door, the Montana Grain Growers Association (MGGGA) is waiting patiently to give producers an annual convention they won't forget.

MGGGA's Annual Convention will be held Tuesday, Nov. 29 through Thursday, Dec. 1, with the Welcome Reception kicking off the festivities on Monday evening. Full registration, which includes all meetings and meals for Tuesday through Thursday, is \$200 for members and \$250 for non-members. Though walk-in registration is welcome, early bird pricing is available through Nov. 25, after which prices increase \$50. For those who only plan to attend for one day, registration costs \$100. Attendees can register at [www.mgga.org/events/convention/](http://www.mgga.org/events/convention/).

For the 2022 Convention, Chairman and Vice President of the MGGGA Board of Directors, Nathan Keane, was tasked with curating an agenda that is sure to impress. While keeping its longstanding tradition of providing producers with applicable knowledge, the 67th MGGGA Annual Convention and Tradeshow is welcoming two new organizations into the fold.

"MGGGA represents all grains, not just wheat and barley, so this year we decided that we want more representation," said Keane, who farms near Loma, Mont. "Therefore, we invited Northern Pulse Growers and Pacific Northwest Canola to be featured."

Each year, the theme sets the tone for the entire

convention and is no small task to select. This year's prevailing message is "Farmers Helping Farmers," and the program's content reflects that concept.

"We're really excited to work together to put on a convention that will help our producers," said MGGGA Executive Director Alison Vergeront. "The population of agricultural producers is so small, and they're feeding such a large population."

Throughout the three days, attendees will have the opportunity to browse the tradeshow floor with over 80 booths and listen to captivating speakers and panels. Panel topics were carefully selected to reflect the theme and include insurance, research, crop rotation and technology.

After days packed with educational content, the keynote speakers slated for Tuesday and Wednesday evening will be the perfect way to cap off the day. Tuesday evening will offer comedic relief with Damian Mason, an ag commentator and comedian, who is a leading voice on issues impacting the agriculture industry.

On Wednesday night, John O'Leary will take the stage. An inspirational speaker, O'Leary suffered severe burns on 100% of his body when he was nine years old. Doctors gave him a 1% chance of survival and he defied the odds. Today,





he travels across the world, sharing his perspective and encouraging his audiences to rediscover their lives. Though O’Leary isn’t an agricultural speaker, his message is relevant to anyone who encounters adversity – of which farmers deal with more than their fair share.

“In some ways it doesn’t have anything to do with agriculture but in a lot of ways, it has a lot to do with agriculture,” Keane said. “We’ll be able to apply a lot of his talk to what we’re facing in agriculture right now.”

For more than 60 years, MGGA has championed on behalf of Montana grain producers. From its humble beginnings in 1956, the organization has blossomed to encompass a membership that represents over 5 million acres in the state of Montana. Without education, this feat

wouldn’t have been possible, which is why everyone is welcomed at the convention.

“We push two elements when it comes to education,” Vergeront said. “The first is educating producers on technologies, research and federal programs and the second is educating the general public.”

So, if you aren’t directly involved in the agriculture industry, don’t think that you don’t belong at this convention.

“I invite anyone interested in agriculture to attend,” Keane said. “There has been a lot of interest in where food comes from and how it’s made and the work it takes to provide food for the world.”

By the time the convention wraps up on Thursday, attendees will be equipped with information that will benefit their operations and their outlook. And, after three jam-packed days, they’ll be ready to hit the ground running.

“I’m really hoping that people will learn and come away from this convention with something new that they can take into the next growing season,” Keane said. 🌾

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*The Northern Pulse Growers and Pacific Northwest Canola associations are joining the 2022 Montana Grain Growers Association’s Annual Convention in Great Falls, Mont.*

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2022  
**Prairie Grains**  
*conference*



***December 8, 2022***

***Alerus Center, Grand Forks, ND***

***Keynote Speakers***



**PAUL GERDES**  
Crop Nutrients Director of Sales  
*CHS, Inc.*  
*9:10 a.m.*



**MARK JIRIK**  
Director  
*Northern Crops Institute*  
*10:00 a.m.*

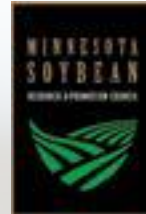


**DARYL RITCHISON**  
Meteorologist/Director of NDAWN  
*North Dakota State University*  
*1:00 p.m.*



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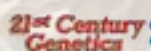
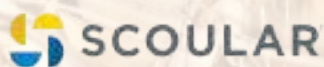
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*Registration by November 22, 2022  
is required for all meal ticket guarantees. Don't delay!*

## Morning Sessions



### 10<sup>th</sup> Annual On-Farm Research Summit

Listen to updates on this year's on-farm research results and participate in group discussions about what the data could mean for wheat and soybean production in our region.

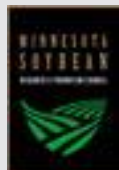
8:00 a.m. **Registration, Breakfast and Social**

8:30 a.m. **Welcome**

- Copper at Tillering on Wheat
- Polyhalite: A New Source of S Fertility?
- Elevated P and K Application in Wheat & Soybeans
- N Rates on High Yielding Wheat Varieties
- Timing Termination when Greenseeding Soybeans into Cereal Rye
- Soybean and dry bean trials from the Manitoba Pulse & Soybean Growers On-Farm Network™

10:45 a.m. **Farmer Cover Crop Panel Discussion**

11:45 a.m. **Wrap-up**



9:30 a.m. - 12:00 p.m. **North Dakota Barley Council County Representatives Meeting**

10:00 a.m. - 12:30 p.m. **Red River Basin Flood Damage Reduction Work Group**

The Flood Damage Reduction Work Group provides funding, technical support and organizational resources to assist watershed-led teams develop projects to reduce flooding and improve natural resource conditions in Minnesota's portion of the Red River Basin. Leaders from NW Minnesota farm organizations will also be attending. *Growers are encouraged to attend.*

## Lunch & Afternoon Sessions

12:00 p.m. **Lunch**

*(guaranteed for those registered prior to Nov. 22, 2022)*

12:00 - 5:00 p.m. **Minnesota Wheat Research Committee**

The committee will be hearing presentations from researchers who have submitted research pre-proposals for funding by the Minnesota Wheat check-off. *Growers are welcome & encouraged to attend.*

1:30 - 4:00 p.m. **Minnesota & North Dakota Malting Barley Program**

*All growers and industry representatives interested in barley markets and production are welcome.*

1:30 p.m. **Welcome**

*Ryan Hough, MN Barley, & Nathan Boll, ND Barley*

1:35 p.m. **Barley Variety Selections**

*Dr. Rich Horsley, Barley Breeder, NDSU*

2:00 p.m. **2022 Cropping Reviews**

*Brian Schaeetz, Agronomist, Rahr Malting*

2:30 p.m. **Production Management of Malting Barley**

*Nitrogen Trials - Brady Goettl, NDSU*

*Herbicides & Growth Regulators - Paul Schroden, Busch Ag*

3:00 p.m. **Pet Food Market**

*Tony Rosing, Anchor Ingredients*

3:30 p.m. **Malting Barley Market**

*Mark Black, Malteurop, Great Falls, MT*





## Afternoon Sessions *continued*

### 2:00 - 3:00 p.m. **MAWG Resolutions Committee Meeting**

The MAWG Resolutions Committee is made up of members who attended the November 22<sup>nd</sup> meeting in Red Lake Falls. The committee will address unresolved resolutions and new resolutions presented in writing by MAWG members. The final resolutions will be presented at the Annual Business Meeting at 4:00 p.m.

### 2:00 - 4:00 p.m. **North Dakota Certified Crop Adviser Annual Meeting**

The NDCCA will hold their annual business meeting, recognize outgoing board members, welcome new board members, and provide an update on CCA activities. *All current and prospective CCAs are welcome to attend.*



### 3:00 - 4:00 p.m. **Minnesota Soybean Growers County Association Meeting**

County leaders from the region will get together to discuss county and regional projects and promotional programs. This is an open meeting and everyone is encouraged to attend to learn more about your soybean organization.

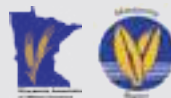


### 3:00 - 4:00 p.m. **Northern Canola Growers Association Annual Business Meeting**

The Northern Canola Growers Association will report on its activities, conduct director elections and discuss hail rates. This is an open meeting, and everyone is encouraged to attend and learn more about the Northern Canola Growers.



### 4:00 - 5:00 p.m. **North Dakota Grain Growers Annual Meeting**



### 4:00 - 5:30 p.m. **MN Assn of Wheat Growers & MN Barley Growers Assn Annual Business Meeting**

The associations will report on their activities, discuss and vote on resolutions and conduct the annual business of the association. This will include the election of board positions. *All members are encouraged to attend.*

*Meal tickets are guaranteed for those who register by Tuesday, November 22, 2022. Don't delay - Register TODAY!*

## **Pre-Conference Social, Banquet, and Live Auction**

*People with a passion for our region's agriculture - Coming together to celebrate and build relationships*

- 5:30 p.m. Social – Hors d'oeuvres & Refreshments
- 6:15 p.m. Welcome and Dinner
- 7:00 p.m. Minnesota Association of Wheat Growers & North Dakota Grain Growers recognition and awards
- 7:30 p.m. Concluding Remarks, Hospitality and Live Auction

*Hospitality hosted by:*



## Prairie Grains conference



- 6:30 a.m. **Registration & Breakfast**
- 7:00 a.m. **Wheat & Soybean Research Reporting Sessions (see next page)**
- 8:00 a.m. **Exhibits open**
- 8:50 a.m. **Break in Exhibit Hall**

9:05 a.m. **Welcome** by Don Wick, *Red River Farm Network*

9:10 a.m. **Navigating the Pre-Pay Landscape: How to Prepare for 2023 Input Price Volatility, Supply Risk, and Logistics**



Paul Gerdes  
*Crop Nutrients Director of Sales, CHS, Inc*

How is the landscape for 2023 inputs taking shape? Paul will review geopolitical complications, railroad labor issues, and historically low river flows impeding barge traffic to help you prioritize your pre-pay options on a limited budget.

10:00 a.m. **The Next Five Years**



Mark Jirik  
*Director, Northern Crops Institute*

The Northern Crops Institute recently hosted "The Next Five Years" conference which focused on major trends impacting agricultural markets for our region which included geopolitics, food production, sustainability, and energy transitions. This presentation will highlight some of the situations, opportunities, and challenges facing the region in the Next Five Years.

10:45 a.m. **Break in Exhibit Hall**

11:15 a.m. **Breakout Sessions - (see next page)**

12:00 p.m. **Lunch & Visit Exhibit Hall**

1:00 p.m. **A Look at the Growing Season Weather in 2023**



Daryl Ritchison  
*Meteorologist & Director of the ND Agricultural Weather Network (NDAWN)*

Daryl Ritchison will give updates to what's new in NDAWN, look back at the weather in 2022, then he will look forward to what he thinks will be happening to the weather for the remainder of the 2022-2023 growing season in South America and finish with his thoughts on the expected weather patterns over North America during the 2023 growing season.

2:00 p.m. **Break in Exhibit Hall**

2:30 p.m. **Breakout Sessions**

3:15 p.m. **Visit Exhibits & Closing Reception** in Exhibit Hall

3:45 p.m. **Conference Closes**

*See you next year - December 13-14, 2023!*



## Research & Reporting Sessions

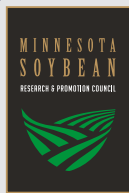
### WHEAT



- 6:30 a.m.** Continental Breakfast  
*Sponsored by MN Wheat Check-off*
- 7:00 a.m.** **Minnesota Small Grains Pest Survey** - *Dr. Jochum Wiersma, Small Grains Specialist, U of MN*
- 7:20 a.m.** **Evaluating the Impact of Drain Spacing and Fungicide Seed Treatment on Common Root Rot and Fusarium Crown Rot in Wheat** – *Ashok Chanda, Extension Sugarbeet Pathologist, U of MN*
- 7:40 a.m.** **Bacterial Seed Inoculation to Improve Nitrogen Uptake and Use Efficiency in Wheat** – *Lindsay Pease, Extension Specialist, U of MN Nutrient Management Specialist, U of MN Extension*
- 8:00 a.m.** **A Novel High-Throughput Phenotyping Pipeline to Deliver More Productive and Stress Resilient Minnesota Wheat Varieties** – *Walid Sadok, Associate Professor, U of MN*
- 8:20 a.m.** **Provision of Rapid End-Use Quality Characterization** – *George Annor, Assistant Professor, U of MN*
- 8:40 a.m.** **Wheat Multi-Trait Predictions: A Quantitative, Genotype x Environment (GxE) Approach to Supporting Minnesota Wheat Breeding and Farmer Varietal Selections** – *Kevin Silverstein, Scientific Lead and RIS Informatics Analyst, U of MN*

**Concluding Remarks**

### SOYBEANS



- 6:30 a.m.** Continental Breakfast  
*Sponsored by MN Soybean Check-off*
- 7:15 a.m.** **P&K in a Long Term Wheat and Soybean Crop Rotation** – *Dr. Dave Grafstrom, Research Agronomist, U of MN - Magnusson Research Farm, Roseau, MN*
- 7:35 a.m.** **An Abundance of MN Soybean Research: Disease, Pest and Crop Management** – *Dr. Angie Peltier, Extension Educator - Crops, U of MN*
- 8:00 a.m.** **Evaluating Soybean Varieties to Identify Genetic and Architectural Sources of Resistance Against White Mold** – *Megan McCaghey, Assistant Professor of Plant Pathology & Dr. Ashish Ranjan, Research Assistant Professor, U of MN*
- 8:25 a.m.** **Soybean Weed Management Research Update** – *David Kee, Director of Research, MN Soybean Research & Promotion Council*

**Concluding Remarks**

## 11:15 a.m. Breakout Sessions

45 minutes sessions

**2022 Spring Wheat Variety Selection and New Variety Update** – *Dr. Jochum Wiersma, Small Grains Specialist, U of MN*

**Cost of Production** – *Ron Dvergsten and Betsy Jensen, Farm Business Management Instructors, Northland Community & Technical College*

**Best Pest Management for Flea Beetles in Canola** – *Janet J. Knodel, PhD, Professor & Extension Entomologist, North Dakota State University*

**Soybean Architecture, Environmental Drivers of Disease, and New Research Considerations in Soilborne Pathogen Management** – *Megan McCaghey, Assistant Professor of Plant Pathology, U of MN*

**What's New? Using a Plant Growth Regulator and Micronutrients to Increase Northern Plains Small Grain Yields** – *Travis Jones, Technology Development Manager, Stoller USA*

**Tillage, Weed Control and Cover Crops - a Crop Consultant's Perspective** – *Jason Hanson, Agronomist, Rock and Roll Agronomy*

**Cost of Wind Erosion & Strategies to Stop the Hemorrhaging** – *Dave Franzen, Professor and Extension Soil Specialist, NDSU*

**Managing Soybean IDC with Soil Testing** – *John Breker, Soil Scientist, AGVISE Laboratories*

## 2:30 p.m. Breakout Sessions

45 minutes sessions

**2022 Spring Wheat Variety Selection and New Variety Update** – *Dr. Jochum Wiersma, Small Grains Specialist, U of MN*

**Regrets, I've Had a Few** – *Josh Tjosaas and Betsy Jensen, Farm Business Management Instructors, Northland Community & Technical College*

**New Tools for Flea Beetle Control in Canola** – *Venkat R. Chapara, PhD, Plant Pathologist, North Dakota State University/ Langdon Research Extension Center*

# Prairie Grains Conference Registration Details

## Join us for the 2022 Prairie Grains Conference!

From weather and marketing to research and business management, you will be sure to walk away with some new and valuable information. Our wide variety of speakers are sure to answer the questions you may have.

### NEW THIS YEAR

**Registration is required for meal ticket guarantees.**

Due to rising food costs, meal tickets for those registering after the deadline will be available on a first-come, first-served basis until gone.

***Don't miss out - Register by November 22, 2022  
Sign up now!***

**Registration for both days of programming and meals are FREE for members of:**

*Minnesota Association of Wheat Growers  
Minnesota Barley Growers Association  
Minnesota Soybean Growers Association  
North Dakota Grain Growers Association*

**Registration is open through the day of the conference - walk-ins are welcome.  
Meals only guaranteed if registered by deadline.**

**Registration fee for non-members - prior to the Nov 22<sup>nd</sup> deadline:**

- Wednesday programming/lunch - \$30 (\$35 after deadline - if available)
- Wednesday banquet tickets \$35 (\$40 after deadline - if available)
- Thursday conference programming/lunch - \$30 (\$35 after deadline - if available)

Visit [mnwheat.org](http://mnwheat.org) to register online, scan the code or call the MN Wheat office at 218-253-4311 ext 4.



### **HOTEL ACCOMMODATIONS**

**Canad Inn**, 701-772-8404, \$103.00/night, Block #319613, ask for Prairie Grains Conference  
(based on availability, cutoff Nov 22, 2022)



**We hope you will join us!**





# 2023

## Small Grains Update Meetings *Wheat, Soybean & Corn*

### JANUARY 10-13, 2023

Visit [mnwheat.org](http://mnwheat.org) for more details.

**Meetings are free - No pre-registration required.**

### LOCATIONS

#### DILWORTH

Tuesday, January 10<sup>th</sup>  
12:00 p.m.  
Dilworth Community Center  
(Lunch served)

#### ADA

Wednesday, January 11<sup>th</sup>  
8:00 a.m.  
Ada Event Center  
(Lunch served)  
(In conjunction with  
Norman County Ag Day)

#### CROOKSTON

Wednesday, January 11<sup>th</sup>  
1:00 p.m.  
Crookston Inn  
(In conjunction with  
West Polk County Crop  
Improvement)

#### LANCASTER

Thursday, January 12<sup>th</sup>  
8:30 a.m.  
Community Center  
(Lunch served)  
(In conjunction with  
Kittson County Crop Show)

#### ROSEAU

Thursday, January 12<sup>th</sup>  
3:30 p.m.  
Gene's Bar & Grill  
(Dinner served)

#### ST. HILAIRE

Friday, January 13<sup>th</sup>  
8:30 a.m.  
Community Center  
(Lunch served)

#### OTHER AREA MEETINGS:

#### Small Grains Update MORRIS

Monday, January 16<sup>th</sup>  
12:00 - 3:00 p.m.  
WCROC  
(Lunch served)

#### Clay County Crops Update DILWORTH

Tuesday, January 17<sup>th</sup>  
TAK Music Venue  
9:00 a.m.  
(Lunch served)



**Dr. Jim Anderson**  
Spring Wheat Breeder  
University of MN

Spring Wheat Variety  
Selections for 2023



**Alex Trunnell**  
Public Policy Specialist  
MN Corn Growers Association

2023 Minnesota Legislative  
Session – What Can Farmers  
Expect?



**Dr. David Kee**  
Director of Research  
MN Soybean Research &  
Promotion Council

Minnesota Soybean Checkoff  
Update



**Allison Thompson**  
Market Analyst  
The Money Farm

Grain Markets - A New Era of  
Volatility (Uncertainty?)



**Melissa Carlson**  
VP of Research  
MN Wheat Research &  
Promotion Council

Latest Results in Wheat &  
Soybean On-farm Research



MN Association of Wheat  
Growers and the MN Wheat  
Research & Promotion Council  
Update

County Soybean and/or Corn Grower Association Annual Meetings will take place in: Dilworth, Ada, Crookston, Lancaster & St. Hilaire (TBD)

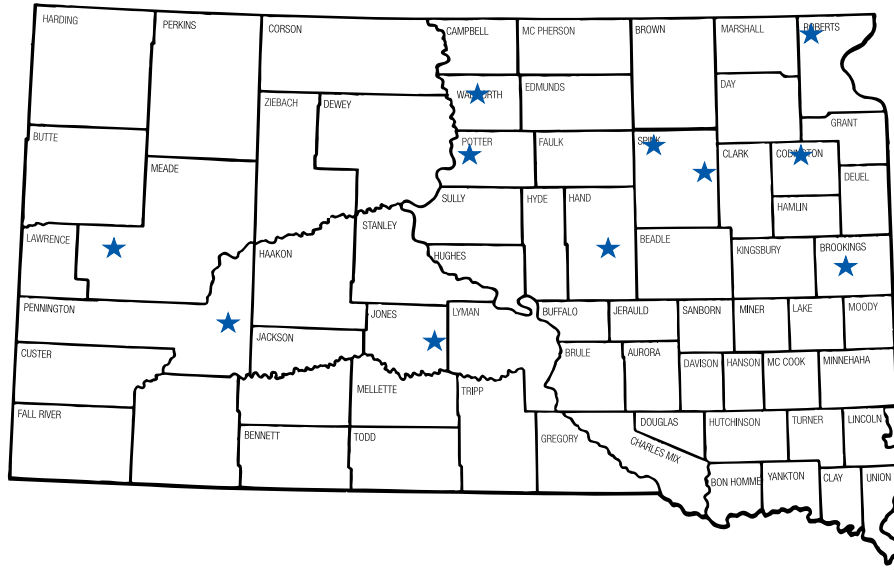
Sponsored in part by:





# 2022 South Dakota Spring Wheat Variety Trial Results Regional Summaries

Jonathan Kleinjan | SDSU Extension Agronomist  
 Christopher Graham | SDSU Extension Agronomist  
 Karl Glover | SDSU Spring Wheat Breeder  
 Shaukat Ali | SDSU Small Grains Pathologist  
 Kevin Kirby | Agricultural Research Manager  
 Shawn Hawks | Agricultural Research Manager  
 Bruce Swan | Agricultural Research Manager  
 Christopher Nelson | Agricultural Research Assistant  
 Travis Iverson | Senior Research Technician



Eastern trial locations: Claire City, Frankfort (no data), South Shore, Volga  
 Central trial locations: Gettysburg, Miller, Northville, Selby  
 Western trial locations: Draper, Sturgis, Wall

Individual trial location results can be accessed online at:  
<https://extension.sdstate.edu/spring-wheat-variety-trial-results>

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Learn more at [extension.sdstate.edu](https://extension.sdstate.edu).

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## 2022 South Dakota Spring Wheat Variety Trial Results Variety List

Table 1. List of spring wheat varieties tested in 2022 along with origin, agronomic, and grain quality characteristics.

Variety	Testing and Origin		Agronomic Characteristics			Grain Quality	
	Years tested in SD trials	Origin†-Year	Relative Heading‡ (days)	Height (inches)	Lodging Score§	Test Wt. (lb/bu)	Protein (%)
AP GunsSmoke CL2	2	AP-21	3	27	2.2	57.1	16.0
AP Murdock	4	AP-19	3	26	1.3	57.6	15.4
AP Revolution	2	AP-22	2	26	1.3	57.9	15.5
Ascend-SD	3	SD-21	5	29	1.3	58.5	15.5
CAG Justify	new	CAG-21	6	28	2.1	55.8	15.1
CAG Reckless	new	CAG-21	4	29	1.7	58.8	15.3
CP3099A	3	WF-20	9	29	1.5	54.0	14.3
CP3530	5+	WF-16	6	30	2.2	57.1	15.8
Driver	5+	SD-19	5	29	1.4	58.8	15.0
Lang-MN	5+	MN-17	5	28	1.3	58.3	15.9
LCS Ascent	new	LCS-21	1	27	1.8	58.5	14.8
LCS Buster	3	LCS-20	9	28	1.4	55.0	13.9
LCS Cannon	5+	LCS-18	-1	27	1.3	59.2	15.3
LCS Dual	new	LCS-21	3	28	2.1	57.8	14.8
LCS Hammer AX	new	LCS-22	4	26	1.4	57.0	15.1
LCS Rebel	5+	LCS-17	1	29	2.1	58.9	15.8
LCS Trigger	5+	LCS-15	9	27	1.3	57.4	14.1
MN-Rothsay	3	MN-21	8	25	1.1	57.8	15.3
MS Charger	new	MS-23	2	27	1.6	57.5	13.9
MS Cobra	2	MS-22	3	26	1.3	57.5	15.5
MS Ranchero	3	MS-20	4	28	1.3	56.9	15.3
ND Frohberg	3	ND-20	4	29	1.7	57.9	15.6
Prevail	5+	SD-13	2	27	1.4	57.9	14.8
Surpass	5+	SD-15	0	28	2.1	57.3	15.4
SY Ingmar	5+	AP-14	6	26	1.2	57.7	15.9
SY Rustler	5+	AP-16	3	27	1.6	57.2	15.2
SY Valda	5+	AP-15	5	27	1.4	57.6	15.1
WB9606	3	WB-20	5	28	1.2	57.7	14.5
WB9719	5+	WB-18	6	27	1.2	58.9	15.2
<b>Trial Averages</b>	-	-	-	28	1.5	57.6	15.1

† AP, AgriPro; CAG, Champion Alliance Group; LCS, Limagrain Cereal Seeds; MN, Minnesota; MS, Meridian Seeds; ND, North Dakota; SD, South Dakota; WI, Winfield; WB, WestBred; and - (Year of Release).  
‡ Difference in days to heading compared to Surpass (2022 eastern and central locations - Julian date 172 - June 21st).  
§ Lodging score: 1, perfectly standing; to 5, completely flat (eastern and central locations).  
¶ Test weight and protein are statewide averages.



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## 2022 South Dakota Spring Wheat Variety Trial Results Regional Summaries

Table 2. Spring wheat variety disease ratings.

Variety	Disease Ratings†				
	Stem Rust	2022 Leaf Rust	2022 Tan Spot	2022 Bacterial Leaf Streak	2022 Fusarium Head Blight
AP Gunsmoke CL2	(MR)§	4	8	9	1
AP Murdock	(MR)	4	7	7	6
AP Revolution	(R)	4	4	6	2
Ascend-SD	MR	2	7	4	3
CAG Justify	(MS)	7	8	8	3
CAG Reckless	(R)	4	8	6	6
CP3099A	(MR)	8	4	6	9
CP3530	(R)	8	5	8	6
Driver	MR	2	7	6	2
Lang-MN	(R)	4	4	6	3
LCS Ascent	(R)	4	3	7	4
LCS Buster	(R)	7	5	5	6
LCS Cannon	(R)	5	5	8	3
LCS Dual	(R)	3	6	7	6
LCS Hammer AX	‡	8	7	8	8
LCS Rebel	(R)	5	5	7	2
LCS Trigger	(R)	5	3	4	5
MN-Rothsay	(R)	4	4	5	7
MS Charger	(R)	5	5	7	3
MS Cobra	(R)	4	6	8	6
MS Ranchero	(R)	5	7	8	8
ND Frohberg	(R-MR)	8	3	8	4
Prevail	MR	4	4	4	2
Surpass	MR	4	3	5	1
SY Ingmar	(R)	3	4	2	6
SY Rustler	(MR)	5	3	6	3
SY Valda	(R)	3	2	8	3
WB9606	(MR)	7	3	7	7
WB9719	(R)	5	4	7	7

† Disease ratings: R, resistant; MR, moderately resistant; MS, moderately susceptible; S, susceptible; or 1, most resistant to 9, most susceptible. Note: SDSU does not perform nursery screenings for all listed pathogens in each growing season.  
‡ A dash (-) signifies no rating provided/available.  
§ Parenthesis denote estimated ratings/rankings (X) based on information provided by the program that submitted the variety.

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**2022 South Dakota  
Spring Wheat Variety Trial Results  
Regional Summaries**

Table 3. 2022 spring wheat variety performance trial results for testing sites in eastern South Dakota. Varieties ranking in the top 1/3 of each trial category are bolded and shaded light blue.

Variety	2020	2021	2022			2-year			3-year		
	Yield (bu/a)	Yield (bu/a)	Yield (bu/a)	Test Wt (lbs)	Protein %	Yield (bu/a)	Test Wt (lbs)	Protein %	Yield (bu/a)	Test Wt (lbs)	Protein %
LCS Trigger	<b>72.3</b>	<b>59.9</b>	<b>49.1</b>	55.7	14.5	<b>55.2</b>	59.0	14.1	<b>61.5</b>	59.6	13.8
LCS Buster	<b>68.8</b>	<b>58.1</b>	<b>45.8</b>	53.4	14.6	<b>52.8</b>	57.4	14.1	<b>58.6</b>	58.0	13.8
Ascend-SD	<b>66.5</b>	<b>54.5</b>	<b>51.0</b>	57.9	16.2	<b>53.0</b>	59.4	15.7	<b>57.9</b>	59.6	15.5
Driver	<b>65.1</b>	<b>56.6</b>	<b>47.7</b>	57.9	15.7	<b>52.8</b>	60.4	15.5	<b>57.3</b>	60.8	15.3
WB9606	62.4	<b>58.4</b>	42.8	56.9	15.3	<b>51.7</b>	59.7	14.7	<b>55.6</b>	59.8	14.3
SY Valda	<b>63.8</b>	<b>54.1</b>	<b>45.8</b>	56.8	16.0	<b>50.5</b>	59.0	15.4	<b>55.3</b>	59.7	15.2
CP3530	<b>65.9</b>	51.6	45.0	56.8	16.4	48.8	58.6	15.8	<b>55.0</b>	59.4	15.5
WB9719	61.1	<b>54.0</b>	<b>46.8</b>	58.2	16.2	<b>51.0</b>	60.8	16.0	54.7	61.1	15.7
CP3099A	56.9	<b>58.5</b>	41.8	53.6	14.8	<b>51.3</b>	56.9	14.0	53.4	56.4	13.7
MN-Rothsay	<b>63.9</b>	50.9	42.1	56.5	16.2	47.1	59.1	15.9	53.2	59.6	15.6
LCS Cannon	60.2	51.0	44.8	58.6	16.1	48.3	60.2	15.6	52.6	60.7	15.3
Prevail	61.5	49.3	45.2	57.5	15.3	47.6	59.2	15.2	52.6	59.4	14.9
AP Murdock	63.4	47.8	43.8	56.6	15.9	46.1	57.8	15.8	52.4	58.4	15.4
Lang-MN	59.4	50.6	44.2	57.4	16.4	47.9	58.9	15.9	52.1	59.6	15.7
ND Frohberg	58.2	52.8	40.8	57.0	16.3	47.6	59.2	16.0	51.5	59.7	15.7
SY Rustler	59.2	48.2	45.1	56.6	15.9	46.9	57.4	15.5	51.3	58.1	15.3
LCS Rebel	54.9	51.7	44.7	57.6	16.6	48.7	60.0	16.3	50.9	60.2	16.1
SY Ingmar	58.6	50.3	40.0	57.5	16.8	45.9	59.4	16.0	50.5	59.9	15.9
Surpass	59.1	47.7	42.6	56.6	16.2	45.5	59.1	15.8	50.5	59.1	15.6
MS Rancho	56.9	49.6	39.2	55.9	16.3	45.1	57.8	15.4	49.4	57.9	15.2
AP Gunsmoke CL2	-	53.8	43.7	55.3	16.9	49.5	57.8	16.5	-	-	-
MS Cobra	-	50.2	41.9	56.3	16.4	46.7	58.8	16.0	-	-	-
AP Revolution	-	47.8	42.3	57.0	16.2	45.4	58.2	15.6	-	-	-
CAG Reckless	-	-	<b>46.3</b>	58.1	16.1	-	-	-	-	-	-
CAG Justify	-	-	<b>46.2</b>	54.7	15.9	-	-	-	-	-	-
MS Charger	-	-	<b>46.1</b>	57.0	14.6	-	-	-	-	-	-
LCS Ascent	-	-	<b>45.6</b>	57.8	15.5	-	-	-	-	-	-
LCS Dual	-	-	44.2	56.7	15.6	-	-	-	-	-	-
LCS Hammer AX	-	-	42.6	56.1	15.9	-	-	-	-	-	-
<b>Trial Average#</b>	62.1	53.1	44.8	56.5	16.0	49.6	58.9	15.5	54.2	59.3	15.2
<b>LSD(0.05)†</b>	1.9	2.5	1.8	0.6	0.4	4.3	1.4	0.5	3.3	1.0	0.4
<b>C.V.%‡</b>	4.4	6.8	4.9	-	-	6.0	-	-	5.2	-	-

# Trial averages may include values from experimental lines that are not reported.

† Value required (≥LSD) to determine if varieties are significantly different from one another.

‡ C.V. is a measure of variability or experimental error, 15% or less is considered acceptable.



**SOUTH DAKOTA STATE  
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## 2022 South Dakota Spring Wheat Variety Trial Results Regional Summaries

Table 4. 2022 spring wheat variety performance trial results for testing sites in central South Dakota. Varieties ranking in the top 1/3 of each trial category are bolded and shaded light blue.

Variety	2020	2021	2022			2-year			3-year		
	Yield (bu/a)	Yield (bu/a)	Yield (bu/a)	Test Wt (lbs)	Protein %	Yield (bu/a)	Test Wt (lbs)	Protein %	Yield (bu/a)	Test Wt (lbs)	Protein %
LCS Trigger	<b>81.5</b>	<b>44.3</b>	<b>64.4</b>	60.6	13.8	<b>54.3</b>	60.3	14.3	<b>63.4</b>	60.1	14.3
LCS Buster	<b>81.1</b>	<b>45.3</b>	<b>62.3</b>	58.4	13.6	<b>53.8</b>	58.7	14.1	<b>62.9</b>	58.5	14.2
SY Valda	<b>72.1</b>	<b>41.6</b>	<b>60.2</b>	59.9	14.8	<b>50.9</b>	60.2	15.3	<b>58.0</b>	59.7	15.7
Ascend-SD	<b>73.4</b>	<b>39.3</b>	<b>60.8</b>	60.2	15.1	<b>50.1</b>	60.1	15.7	<b>57.9</b>	59.8	16.0
CP3099A	<b>74.5</b>	<b>44.5</b>	53.8	56.6	14.1	<b>49.1</b>	57.1	14.2	<b>57.6</b>	56.9	14.4
Driver	<b>70.8</b>	<b>41.1</b>	58.0	61.0	15.0	<b>49.6</b>	61.1	15.6	<b>56.7</b>	60.6	15.8
WB9606	70.3	<b>39.8</b>	<b>58.4</b>	59.8	14.4	<b>49.1</b>	60.2	15.2	<b>56.2</b>	59.7	15.2
CP3530	<b>72.7</b>	38.9	56.7	59.2	15.6	47.8	59.1	15.9	56.1	58.9	16.1
LCS Cannon	68.3	39.1	<b>58.7</b>	60.7	15.4	48.9	61.1	16.0	55.4	60.9	16.1
WB9719	70.4	39.1	55.4	60.7	15.1	47.3	60.9	16.3	55.0	60.3	16.3
MN-Rothsay	68.9	35.8	56.0	59.7	15.1	45.9	59.8	15.9	53.6	59.3	16.0
LCS Rebel	64.2	39.1	55.5	60.5	15.8	47.3	60.6	16.5	52.9	60.1	16.8
AP Murdock	67.5	33.5	57.7	59.4	15.2	45.6	59.3	16.1	52.9	59.0	16.1
SY Ingmar	64.5	38.4	54.6	59.7	15.9	46.5	60.1	16.4	52.5	60.0	16.6
MS Ranchero	64.9	36.8	53.5	58.4	15.2	45.1	58.6	15.7	51.7	58.2	15.7
Lang-MN	62.5	36.5	56.0	59.9	15.7	46.3	59.6	16.2	51.7	59.2	16.6
Surpass	63.3	34.0	56.5	59.3	15.4	45.3	59.9	16.3	51.3	59.1	16.5
SY Rustler	63.9	34.8	54.9	58.7	15.1	44.8	58.4	15.9	51.2	58.2	16.2
Prevail	63.3	32.0	56.0	59.5	14.9	44.0	59.3	16.0	50.4	59.0	16.0
ND Frohberg	63.4	30.6	51.1	59.4	15.6	40.8	59.3	16.5	48.4	59.2	16.5
AP Gunsmoke CL2	-	<b>41.5</b>	58.0	59.6	15.6	<b>49.8</b>	59.6	16.3	-	-	-
AP Revolution	-	36.4	<b>58.6</b>	59.9	15.3	47.5	59.9	15.9	-	-	-
MS Cobra	-	35.2	55.4	59.0	15.4	45.3	59.3	16.1	-	-	-
MS Charger	-	-	<b>62.6</b>	59.0	13.6	-	-	-	-	-	-
CAG Justify	-	-	<b>59.9</b>	58.1	14.7	-	-	-	-	-	-
CAG Reckless	-	-	<b>58.5</b>	60.4	15.3	-	-	-	-	-	-
LCS Ascent	-	-	58.3	59.9	14.7	-	-	-	-	-	-
LCS Dual	-	-	57.7	59.5	14.8	-	-	-	-	-	-
LCS Hammer AX	-	-	55.4	58.8	15.3	-	-	-	-	-	-
<b>Trial Average#</b>	69.3	37.2	57.6	59.4	15.1	47.7	59.6	15.7	55.0	59.3	15.8
<b>LSD(0.05)†</b>	1.9	1.9	1.4	0.4	0.3	4.0	0.8	0.5	3.5	0.7	0.4
<b>C.V.%‡</b>	4.0	6.9	3.3	-	-	4.8	-	-	4.4	-	-

# Trial averages may include values from experimental lines that are not reported.  
 † Value required ( $\geq$ LSD) to determine if varieties are significantly different from one another.  
 ‡ C.V. is a measure of variability or experimental error, 15% or less is considered acceptable.





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## 2022 South Dakota Spring Wheat Variety Trial Results Regional Summaries

Table 5. 2022 spring wheat variety performance trial results for testing sites in western South Dakota. Varieties ranking in the top 1/3 of each trial category are bolded and shaded light blue.

Variety	2020	2021	2022			2-year			3-year		
	Yield (bu/a)	Yield (bu/a)	Yield (bu/a)	Test Wt (lbs)	Protein %	Yield (bu/a)	Test Wt (lbs)	Protein %	Yield (bu/a)	Test Wt (lbs)	Protein %
LCS Cannon	49.1	<b>45.0</b>	<b>55.1</b>	58.3	14.5	<b>50.0</b>	59.4	15.5	<b>49.8</b>	59.5	15.3
LCS Trigger	<b>55.3</b>	<b>42.6</b>	51.2	55.9	14.1	<b>46.9</b>	57.9	15.3	<b>49.0</b>	57.9	15.0
WB9606	<b>51.0</b>	<b>41.3</b>	<b>55.2</b>	56.3	13.7	<b>48.2</b>	58.3	15.1	<b>48.9</b>	58.4	15.0
Lang-MN	<b>52.6</b>	39.9	<b>53.5</b>	57.7	15.5	<b>46.7</b>	58.5	16.2	<b>48.2</b>	58.6	16.0
Ascend-SD	50.7	<b>41.3</b>	<b>52.0</b>	57.5	15.1	<b>46.6</b>	59.0	16.1	<b>47.7</b>	59.0	15.7
LCS Buster	<b>56.7</b>	37.8	51.2	53.1	13.7	44.5	55.8	15.2	<b>47.6</b>	55.9	14.9
CP3099A	<b>60.2</b>	33.8	<b>51.9</b>	51.9	14.0	42.9	54.6	15.3	<b>47.2</b>	55.1	14.8
Surpass	48.1	41.1	50.8	56.1	14.5	<b>46.0</b>	57.3	15.7	46.5	57.8	15.5
SY Valda	46.3	<b>41.1</b>	<b>51.8</b>	56.2	14.7	<b>46.5</b>	58.0	15.7	46.4	58.4	15.5
CP3530	50.1	40.6	49.1	55.5	15.4	44.9	57.3	16.1	46.2	57.3	16.1
LCS Rebel	<b>52.2</b>	<b>41.6</b>	46.7	58.5	14.9	44.1	59.2	15.9	46.2	59.3	15.8
WB9719	49.5	37.2	<b>52.6</b>	57.8	14.4	44.9	58.7	15.4	46.0	59.2	15.3
Driver	<b>53.2</b>	39.4	47.9	57.3	14.4	43.6	58.2	15.4	46.0	58.3	15.1
MS Ranchero	48.6	<b>42.3</b>	47.3	56.5	14.2	44.8	57.7	15.4	45.7	57.8	15.1
SY Rustler	47.8	40.3	49.1	56.3	14.7	44.7	57.1	15.7	45.5	57.2	15.5
Prevail	45.4	<b>42.3</b>	48.1	56.8	14.3	45.2	57.8	15.4	45.2	58.0	15.3
ND Frohberg	47.1	35.6	50.5	57.2	14.9	43.1	57.7	15.9	44.1	57.8	15.8
MN-Rothsay	44.2	39.1	48.9	57.1	14.7	44.0	58.7	15.9	44.0	58.5	15.8
SY Ingmar	50.3	36.7	46.2	55.8	15.0	41.4	57.8	16.0	43.7	57.9	15.9
AP Murdock	43.5	35.5	50.7	56.8	15.1	43.1	57.3	16.1	43.2	57.3	16.0
AP Gunsmoke CL2	-	40.3	50.4	56.3	15.4	<b>45.4</b>	57.7	16.5	-	-	-
MS Cobra	-	40.3	47.8	57.2	14.7	44.1	57.9	15.9	-	-	-
AP Revolution	-	36.5	45.3	56.7	14.9	40.9	56.5	15.8	-	-	-
CAG Justify	-	-	<b>53.0</b>	54.7	14.7	-	-	-	-	-	-
LCS Ascent	-	-	<b>52.3</b>	57.7	14.2	-	-	-	-	-	-
LCS Hammer AX	-	-	<b>51.3</b>	56.2	14.2	-	-	-	-	-	-
CAG Reckless	-	-	50.5	57.8	14.4	-	-	-	-	-	-
MS Charger	-	-	50.5	56.5	13.5	-	-	-	-	-	-
LCS Dual	-	-	49.9	57.1	13.8	-	-	-	-	-	-
<b>Trial Average#</b>	49.8	40.0	50.3	56.4	14.6	45.1	57.8	15.7	46.4	58.0	15.5
<b>LSD(0.05)†</b>	4.6	3.0	4.0	0.7	0.4	4.5	1.6	0.6	4.7	1.2	0.5
<b>C.V.%‡</b>	9.4	9.2	9.7	-	-	9.6	-	-	9.4	-	-

# Trial averages may include values from experimental lines that are not reported.  
† Value required (≥LSD) to determine if varieties are significantly different from one another.  
‡ C.V. is a measure of variability or experimental error, 15% or less is considered acceptable.



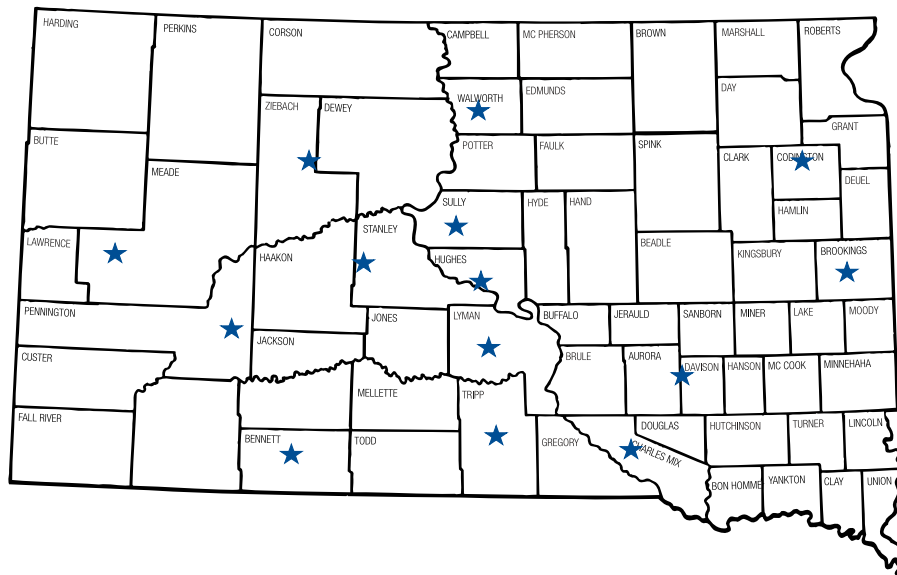
**AG SERVICES**





# 2022 South Dakota Winter Wheat Variety Trial Results Regional Summaries

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Eastern trial locations: Brookings, Mt. Vernon, Platte, South Shore

Central trial locations: Hayes, Onida, Pierre, Selby, Vivian, Winner

Western trial locations: Faith/Lantry, Martin, Sturgis, Wall

Individual trial location results can be accessed online at: [extension.sdstate.edu/winter-wheat-variety-trial-results](https://extension.sdstate.edu/winter-wheat-variety-trial-results)

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## 2022 South Dakota Winter Wheat Performance Trial Highlights

Jonathan Kleinjan | SDSU Extension Agronomist

The winter wheat growing season of 2021-2022 in South Dakota was characterized by a relatively dry planting season in the fall of 2021 followed by an open winter. There were concerns about the dry conditions lasting into 2022 but several areas of the state received decent rainfall in late spring. Drought conditions persisted in some areas, predominately west and northwest of Pierre. Heat during flowering and grain fill was also a concern and reduced yields in a few production areas. On the upside, the dry conditions prevalent in 2022 resulted in essentially no disease issues. At harvest, yield reports ranged from 25 bu/acre in areas affected by drought and heat to 100+ bu/acre in areas with ideal growing conditions. Overall, the quality of the crop was very good with high test weights and above average grain protein content.

Albert Lea Seed was a new participant in the South Dakota State University Crop Performance Testing (CPT) winter wheat trials for 2021-2022. Testing continued on several CoAXium<sup>®</sup> varieties from four separate companies/public programs. These varieties have a natural mutation that confers tolerance to Aggressor<sup>®</sup> herbicide, providing a new grass control option for wheat producers. There were also two Clearfield<sup>®</sup> varieties tested from two separate entities.

South Dakota State University CPT winter wheat trials in eastern SD locations (Bookings, Mt. Vernon, Platte, and South Shore) yielded an average of 60 bu/acre, ranging from 49 bu/acre at Platte to 67 bu/acre in Brookings. Varieties yielding in the top 1/3 of the eastern SD trials over three years (2020-2022) were **SD Andes, SD Midland, Winner, SY Wolverine, and Ideal**. A promising variety yielding in the top 1/3 over two years was **AP Clair**.

Yields in central SD (Hayes, Onida, Pierre, Selby, Vivian, and Winner) averaged 67 bu/acre, ranging from 34 bu/acre at Hayes to 90 bu/acre at Vivian. Varieties yielding in the top 1/3 of the central SD trials for 2020-2022 were **CP7017AX, SY Wolverine, WB4309, Winner, and Draper**. Promising varieties yielding in the top 1/3 over two years include **AP Clair, LCS Steel AX, and AP Bigfoot**.

Western SD trial locations (Faith, Sturgis, and Wall) averaged 43 bu/acre, ranging from 30 bu/acre at Faith to 64 bu/acre at Wall. Varieties yielding in the top 1/3 over three years in the western trial locations were **Winner, SD Andes, SD Midland, Ideal, and CP7909**.

The protein content of the crop was very good statewide, averaging 13.8%, 14.1%, and 14.2% in eastern, central and western SD, respectively. Complete trial results, including yield, test weight, protein content, height, and lodging (where measured) for each location are available at: [extension.sdstate.edu/winter-wheat-variety-trial-results](https://extension.sdstate.edu/winter-wheat-variety-trial-results).



Consider as much performance information as possible when selecting a variety, and give more weight to information from trials close to home, as some varieties may be better suited to certain geographic areas. Also pay close attention to relative performance over many locations. This type of performance is an indication of “yield stability”. Good yield stability refers to the ability of a variety exhibit high yield potential at many locations over years. For example, a variety that ranks in the upper 40% at all locations exhibits better yield stability than a variety that is number one for yield at one location but ranks in the lower 40% at some other locations. Performance over multiple years is also very important. Growing conditions in a single season may favor certain varieties, providing a poor representation of yield potential over time. For example, heat during the growing season in 2022 affected some mid-to-late maturing varieties and the absence of significant disease pressure allowed some varieties to perform better than average. A good rule of thumb is to plant 65%-75% of your acres to varieties with a proven track record (i.e. a good multi-year average) and plant the remaining 25%-35% to a promising new variety.

It is important to remember that varieties may differ by 5 bu/acre or even more and still be statistically similar. This is due to inherent variability in the environment and the yield testing process. Varieties that are statistically similar to the top performing variety at each location can be calculated by subtracting the least significant difference (LSD) value from the top performing variety. The LSD is a statistic used to determine if varieties are truly different from one another.

The coefficient of variation (CV) listed at the bottom of each data column, which is often expressed as a percentage of a given trait mean, is a relative measure of the amount of test variation for that trait. Generally, in yield trials, a CV of 15% is considered acceptable and a CV of 10% or less indicates good quality data. Higher variability (and thus higher CVs) can be caused by several environmental factors, such as stand loss due to winterkill or drought, and reduces the ability to detect true differences between varieties.

***“I’ve tested seed treatments for many years. I’ve never seen a seed treatment perform like Stoller® Bio-Forge® Advanced.”***

Chad Rubbelke  
Rubbleke Farms  
Des Lacs, ND



2022 was a tough growing season at Rubbelke Farms near Des Lacs, ND. Chad explains, “We started with spring blizzards. We were late getting the crops planted. Some were ‘mudded in’ and didn’t get a chance to get a good root system established.”

In addition to farming, Chad does contracted trials for various products. He says, “I’ve never seen a seed treatment improve the root system like we saw the Bio-Forge® Advanced on our 2022 durum wheat trials. Depending on soil type, we saw a three to four bushel yield advantage with just the Bio-Forge Advanced seed treatment.”

“Bi-Forge Advanced seed treat combined with early heading Stoller Xcyte™ and Harvest More® Urea Mate gave us a 14-bushel yield advantage over untreated. Both early season and late season results were impressive.” says Chad.

**Learn how you can improve yields on your farm by visiting with Chad at the Prairie Grains Conference in Grand Forks on December 8.**



Steve Spittler 605 280 2003



Fred Lukens 701 739 0240



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## 2022 South Dakota Winter Wheat Variety Trial Results Variety List

Table 1. List of winter wheat varieties tested in 2021-22 along with origin, agronomic, and grain quality characteristics.

Variety	Testing and Origin		Agronomic Characteristics				Grain Quality		
	Years tested in SD trials	Origin†-Year	Relative Heading (days)‡	Height (inches)	Lodging Score (1-5)§	Winter Hrd.¶	2021 Test Wt. (lb/bu)#	2021 Protein (%)#	Baking Quality††
AP 18AX	3	AP-18	0	31	1.4	A	57.9	13.7	(A)
AP Bigfoot	2	AP-20	2	31	1.2	A	58.8	14.0	(A)
AP Clair	2	AP-18	3	30	1.3	G	58.9	14.1	(G)
Byrd CL Plus	new	PG-18	2	32	1.8	(G-E)‡‡	57.6	13.4	(G)
CP7017AX	3	CP-20	1	30	1.9	A	58.6	13.3	(NR)
CP7050AX	3	CP-20	0	32	1.2	G-E	59.8	14.3	(NR)
CP7869	2	CP-17	1	30	1.7	A	58.7	13.7	(NR)
CP7909	3	CP-18	-2	30	2.0	G	59.1	13.8	(NR)
CP7266AX	new	CP-22	1	32	1.9	(NR)	58.0	13.6	(NR)
Crescent AX	3	PG-18	0	33	2.1	A	58.6	13.7	(G)
Draper	5+	SD-19	2	32	1.4	G-E	57.9	14.1	G
Expedition	5+	SD-02	0	32	1.9	G	58.7	14.5	G
Ideal	5	SD-11	5	32	1.7	G-E	59.1	14.1	A
Kivari AX	new	PG-20	2	31	2.5	(E)	57.6	12.8	(G)
LCS Chrome	2	LCS-15	2	33	1.4	G	58.2	14.6	(G)
LCS Helix AX	3	LCS-19	1	32	1.5	G	59.1	13.5	(E)
LCS Julep	2	LCS-19	1	31	1.3	G	60.3	14.4	(E)
LCS Photon AX	2	LCS-18	-1	31	1.4	A	59.7	14.6	(E)
LCS Steel AX	2	LCS-21	5	33	1.2	A	57.9	13.5	(NR)
MS Iceman	2	MS-21	2	30	1.1	A	59.8	14.8	(A)
MS Maverick	new	MS-20	3	32	2.1	(NR)	58.4	14.1	(NR)
Redfield	5+	SD-13	4	31	1.6	A	58.1	14.5	G
SD Andes	5+	SD-20	5	32	1.3	E	59.1	13.7	A
SD Midland	5+	SD-21	5	33	1.2	E	58.9	14.0	E
SY Wolverine	4	AP-19	1	29	1.2	G-E	59.0	13.8	(G)
Viking 211	new	ALS-20	2	31	2.1	(G)	58.3	13.9	(G)
WB4309	3	WB-19	1	31	1.5	G-E	58.1	14.1	(E)
WB4422	new	WB-22	2	32	1.2	(E)	59.5	14.4	(G)
WB4510CLP	new	WB-20	3	32	1.3	(E)	59.0	14.1	(A)
Winner	5+	SD-19	2	32	1.4	G-E	58.6	14.1	G
<b>Trial Average</b>	-	-	-	<b>30</b>	<b>1.6</b>	-	<b>58.7</b>	<b>14.0</b>	-

† AP - AgriPro; ALS - Albert Lea Seed; CP - Croplan; LCS - Limagrain Cereal Seeds; MS - Meridian Seeds; PG - PlainsGold; SD - South Dakota; WB - WestBred; and - (Year of Release).

‡ Relative heading compared to Expedition (157 days Julian or June 6) in 2022.

§ Lodging score: 1, perfectly standing; to 5, completely flat.

¶ Winter hardiness: E - excellent; G - good; F - fair; P - poor, NR - not reported.

# Test weight (lbs/bu) and protein (%) as averaged from central and eastern SD testing sites.

†† Baking quality: E, excellent; G, good; A, acceptable; P, Poor. Note: SDSU does not typically perform baking quality analysis.

‡‡ Parenthesis designate estimated ratings (X), based on information provided by entity that submitted the variety.

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## 2022 South Dakota Winter Wheat Variety Trial Results Disease Ratings

Table 2. Winter wheat variety disease ratings.

Variety	Disease Ratings†						
	Stripe Rust	Stem Rust	Leaf Rust	WSMV§	Tan Spot	Bacterial Leaf Streak	FHB¶ (Scab)
AP 18AX	2	(NR)‡	7	(4)	3	(5)	7
AP Bigfoot	(3)	(2)	7	(4)	3	(3)	7
AP Clair	(R)	(S)	7	(NR)	7	(NR)	8
Byrd CL Plus	(7)	(8)	8	(3)	8	(NR)	8
CP7017AX	(MR)	(R)	6	(NR)	8	(MR)	7
CP7050AX	(R)	(S)	7	(NR)	8	(MS)	5
CP7869	(R)	(R)	6	(NR)	4	(MS)	7
CP7909	(S)	(MS)	7	(NR)	5	(NR)	3
CP7266AX	(NR)	(NR)	6	(NR)	8	(NR)	6
Crescent AX	(4)	(NR)	7	(2)	7	(NR)	6
Draper	5	MR-MS	7	(NR)	8	7	6
Expedition	7	R	6	S	8	7	4
Ideal	8	MR	4	S	8	5	5
Kivari AX	(8)	(8)	8	(3)	8	(NR)	8
LCS Chrome	(1)	(NR)	7	(NR)	7	(NR)	7
LCS Helix AX	(2)	(1)	7	(1)	4	(NR)	5
LCS Julep	(2)	(4)	4	(1)	7	(NR)	7
LCS Photon AX	(2)	(9)	8	(3)	8	(NR)	4
LCS Steel AX	(7)	(9)	7	(NR)	6	(NR)	6
MS Iceman	(7)	(5)	8	(NR)	7	(NR)	7
MS Maverick	(1)	(5)	6	(NR)	6	(NR)	9
Redfield	5	MR	6	S	8	6	5
SD Andes	1	(NR)	8	(NR)	7	(NR)	4
SD Midland	1	(7)	8	(6)	7	(NR)	4
SY Wolverine	(6)	(2)	7	(4)	4	(3)	6
Viking 211	(NR)	(NR)	NR	(NR)	4	(NR)	7
WB4309	(MR-MS)	(MR-MS)	8	(MS)	8	(MS)	5
WB4422	(8)	(6)	6	(6)	4	(NR)	6
WB4510CLP	(2)	(NR)	NR	(6)	4	(NR)	7
Winner	5	MR	NR	(NR)	6	7	4

† Disease ratings: R, resistant; MR, moderately resistant; MS, moderately susceptible; S, susceptible; or 1, most resistant to 9, most susceptible. Note: SDSU does not perform nursery screenings for all listed pathogens in each growing season.  
 § Wheat Streak Mosaic Virus; ¶ Fusarium Head Blight  
 ‡ Parenthesis denote estimated rankings (X) provided by the program that submitted the variety, NR - not reported.





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## 2022 South Dakota Winter Wheat Variety Trial Results Eastern Summary

Table 3. 2020-2022 winter wheat variety performance trial results for testing sites in eastern South Dakota. Varieties ranking in the top 1/3 of each trial category are shaded light blue and bolded.

Variety	2020	2021	2022			2-year			3-year		
	Yield (bu/a)	Yield (bu/a)	Yield (bu/a)	Test Wt (lbs)	Protein %	Yield (bu/a)	Test Wt (lbs)	Protein %	Yield (bu/a)	Test Wt (lbs)	Protein %
SD Andes	<b>81.0</b>	<b>71.8</b>	<b>61.3</b>	58.9	13.5	<b>66.6</b>	60.1	13.1	<b>71.0</b>	60.2	12.9
SD Midland	77.4	<b>72.3</b>	<b>62.4</b>	59.0	13.6	<b>67.4</b>	59.9	13.1	<b>70.7</b>	59.7	13.0
Winner	<b>81.2</b>	<b>69.7</b>	<b>60.8</b>	58.4	13.8	<b>65.2</b>	59.5	13.3	<b>70.4</b>	59.6	13.0
SY Wolverine	<b>79.8</b>	<b>69.0</b>	<b>60.6</b>	58.8	13.6	<b>64.8</b>	59.6	13.4	<b>69.5</b>	59.4	13.2
Ideal	78.3	<b>71.4</b>	59.4	58.9	13.9	<b>65.4</b>	60.3	13.3	<b>69.4</b>	59.9	13.0
WB4309	76.9	<b>71.0</b>	59.5	58.3	13.7	<b>65.3</b>	59.3	13.4	69.2	59.2	13.5
CP7017AX	77.5	66.8	<b>63.0</b>	58.1	12.9	<b>64.9</b>	59.1	12.6	69.0	58.9	12.5
Draper	<b>79.5</b>	66.9	<b>60.6</b>	57.8	13.9	63.7	59.2	13.6	68.6	59.0	13.3
LCS Helix AX	<b>79.2</b>	65.6	<b>60.7</b>	58.8	13.3	63.2	60.2	12.8	68.3	60.4	12.6
Redfield	78.0	67.9	58.8	58.5	14.4	63.4	59.6	14.0	68.1	59.6	13.7
CP7909	76.3	64.7	59.4	59.8	13.3	62.0	60.4	13.1	67.0	60.0	12.8
AP 18AX	75.4	64.0	58.4	57.8	13.6	61.2	58.9	13.3	65.9	58.8	13.0
Crescent AX	77.9	60.8	58.6	58.7	13.4	59.7	59.8	13.4	65.5	59.9	13.2
Expedition	70.2	59.5	57.4	58.9	14.5	58.5	60.0	14.1	62.5	60.0	13.8
CP7050AX	70.1	56.4	56.6	59.3	14.2	56.5	60.2	14.1	61.0	60.3	14.0
AP Clair	-	<b>71.4</b>	<b>60.9</b>	58.9	13.9	<b>66.2</b>	59.7	13.4	-	-	-
AP Bigfoot	-	66.9	<b>61.3</b>	58.6	13.5	64.1	59.5	13.3	-	-	-
LCS Steel AX	-	<b>68.4</b>	59.8	58.3	13.0	64.1	58.8	12.6	-	-	-
CP7869	-	67.5	60.0	58.9	13.2	63.7	59.6	12.7	-	-	-
LCS Julep	-	64.1	59.5	60.1	14.1	61.8	61.4	13.8	-	-	-
LCS Photon AX	-	57.2	59.9	59.5	14.5	58.6	60.3	14.2	-	-	-
MS Iceman	-	60.2	56.8	60.2	14.9	58.5	61.1	14.5	-	-	-
LCS Chrome	-	61.4	55.0	58.2	14.6	58.2	59.3	14.2	-	-	-
WB4422	-	-	<b>63.9</b>	59.4	14.2	-	-	-	-	-	-
Byrd CL Plus	-	-	59.2	57.5	13.2	-	-	-	-	-	-
Viking 211	-	-	59.0	58.2	13.7	-	-	-	-	-	-
MS Maverick	-	-	57.3	58.0	14.0	-	-	-	-	-	-
Kivari AX	-	-	55.2	57.0	12.6	-	-	-	-	-	-
WB4510CLP	-	-	54.7	58.3	13.6	-	-	-	-	-	-
CP7266AX	-	-	54.5	58.0	13.5	-	-	-	-	-	-
<b>Trial Average#</b>	77.6	66.9	59.8	58.7	13.8	63.6	59.9	13.5	68.1	59.7	13.2
<b>LSD(0.05)†</b>	2.2	3	1.7	0.5	0.3	1.7	0.3	0.2	1.4	0.4	0.2
<b>C.V.%‡</b>	4.6	7	4.6	1.2	3.6	6.1	1.2	3.7	5.6	1.6	4.3

# Trial averages may include values from experimental lines that are not reported.  
 † Value required ( $\geq$ LSD) to determine if varieties are significantly different from one another.  
 ‡ C.V. is a measure of variability or experimental error, 15% or less is considered acceptable.  
 Note: Eastern trial sites include Brookings, Mt. Vernon, Platte, and South Shore.



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## 2022 South Dakota Winter Wheat Variety Trial Results Central Summary

Table 4. 2021-2022 winter wheat variety performance trial results for testing sites in central South Dakota. Varieties ranking in the top 1/3 of each trial category are shaded light blue and bolded.

Variety	2020	2021	2022			2-year			3-year		
	Yield (bu/a)	Yield (bu/a)	Yield (bu/a)	Test Wt (lbs)	Protein %	Yield (bu/a)	Test Wt (lbs)	Protein %	Yield (bu/a)	Test Wt (lbs)	Protein %
CP7017AX	<b>92.3</b>	71.5	<b>71.4</b>	59.1	13.4	<b>71.4</b>	59.3	13.3	<b>78.8</b>	59.7	12.8
SY Wolverine	88.3	<b>76.3</b>	<b>71.3</b>	59.6	13.9	<b>73.6</b>	60.0	13.9	<b>78.8</b>	60.2	13.5
WB4309	<b>89.6</b>	<b>73.4</b>	<b>69.4</b>	58.4	14.1	<b>71.2</b>	58.9	14.1	<b>77.7</b>	59.4	13.7
Winner	<b>92.5</b>	<b>74.4</b>	64.7	59.3	14.5	69.1	59.7	14.2	<b>77.4</b>	60.1	13.6
Draper	88.8	<b>72.3</b>	68.0	58.3	14.2	<b>69.9</b>	58.6	14.2	<b>76.6</b>	59.1	13.7
SD Andes	85.1	71.8	<b>70.4</b>	60.0	14.0	<b>71.1</b>	60.6	14.0	76.0	60.8	13.5
CP7909	88.3	69.3	<b>69.0</b>	58.9	13.7	69.1	59.0	13.7	75.9	59.7	13.0
SD Midland	88.4	70.8	67.2	59.4	14.3	68.9	59.9	14.1	75.8	60.2	13.6
LCS Helix AX	<b>89.6</b>	66.5	<b>69.5</b>	60.2	13.5	68.1	60.8	13.5	75.7	61.0	13.0
Ideal	88.7	<b>71.9</b>	63.7	59.4	14.3	67.5	59.7	14.3	74.9	60.1	13.7
AP 18AX	88.2	68.7	66.5	58.8	13.6	67.5	58.9	13.7	74.8	59.3	13.2
Crescent AX	<b>88.9</b>	62.3	<b>68.6</b>	59.3	13.5	65.7	60.0	13.9	73.9	60.5	13.3
Redfield	86.0	64.1	66.4	58.3	14.6	65.4	59.2	14.6	72.7	59.8	14.1
Expedition	81.7	65.0	63.2	59.0	14.6	64.0	59.6	14.5	70.3	59.9	14.0
CP7050AX	81.9	62.6	64.0	60.4	14.5	63.4	60.9	14.4	69.9	61.3	13.9
AP Clair	-	<b>73.4</b>	<b>69.8</b>	59.4	14.2	<b>71.5</b>	59.8	14.1	-	-	-
LCS Steel AX	-	<b>72.7</b>	<b>68.7</b>	58.6	13.4	<b>70.5</b>	59.1	13.4	-	-	-
AP Bigfoot	-	<b>72.4</b>	68.3	58.8	14.0	<b>70.2</b>	59.1	14.0	-	-	-
LCS Julep	-	69.2	67.1	60.3	14.4	68.1	61.2	14.5	-	-	-
MS Iceman	-	69.2	64.6	60.2	14.7	66.7	60.7	15.0	-	-	-
CP7869	-	67.2	64.0	59.2	14.0	65.5	59.4	13.9	-	-	-
LCS Chrome	-	67.0	64.2	58.1	14.8	65.5	59.0	14.8	-	-	-
LCS Photon AX	-	62.0	63.0	60.4	14.7	62.5	60.9	14.6	-	-	-
WB4422	-	-	<b>74.2</b>	60.2	14.4	-	-	-	-	-	-
Byrd CL Plus	-	-	66.6	57.9	13.4	-	-	-	-	-	-
Kivari AX	-	-	65.5	58.4	12.7	-	-	-	-	-	-
Viking 211	-	-	65.5	58.5	14.3	-	-	-	-	-	-
MS Maverick	-	-	64.8	58.6	14.2	-	-	-	-	-	-
CP7266AX	-	-	62.7	58.3	13.4	-	-	-	-	-	-
WB4510CLP	-	-	58.6	59.7	14.2	-	-	-	-	-	-
<b>Trial Average#</b>	87.9	69.7	66.5	59.1	14.1	68.2	59.7	14.2	75.3	60.1	13.5
<b>LSD(0.05)†</b>	3.0	3.5	2.9	0.9	0.3	2.3	0.4	0.2	1.7	0.3	0.2
<b>C.V.%‡</b>	5.9	8.1	7.8	1.9	3.2	7.9	1.6	3.5	6.9	1.5	3.7

# Trial averages may include values from experimental lines that are not reported.

† Value required ( $\geq$ LSD) to determine if varieties are significantly different from one another.

‡ C.V. is a measure of variability or experimental error, 15% or less is considered acceptable.

Note: Central trial sites include Hayes, Onida, Pierre, Selby, Vivian, and Winner.



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**2022 South Dakota  
Winter Wheat Variety Trial Results  
Western Summary**

Table 5. 2021-2022 winter wheat variety performance trial results for testing sites in western South Dakota. Varieties ranking in the top 1/3 of each trial category are shaded light blue and bolded.

Variety	2020	2021	2022			2-year			3-year		
	Yield (bu/a)	Yield (bu/a)	Yield (bu/a)	Test Wt (lbs)	Protein %	Yield (bu/a)	Test Wt (lbs)	Protein %	Yield (bu/a)	Test Wt (lbs)	Protein %
Winner	<b>68.6</b>	<b>66.6</b>	43.5	58.0	14.1	<b>55.1</b>	58.1	13.2	<b>59.6</b>	58.1	13.0
SD Andes	<b>67.9</b>	<b>66.5</b>	<b>45.8</b>	58.5	13.8	<b>55.3</b>	58.9	13.4	<b>59.5</b>	58.9	13.0
SD Midland	<b>65.9</b>	<b>67.2</b>	<b>44.7</b>	58.2	14.0	<b>55.6</b>	58.3	14.2	<b>59.0</b>	58.2	13.1
Ideal	<b>70.1</b>	59.1	<b>44.7</b>	59.1	14.0	52.1	58.0	13.9	<b>58.1</b>	58.1	13.5
CP7909	62.2	<b>67.1</b>	44.2	58.7	14.3	<b>55.4</b>	58.0	13.8	<b>57.7</b>	57.8	13.4
Draper	63.2	<b>63.2</b>	<b>46.6</b>	57.7	14.1	<b>54.7</b>	57.7	13.7	57.6	57.8	13.4
LCS Helix AX	62.9	<b>64.8</b>	41.6	58.3	13.8	<b>53.4</b>	58.3	13.2	56.6	58.1	12.9
Redfield	59.2	<b>64.5</b>	44.1	57.7	14.5	<b>54.3</b>	58.0	13.2	55.9	57.8	13.8
WB4309	62.1	<b>66.1</b>	40.6	57.6	14.5	52.8	57.8	13.2	55.9	57.6	13.4
CP7017AX	<b>67.5</b>	54.1	<b>45.7</b>	58.6	13.5	49.8	57.3	13.7	55.7	57.1	13.2
Crescent AX	64.2	61.2	38.3	57.8	14.0	49.6	57.9	13.6	54.5	57.7	13.2
SY Wolverine	57.4	61.5	44.4	58.7	13.9	<b>53.0</b>	58.0	13.7	54.4	57.6	13.3
AP 18AX	61.5	58.6	43.5	57.1	13.9	50.9	56.6	13.7	54.4	56.7	13.2
CP7050AX	58.9	57.9	40.4	59.7	14.2	48.5	59.4	14.2	51.9	59.4	13.9
Expedition	46.2	57.7	41.0	58.1	14.4	49.4	58.0	14.1	48.3	57.9	13.7
AP Clair	-	62.9	41.9	58.4	14.2	52.1	57.8	14.0	-	-	-
LCS Steel AX	-	61.8	42.5	56.7	14.1	51.1	57.1	14.5	-	-	-
LCS Chrome	-	60.8	42.2	58.5	14.5	51.0	58.5	14.0	-	-	-
CP7869	-	59.6	41.9	58.0	14.1	49.9	57.4	14.1	-	-	-
MS Iceman	-	56.7	42.1	58.9	14.8	49.6	59.0	14.1	-	-	-
AP Bigfoot	-	58.7	39.3	59.0	14.5	49.2	58.0	14.1	-	-	-
LCS Julep	-	58.8	40.2	60.4	14.6	48.9	59.7	14.2	-	-	-
LCS Photon AX	-	58.7	38.8	59.3	14.5	48.0	59.4	13.9	-	-	-
Kivari AX	-	-	<b>49.2</b>	57.6	13.0	-	-	-	-	-	-
Viking 211	-	-	<b>47.6</b>	58.1	13.7	-	-	-	-	-	-
Byrd CL Plus	-	-	<b>46.0</b>	57.4	13.6	-	-	-	-	-	-
MS Maverick	-	-	<b>45.9</b>	58.6	14.0	-	-	-	-	-	-
WB4422	-	-	<b>44.6</b>	59.0	14.7	-	-	-	-	-	-
CP7266AX	-	-	40.3	57.6	14.0	-	-	-	-	-	-
WB4510CLP	-	-	39.2	59.1	14.4	-	-	-	-	-	-
<b>Trial Average#</b>	62.9	61.0	43.1	58.3	14.2	51.7	58.1	13.9	56.1	57.9	13.3
<b>LSD(0.05)†</b>	4.3	4.7	3.6	0.8	0.5	3.3	0.7	0.6	2.6	0.5	0.4
<b>C.V.%‡</b>	8.5	9.7	12	1.9	4.9	11.1	2.1	7.2	9.9	2	6.8

# Trial averages may include values from experimental lines that are not reported.  
 † Value required (≥LSD) to determine if varieties are significantly different from one another.  
 ‡ C.V. is a measure of variability or experimental error, 15% or less is considered acceptable.  
 Note: Western trial sites include Lantry/Faith, Martin, Sturgis, and Wall.



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## 21st Century Genetics (TCG) Hard Red Spring Wheat (HRS) trials in 2022

2021 and 2022 were contrasting years. 2021 was characterized by very early heat, and season long droughty conditions. 2022 was characterized by late planting, Spring would never come, and more moderate growing condition. Despite the short season harvest went very well, perfect harvest conditions, and the yields were generally good, exceeding 85 bushels in many places. Quality was variable but generally good. There were no serious disease problems except BLS, it returned after an absence in droughty 2021.

TCG varieties performed very well in droughty 2021, and equally well in high yield 2022, especially our highest yielding varieties TCG-Spitfire and TCG-Wildcat. See Table 1- and 3-year Summary, Table 2.

TCG-Spitfire is our best performing HRS across environments year in and year out with an excellent combination

of yield and standability, with medium protein and TW and excellent tolerance to BLS. TCG-Spitfire is slightly susceptible to preharvest sprouting (PHS) so timely harvest is recommended to prevent low falling numbers.

TCG-Wildcat is much like TCG-Spitfire, but it has higher protein and TW, with earlier maturity and quicker dry down, slightly better standability and good tolerance to PHS. It has a good coping reaction to BLS. It yields right with TCG-Spitfire in most places with all the advantages. TCG-Wildcat is a certified seed only (CSO) variety. MS-S for scab so well-timed fungicide is a must.

TCG-Heartland is our highest quality variety based on protein and TW, it has good tolerance to PHS, with excellent standability and good yielding ability especially in the Northern Third of ND

and MN. TCG-Heartland is a certified seed only (CSO) variety.

TCG-Wildfire is an alkali tolerant choice for your tough alkali ground.

TCG-Badlands (new for 2024) a new alkali tolerant variety with better standability and yield than TCG-Wildfire. CSO variety. Test marketing in 2023.

TCG-Teddy (new for 2023) outstanding standability with big yield punch, when planted at high rates 1.8M. Good tolerance to BLS and preharvest sprouting, which preserves high falling numbers. CSO Variety.

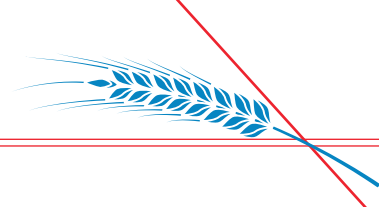
T18C904 (new for 2024) this is an improved TCG-Spitfire type with better scab resistance than TCG-Spitfire, and better tolerance to preharvest Sprouting (PHS). T18C904 stands well and can produce big yields planted at normal populations (1.5M). Increased in 2023 for sale in 2024 as a CSO variety.



# 21<sup>ST</sup> CENTURY GENETICS

TCG-SPITFIRE	NEW CSO TCG-WILDCAT	CSO TCG-HEARTLAND	TCG-WILDFIRE	NEW CSO TCG-TEDDY
Top Yield, Standability and Drought Tolerance Region Wide	Widely Adapted Management Wheat	Excellent Combination of Standability, Protein, TW and Yield Adapted to well Drained, Light-Medium Texture Soils	Good Yields with Consistent Protein on Tough Alkali Ground	Outstanding Standability with Big Yield Punch
Medium Protein Good Tolerance to BLS	Excellent Combination of Yield, Standability, TW, and Protein	Tolerance to Preharvest Sprouting	PVPA (94)	Good Tolerance to BLS and Preharvest Sprouting
PVPA (94)	Good Tolerance to Preharvest Sprouting	PVPA (94) Patented		Performs Best at Higher Seeding Rates
	PVPA (94) and Patent Pending			Patent Pending

Visit [tcgwheat.com](http://tcgwheat.com) to find a TCG seed associate near you.



**Table 1.** 2022 TCG HRS Wheat trial results in 7 environments

Variety	Site Yield (bu/A)							Average across 7 sites			Average of 2-3 impacted sites	
	Minnesota				North Dakota			Yield	Protein	Test Wt	Lodging	BLS <sup>3</sup>
	Stephen <sup>1</sup>	Crookston <sup>1</sup>	Fisher <sup>1</sup>	Fisher	Thompson <sup>1</sup>	Casselton	Crystal <sup>1</sup>	bu/A	%	lbs/bu	Score <sup>2</sup>	Score <sup>2</sup>
TCG-Spitfire	85.0	90.1	90.9	108.3	103.6	80.1	77.1	90.7	14.2	59.6	1.5	2.8
LCS Trigger	90.3	86.5	93.8	84.3	97.2	86.5	83.1	88.8	12.5	60.8	2.7	2.5
TCG-Wildcat	80.8	95.3	86.8	98.2	92.0	84.5	80.2	88.3	15.3	60.9	0.8	2.8
MN-Rothsay	68.2	91.8	97.3	97.2	96.5	80.3	80.4	87.4	14.5	59.9	1.2	5.3
T18C904	68.2	90.1	98.9	103.2	89.1	80.8	75.9	86.6	14.8	60.5	0.3	4.3
Prosper	69.6	92.8	92.2	89.1	81.1	90.2	88.1	86.1	14.9	60.7	4.3	3.5
TCG-Teddy	71.8	97.9	95.2	96.7	84.9	76.6	77.8	85.9	14.9	59.3	0.0	2.3
WB-Mayville	69.0	94.4	95.2	89.5	86.5	83.1	69.4	83.9	15.5	60.7	0.5	3.0
SY-Valda	76.7	86.4	89.6	92.2	86.7	75.4	76.1	83.3	14.2	60.4	2.2	2.8
Shelly	63.0	89.4	96.4	85.0	85.8	79.5	72.6	81.7	15.7	60.9	0.5	4.5
TCG-Badlands	68.7	77.1	89.3	85.5	86.8	73.9	82.8	80.6	14.8	59.9	1.7	3.5
AP Murdock	80.7	87.0	76.3	72.7	89.0	76.7	79.7	80.3	14.6	59.7	3.8	3.5
Torgy	75.0	80.8	81.0	79.4	86.4	76.6	78.8	79.7	15.6	60.3	4.2	2.5
Driver	69.6	81.3	83.2	82.0	88.1	77.6	74.0	79.4	15.1	61.1	5.2	4.3
LCS Rebel	76.4	81.5	83.4	79.2	79.5	75.4	76.6	78.9	15.2	61.8	5.8	2.5
LCS Cannon	63.8	75.8	91.7	86.4	76.4	81.9	74.9	78.7	14.7	61.1	2.0	3.0
TCG-Heartland	65.0	78.2	88.4	88.1	80.9	77.2	71.3	78.4	16.1	60.9	0.7	3.8
TCG-Wildfire	73.9	75.4	90.0	82.0	78.7	74.2	72.0	78.0	14.9	60.3	3.0	3.5
Linkert	67.8	69.6	89.1	93.2	79.8	72.7	66.7	77.0	15.9	60.6	0.3	2.8
SY-Ingmar	79.9	70.3	81.2	79.4	74.1	73.8	71.0	75.7	15.7	60.8	3.3	2.5
Boost	77.9	78.6	70.0	69.9	81.4	76.4	71.2	75.1	15.1	59.5	5.3	2.0
Bolles	49.9	86.5	72.7	79.6	74.6	74.2	70.7	72.6	16.8	60.2	4.0	4.0
Barlow	47.2	78.3	80.9	75.6	77.2	67.7	69.1	70.9	16.0	60.9	6.3	4.5

<sup>1</sup> Sites treated with fungicide  
<sup>2</sup> Score from 0-10 (0 = none, 10 = most)  
<sup>3</sup> Bacterial Leaf Streak

**Table 2.** Three year average performance of TCG varieties and checks across 6-7 sites

Variety	Average Yield (bu/A)			3 Year Averages			
	2020	2021	2022	Yield	Protein	Test Weight	Lodging
				bu/a	%	lbs/bu	Score <sup>2,3</sup>
TCG-Spitfire	68.3	58.9	90.7	72.7	14.1	59.4	0.8
T18C904	68.8	53.3	86.6	69.6	14.8	60.0	0.4
TCG-Wildcat	66.1	52.5	88.3	69.0	15.3	60.6	0.4
TCG-Teddy	67.1	53.3	85.9	68.7	15.0	59.4	0.0
LCS Trigger	62.4	54.8	88.8	68.7	12.7	60.0	3.6
SY-Valda	63.4	54.5	83.3	67.1	14.2	60.1	3.0
WB-Mayville	66.4	50.2	83.9	66.8	15.7	60.6	0.4
Prosper	55.0	56.0	86.1	65.7	14.8	59.8	4.4
LCS Rebel	63.9	51.5	78.9	64.7	15.3	61.5	6.0
TCG-Badlands	68.1	45.5	80.6	64.7	14.7	59.2	1.2
LCS Cannon	65.6	47.6	78.7	64.0	14.9	61.4	1.7
Shelly	59.9	46.2	81.7	62.6	15.5	60.6	2.0
TCG-Wildfire	64.0	45.5	78.0	62.5	15.0	59.6	2.1
TCG-Heartland	62.6	46.1	78.4	62.4	16.2	60.8	0.3
Boost	56.9	50.9	75.1	60.9	15.2	59.4	4.8
Linkert	57.3	46.7	77.0	60.3	16.0	60.7	0.2
SY-Ingmar	60.2	42.7	75.7	59.5	15.4	60.5	2.2
Barlow	50.8	43.9	70.9	55.2	15.8	61.1	5.8
Bolles	46.1	44.3	72.6	54.3	16.9	59.3	4.4

<sup>1</sup> Bacterial Leaf Streak  
<sup>2</sup> Score from 0-10 (0 = none, 10 = most)  
<sup>3</sup> Average of two affected years: 2020 and 2022



# A program that ‘works on every level’: Certifying Agents assist producers in enrolling in the MAWQCP

The Minnesota Agricultural Water Quality Certification Program (MAWQCP) certifies farmers for managing the land within their operation in a way that protects water quality and improves soil health for today’s and tomorrow’s farmers.

Area Certification Specialists assist farmers through the certification process. Producers can get started by contacting their local Soil and Water Conservation District, their Area Certification Specialist or contact the Minnesota Department of Agriculture ([www.mda.state.mn.us/mawqcp-contact-form](http://www.mda.state.mn.us/mawqcp-contact-form)) for follow up from program staff. After a farmer complete the program application, a Certifying Agent will work with you on the assessment process, which includes an online assessment tool and on-farm field verification. Lastly, compliance with existing laws and rules needs to be complete when the certification agreement is signed.

“Our specialists are the crucial part of the certification process,” MAWQCP Project Manager Brad Jordahl Redlin said. “They love working with farmers and helping them every step of the way—finding financial assistance, handling the paperwork, identifying options—to ensure every certification serves the unique needs of each farm.”

## MAWQCP Endorsements

The MAWQCP currently has five Endorsements available to water quality certified producers: Climate Smart Farm, Soil Health, Integrated Pest Management, Wildlife and Irrigation Water Management. Many conservation practices targeting water quality have benefits for other conservation goals, and the Endorsements provide additional recognition to water quality certified producers who are going above and beyond to implement

conservation on their farms. The MAWQCP partnered with

various non-profit organizations, University of Minnesota, Soil and Water Conservation Districts, and federal and state agencies to develop the criteria for the Endorsements.

Endorsements are available to producers who are enrolled in the MAWQCP. Those who achieve an Endorsement will receive an additional sign for their farm and recognition for their conservation excellence.

## Contact a MAWQCP Area Certification Specialist today!

**Northwest:** Glen Kajewski, East Polk SWCD, [glen.kajewskieastpolk@gmail.com](mailto:glen.kajewskieastpolk@gmail.com), 218-689-1502

**North Central:** Jim Lahn, East Otter Tail SWCD, [james.lahn@eot.mnswcd.org](mailto:james.lahn@eot.mnswcd.org), 218-346-4260 x122

**Northeast:** Ryan Clark, Carlton SWCD, [ryan.clark@carltonswcd.org](mailto:ryan.clark@carltonswcd.org), 218-384-3891 x6

**West Central:** Grant Pearson, Stearns SWCD, [grant.pearson@mn.nacdnet.net](mailto:grant.pearson@mn.nacdnet.net), 320-428-4374

**South Central:** Herman Bartsch, Cottonwood SWCD, [hermanbartsch@outlook.com](mailto:hermanbartsch@outlook.com), 507-344-3210

**Southwest:** Danielle Evers, Pipestone SWCD, [danielle.evers@co.pipestone.mn.us](mailto:danielle.evers@co.pipestone.mn.us), 507-825-1199

**Southeast:** Mark Root, Olmsted SWCD, [MSROOTMAWQCP@gmail.com](mailto:MSROOTMAWQCP@gmail.com), 507-226-5923

**Metro:** [www.mda.state.mn.us/mawqcp-contact-form](http://www.mda.state.mn.us/mawqcp-contact-form), 651-200-5307

“(The specialists) really did a great job,” said Washington County farmer Fran Miron, who was MAWQCP-certified in 2020. “It’s really a painless process.”

The more than 1,275 producers currently certified in the program – now in its seventh year of implementation – cover over 925,000 certified acres and implement more than 2,550 new conservation practices. These practices are reducing over 43,000 tons of sediment of each year, 127,000 tons of soil and cutting nitrogen loss by nearly 50%. The MDA plans to celebrate certifying one-million acres of farmland in Minnesota in early 2023.

“This program works on every level,” Gov. Tim Walz said at the 2022 MN AG EXPO, “and it works because producers are at the center of it, producers help write it and producers help execute it.”

Brought to you by the Minnesota Department of Agriculture



# IT'S NOT JUST YOUR LAND. IT'S YOUR LEGACY.

The Minnesota Agricultural Water Quality Certification Program rewards farmers like you for what you do best, taking care of your land and its natural resources.

To get started and learn more, contact your local soil and water conservation district or go to:

[MyLandMyLegacy.com](http://MyLandMyLegacy.com)





Clair Keene, Andrew Green, Andrew Friskop, Matt Breiland, Tim Friesen, Zhaohui Liu and Shaobin Zhong (NDSU Main Station); John Rickertsen (Hettinger Research Extension Center); Eric Eriksmoen (North Central Research Extension Center, Minot); Bryan Hanson (Langdon Research Extension Center); Glenn Martin (Dickinson Research Extension Center); Gautam Pradhan (Williston Research Extension Center); Mike Ostlie (Carrington Research Extension Center)

Hard red spring (HRS) wheat was planted on 5.4 million acres in 2022, down slightly from 5.5 million in 2021. The average yield of HRS wheat was 52 bushels/acre (bu/a), up substantially from 34 bu/a in 2021. Low 2021 yields were caused by wide-spread and severe drought. The 2022 growing season started with late planting after spring blizzards and heavy rains delayed field work for many across the state.

SY Valda was the most popular HRS wheat variety in 2022, occupying 11.0% of the planted acreage, followed by SY Ingmar (9.4%), AP Murdock (8.8%), WB9590 (8.8%), WB9719 (4.1%), Shelly (3.9%), ND Vitpro (3.0%), Elgin ND (3.0%), and Faller (2.9%). SY Valda, SY Ingmar, and AP Murdock were released by Syngenta/AgriPro. WB9590 and WB9719 were released by Westbred/Monsanto. Shelly is a University of Minnesota release and ND Vitpro, Elgin, and Faller are NDSU varieties.

Successful wheat production depends on numerous factors, including selecting the right variety for a particular area. The information included in this publication is meant to aid in selecting that variety or group of varieties. Characteristics to consider in selecting a variety may include yield

potential, protein content when grown with proper fertility, straw strength, plant height, response to problematic pests (diseases, insects, etc.) and maturity. Every growing season differs; therefore, when selecting a variety, we recommend using data that summarize several years and locations. Choose the variety that, on average, performs the best at multiple locations near your farm during several years.

Selecting varieties with good milling and baking quality also is important to maintain market recognition and avoid discounts. Hard red spring wheat from the northern Great Plains is known around the world for its excellent end-use quality.

Millers and bakers consider many factors in determining the quality and value of wheat they purchase. Several key parameters are: high test weight (for optimum milling yield and flour color), high falling number (greater than 300 seconds indicates minimal sprout damage), high protein content (the majority of HRS wheat export markets want at least 14% protein) and excellent protein quality (for superior bread-making quality as indicated by traditional strong gluten proteins, high baking absorption and large bread loaf volume).

Gluten strength, and milling and baking quality ratings are provided for individual varieties based on the results from the NDSU field plot variety trials in multiple locations in 2021. The wheat protein data often are higher than obtained in actual production fields but can be used to compare relative differences among varieties.

The agronomic data presented in this publication are from replicated research plots using experimental designs that enable the use of statistical analysis. These analyses

enable the reader to determine, at a predetermined level of confidence, if the differences observed among varieties are reliable or if they might be due to error inherent in the experimental process.

The LSD (least significant difference) values beneath the columns in the tables are derived from these statistical analyses and apply only to the numbers in the column in which they appear. If the difference between two varieties exceeds the LSD value, it means that with 95% or 90% confidence (LSD probability 0.05 or 0.10), the higher-yielding variety has a significant yield advantage. When the difference between two varieties is less than the LSD value, no significant difference was found between those two varieties under those growing conditions.

NS is used to indicate no significant difference for that trait among any of the varieties at the 95% or 90% level of confidence. The CV stands for coefficient of variation and is expressed as a percentage. The CV is a measure of variability in the trial. Large CVs mean a large amount of variation could not be attributed to differences in the varieties. Yield is reported at 13.5% moisture, while protein content is reported at 12% moisture content.

Presentation of data for the entries tested does not imply approval or endorsement by the authors or agencies conducting the test. North Dakota State University approves the reproduction of any table in the publication only if no portion is deleted, appropriate footnotes are given and the order of the data is not rearranged. Additional data from county sites are available from each Research Extension Center at <https://vt.ag.ndsu.edu/>.





**Table 1.** North Dakota hard red spring wheat variety descriptions, agronomic traits, 2022.

Variety	Agent or Origin <sup>1</sup>	Year Released	Height (inches) <sup>2</sup>	Straw Strength <sup>3</sup>	Days to Head <sup>4</sup>	Reaction to Disease <sup>5,6</sup>		
						Leaf Rust	Tan Spot	Bact. Leaf Streak
AAC Brandon	Canada	2012	31	4	49	6	NA	6
AAC Starbuck	Canada	2018	32	4	49	6	NA	6
AAC Wheatland	Canada	2018	31	4	49	4	NA	7
AP Gunsmoke CL2	Syngenta/AgriPro	2021	30	6	48	3	4	8
AP Murdock	Syngenta/AgriPro	2019	28	4	49	5	4	6
AP Smith	Syngenta/AgriPro	2021	28	2	50	3	3	5
Ascend-SD	SD	2022	34	4	50	4	NA	5
Bolles	MN	2015	30	4	51	2	4	6
CAG-Justify	Champions Alliance Grp	2021	31	6	51	2	5	6
CAG-Reckless	Champions Alliance Grp	2021	32	5	49	2	6	6
CAG-Recoil	Champions Alliance Grp	2022	29	3	55	1	NA	3
CP3099A	Croplan	2020	32	5	52	3	4	6
CP3188	Croplan	2020	30	7	49	2	6	7
CP3530	Croplan	2015	33	7	50	5	6	6
Dagmar <sup>7</sup>	MT	2019	30	6	47	7	4	7
Driver	SD	2019	31	4	50	1	7	7
Faller	ND	2007	32	6	50	7	7	5
Glenn	ND	2005	33	4	47	6	6	5
Lanning	MT	2017	30	3	50	7	4	8
LCS Ascent	Limagrain	2022	30	4	46	6	NA	6
LCS Buster	Limagrain	2020	32	5	53	4	4	4
LCS Cannon	Limagrain	2018	29	4	45	7	5	7
LCS Dual	Limagrain		30	4	48	6	NA	7
LCS Hammer AX	Limagrain	2022	29	4	47	6	NA	7
LCS Rebel	Limagrain	2017	33	6	46	7	3	5
LCS Trigger	Limagrain	2016	33	5	54	1	4	4
MN-Rothsay	MN	2022	29	3	51	6	NA	6
MN-Torgy	MN	2020	31	4	50	3	3	4
MN-Washburn	MN	2019	30	3	51	1	6	6
MS Barracuda	Meridian Seeds	2018	28	4	45	NA	7	7
MS Charger	Meridian Seeds	2022	29	7	47	2	NA	7
MS Cobra	Meridian Seeds	2022	29	4	48	2	4	8
MS Rancho	Meridian Seeds	2020	32	5	53	4	5	6
ND Frohberg	ND	2020	33	5	49	5	8	5
ND Heron	ND	2021	31	6	46	7	NA	7
ND VitPro	ND	2016	31	4	48	4	6	6
Shelly	MN	2016	29	4	51	6	3	8
SK Rush	Canada	2016	33	4	50	2	NA	7
SY 611 CL2	Syngenta/AgriPro	2019	28	3	48	6	4	6
SY Ingmar	Syngenta/AgriPro	2014	29	3	50	3	6	6
SY Longmire <sup>7</sup>	Syngenta/AgriPro	2019	29	5	49	6	4	6
SY McCloud	Syngenta/AgriPro	2019	30	4	48	5	7	8
SY Valda	Syngenta/AgriPro	2015	29	5	49	2	7	6
TCG-Heartland	21st Century Genetics	2019	28	3	47	3	4	7
TCG-Spitfire	21st Century Genetics	2015	30	3	51	5	6	5
TCG-Wildcat	21st Century Genetics	2020	30	3	49	5	6	7
WB9590	WestBred	2017	27	3	48	3	8	8

<sup>1</sup> Refers to agent or developer: MN = University of Minnesota; MT = Montana State University; ND = North Dakota State University; SD = South Dakota State University; Canada = Agri-Food Canada. Bold varieties are those recently released, so data are limited and rating values may change.

<sup>2</sup> Height data averaged from multiple locations in 2022.

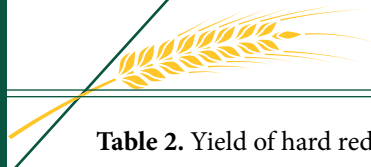
<sup>3</sup> Straw Strength = 1 to 9 scale, with 1 the strongest and 9 the weakest. These values are based on recent data and may change as more data become available.

<sup>4</sup> Days to Head = the number of days from planting to head emergence from the boot, averaged based on data from several locations in 2022.

<sup>5</sup> Disease reaction scores from 1 to 9, with 1 = resistant and 9 = very susceptible, NA = not available.

<sup>6</sup> All wheat varieties are resistant to moderately resistant to stem rust when screened using *Puccinia graminis* f. sp. *tritici* races TPMK, TMLK, RTQQ, QFCQ and QTHJ.

<sup>7</sup> Solid stemmed or semisolid stem, imparting resistance to sawfly.



**Table 2.** Yield of hard red spring wheat varieties grown at five locations in eastern North Dakota, 2020-2022.

Variety	Carrington		Casselton		Grand Forks		Langdon		Prosper		Average	
	2022	3 Yr.	2022	3 Yr.	2022	3 Yr.	2022	3 Yr. <sup>1</sup>	2022	2 Yr.	2022	3 Yr.
	------(bu/a)-----											
AAC Brandon	56.8	--	66.2	--	80.4	--	75.0	--	66.4	--	69.0	--
AAC Starbuck	60.7	--	69.5	--	77.5	--	80.1	--	55.9	--	68.7	--
AAC Wheatland	54.8	--	70.2	--	81.8	--	75.7	--	49.3	--	66.4	--
AP Gunsmoke CL2	57.7	54.0	72.9	--	86.1	--	80.6	--	50.8	73.5	69.6	--
AP Murdock	54.5	51.6	72.7	86.9	90.5	78.9	92.6	87.2	66.5	75.4	75.4	76.0
AP Smith	53.4	48.9	67.8	--	82.2	--	79.8	--	58.0	72.3	68.2	--
Ascend-SD	60.3	--	72.2	--	94.4	--	89.9	--	78.4	--	79.1	--
Bolles	46.1	45.7	74.4	77.0	83.1	69.7	71.0	70.5	42.0	61.7	63.3	64.9
CAG-Justify	60.7	--	74.7	--	78.8	--	92.6	--	50.3	70.9	71.4	--
CAG-Reckless	53.3	--	74.6	--	82.7	--	82.3	--	64.1	78.1	71.4	--
CAG-Recoil	53.2	--	62.3	--	95.1	--	85.5	--	75.3	--	74.3	--
CP3099A	59.7	--	83.7	--	87.8	--	81.8	--	57.9	78.2	74.2	--
CP3188	66.2	--	68.5	--	76.0	--	80.5	--	49.3	69.9	68.1	--
CP3530	58.7	54.4	71.9	85.3	86.5	77.6	86.7	82.7	63.9	70.3	73.5	74.1
Dagmar	62.8	56.0	68.4	80.8	89.3	75.6	68.7	--	54.7	68.3	68.8	--
Driver	58.3	56.6	77.5	86.7	87.5	78.9	81.9	--	51.6	73.6	71.4	--
Faller	59.4	56.7	71.0	82.8	81.5	77.2	85.7	83.3	69.9	80.5	73.5	76.1
Glenn	47.3	45.8	58.7	70.3	74.8	65.6	67.6	72.0	52.9	56.1	60.3	62.0
Lanning	49.2	47.5	67.9	81.7	78.5	69.7	60.5	--	60.2	71.1	63.3	--
LCS Ascent	51.4	--	79.9	--	90.5	--	85.0	--	57.1	--	72.8	--
LCS Buster	57.6	50.3	80.6	92.4	86.4	79.5	86.4	--	65.6	76.4	75.3	--
LCS Cannon	55.5	48.6	76.7	91.5	92.3	77.0	85.8	76.7	52.5	--	72.6	--
LCS Dual	65.9	--	76.4	--	88.7	--	73.1	--	46.2	--	70.1	--
LCS Hammer AX	63.2	--	76.7	--	87.8	--	79.5	--	63.6	--	74.2	--
LCS Rebel	64.4	55.4	76.9	82.0	78.9	76.3	76.7	77.8	64.3	76.7	72.2	73.6
LCS Trigger	58.6	55.4	80.7	90.6	91.2	85.3	93.5	87.1	81.3	87.4	81.1	81.2
MN-Rothsay	51.0	--	70.1	--	92.2	--	77.1	--	60.4	--	70.2	--
MN-Torgy	62.3	60.6	74.2	83.7	89.1	77.2	82.0	78.8	65.6	75.9	74.6	75.2
MN-Washburn	51.1	49.2	71.2	80.8	90.9	74.7	80.1	77.9	59.4	72.9	70.5	71.1
MS Barracuda	53.0	48.3	74.0	83.1	80.1	70.9	73.0	74.0	51.9	65.2	66.4	68.3
MS Charger	60.9	--	86.9	--	94.9	--	89.6	--	57.3	--	77.9	--
MS Cobra	60.6	--	76.4	--	78.3	--	67.5	--	47.9	66.8	66.2	--
MS Ranchero	55.6	55.4	66.2	82.4	80.2	75.3	76.1	--	50.4	62.3	65.7	--
ND Frohberg	54.9	48.2	72.2	82.3	79.4	69.8	77.4	77.2	62.0	73.7	69.2	70.3
ND Heron	48.5	42.8	66.7	--	79.1	--	68.0	71.1	56.5	--	63.8	--
ND VitPro	59.5	56.5	56.1	71.8	80.3	69.5	71.1	73.4	60.6	69.3	65.5	68.1
Shelly	65.0	59.0	78.3	--	86.1	73.5	76.0	71.9	46.5	--	70.4	--
SK Rush	46.9	--	60.5	--	74.8	--	75.5	--	59.4	--	63.4	--
SY 611CL2	57.3	48.8	67.1	81.4	82.2	72.9	81.6	80.9	58.5	76.2	69.3	72.0
SY Ingmar	50.4	46.6	66.5	77.9	81.9	72.6	75.3	77.8	50.1	67.5	64.8	68.5
SY Longmire	48.9	--	61.4	79.5	78.6	71.2	70.0	75.6	52.6	69.8	62.3	--
SY McCloud	52.2	50.5	75.9	84.2	84.8	71.7	75.4	76.5	54.4	71.2	68.5	70.8
SY Valda	55.2	53.9	71.8	85.8	93.9	77.6	86.1	81.7	62.6	77.2	73.9	75.2
TCG-Heartland	45.0	44.3	70.9	79.0	88.1	72.0	68.4	69.9	48.9	65.1	64.3	66.1
TCG-Spitfire	58.2	55.2	71.8	81.4	96.4	82.8	82.5	80.3	72.0	85.7	76.2	77.1
TCG-Wildcat	54.8	49.1	79.6	83.7	90.9	78.4	76.1	--	60.0	74.8	72.3	--
WB9590	56.7	--	78.9	--	97.4	--	74.4	--	50.3	68.5	71.5	--
Mean	56.3	51.6	71.9	82.5	85.3	74.9	78.6	77.5	59.2	72.2	70.1	71.7
CV%	9.9	--	4.4	--	6.5	--	7.7	--	12.1	--	8.2	--
LSD 0.05	7.8	--	5.8	--	6.2	--	8.4	--	8.1	--	7.1	--
LSD 0.10	6.6	--	4.5	--	5.2	--	7.1	--	6.8	--	6.0	--

<sup>1</sup>Langdon 3-year avg. includes 2019, 2020 and 2022.



**Table 3.** Yield of hard red spring wheat varieties grown at four locations in western North Dakota, 2020-2022.

Variety	Hettinger		Mandan		Minot		Williston		Average	
	2022	3 Yr.	2022	3 Yr.	2022	3 Yr.	2022	3 Yr.	2022	3 Yr.
	------(bu/a)-----									
AAC Brandon	73.1	--	49.3	--	62.2	--	31.2	--	53.9	--
AAC Starbuck	76.1	--	51.6	--	52.4	--	33.3	--	53.4	--
AAC Wheatland	73.3	--	51.2	--	60.1	--	31.9	--	54.1	--
AP Gunsmoke CL2	78.8	50.5	66.4	43.8	57.7	--	34.8	--	59.4	--
AP Murdock	73.6	45.3	65.2	42.2	58.1	52.7	33.2	25.2	57.5	41.3
AP Smith	76.5	44.2	58.5	42.0	58.6	--	36.1	--	57.4	--
Ascend-SD	74.4	--	65.7	--	61.8	--	37.9	--	60.0	--
Bolles	70.3	43.1	56.5	38.5	61.5	55.4	31.6	24.3	55.0	40.3
CAG-Justify	82.4	--	67.2	--	66.7	--	33.8	--	62.5	--
CAG-Reckless	75.2	--	57.9	--	56.3	--	36.1	--	56.4	--
CAG-Recoil	76.4	--	66.6	--	66.9	--	37.7	--	61.9	--
CP3099A	76.8	--	62.8	--	68.7	--	34.6	--	60.7	--
CP3188	77.2	--	58.7	--	59.4	--	39.2	--	58.6	--
CP3530	76.0	48.0	58.4	41.1	55.5	56.8	33.4	--	55.8	--
Dagmar	82.6	51.7	57.7	39.0	60.9	53.7	30.7	26.9	58.0	42.8
Driver	76.9	50.4	57.0	43.7	63.0	--	32.1	26.6	57.3	--
Faller	79.2	50.8	61.2	44.3	72.0	64.6	31.1	28.0	60.9	46.9
Glenn	71.2	45.3	54.6	38.6	56.6	50.5	27.0	25.5	52.4	40.0
Lanning	77.3	48.9	56.0	41.9	63.4	55.9	34.6	28.9	57.8	43.9
LCS Ascent	80.9	--	54.9	--	65.1	--	33.9	--	58.7	--
LCS Buster	81.3	50.9	69.5	48.6	66.8	--	40.0	29.4	64.4	--
LCS Cannon	79.6	50.7	56.6	38.7	59.2	52.9	28.1	24.0	55.9	41.6
LCS Dual	80.2	--	55.1	--	72.7	--	32.8	--	60.2	--
LCS Hammer AX	77.6	--	62.8	--	60.4	--	36.8	--	59.4	--
LCS Rebel	78.2	51.0	58.5	40.8	61.0	56.5	34.9	28.4	58.2	44.2
LCS Trigger	77.1	50.3	70.4	47.6	66.7	64.9	36.5	29.2	62.7	48.0
MN-Rothsay	74.2	45.1	63.5	44.8	70.1	--	36.8	--	61.1	--
MN-Torgy	77.1	49.0	65.7	45.1	65.4	58.7	36.0	28.1	61.0	45.2
MN-Washburn	76.1	47.5	58.1	39.8	56.0	52.6	31.7	25.6	55.5	41.4
MS Barracuda	82.8	49.3	57.3	37.7	61.6	57.7	28.9	25.5	57.6	42.5
MS Charger	86.5	--	61.6	--	59.0	--	39.0	--	61.5	--
MS Cobra	77.7	--	62.1	--	55.2	--	32.9	--	57.0	--
MS Ranchero	78.2	51.0	64.3	46.8	52.1	--	33.3	27.0	57.0	--
ND Frohberg	73.7	47.3	57.9	40.6	58.0	53.0	34.4	26.5	56.0	41.9
ND Heron	74.3	48.0	54.2	37.7	55.9	--	30.5	--	53.7	--
ND VitPro	71.6	44.0	51.1	38.0	54.2	48.5	28.8	24.8	51.4	38.8
Shelly	78.9	--	60.9	--	63.8	56.8	32.1	--	58.9	--
SK Rush	76.1	--	57.0	--	50.4	--	36.3	--	54.9	--
SY 611CL2	81.4	50.3	60.7	41.7	56.5	57.4	36.4	29.6	58.7	44.8
SY Ingmar	65.1	42.0	54.3	38.6	53.5	48.8	36.8	28.6	52.4	39.5
SY Longmire	70.7	45.6	55.2	40.0	53.5	54.7	38.1	29.5	54.4	42.4
SY McCloud	76.9	47.9	59.8	39.6	66.7	53.7	34.6	26.3	59.5	41.9
SY Valda	74.8	48.1	60.8	44.6	57.4	51.4	35.4	26.9	57.1	42.7
TCG-Heartland	73.2	46.5	51.0	36.2	58.7	54.7	30.1	27.2	53.3	41.2
TCG-Spitfire	77.4	50.1	63.5	45.9	62.6	60.4	38.7	30.2	60.6	46.7
TCG-Wildcat	75.5	46.5	63.9	41.5	61.3	--	38.2	29.1	59.7	--
WB9590	77.6	--	57.2	--	59.0	--	30.6	--	56.1	--
Mean	76.6	47.8	59.4	41.6	60.9	55.3	34.5	27.3	57.7	42.8
CV%	3.1	--	6.5	--	8.7	--	7.1	--	6.4	--
LSD 0.05	2.8	--	4.5	--	8.6	--	4.0	--	5.1	--
LSD 0.10	2.2	--	3.5	--	7.2	--	3.3	--	4.3	--



**Table 4.** Protein at 12% moisture of hard red spring wheat varieties grown at nine locations in North Dakota, 2022.

Variety	Carrington	Casselton	Grand Forks	Langdon	Prosper	Hettinger	Mandan	Minot	Williston	State Avg.
	------(%)-----									
AAC Brandon	13.9	14.5	16.1	15.0	16.9	13.2	12.3	14.7	13.7	14.5
AAC Starbuck	13.7	15.3	16.5	15.3	17.3	14.1	13.2	14.1	14.7	14.9
AAC Wheatland	12.9	14.8	16.3	15.5	17.1	13.1	12.0	13.8	13.9	14.4
AP Gunsmoke CL2	12.0	14.3	15.5	14.8	17.0	12.6	11.4	13.3	15.0	14.0
AP Murdock	12.1	13.4	14.0	13.7	15.2	12.7	11.4	13.0	13.4	13.2
AP Smith	12.5	14.1	15.0	14.7	15.4	13.1	12.1	13.4	14.6	13.9
Ascend-SD	12.4	14.2	16.0	14.1	16.4	13.1	10.8	12.7	13.7	13.7
Bolles	14.1	15.9	16.5	15.8	17.4	13.6	13.4	13.9	16.0	15.2
CAG-Justify	11.1	13.5	14.8	13.1	15.7	12.2	10.6	12.0	13.5	12.9
CAG-Reckless	13.0	14.3	15.6	14.3	15.6	12.7	11.3	13.8	13.7	13.8
CAG-Recoil	12.6	13.5	14.4	14.4	15.4	13.2	11.2	12.6	13.6	13.4
CP3099A	11.6	12.6	13.8	12.5	14.6	11.7	10.8	12.1	12.2	12.4
CP3188	11.2	13.0	14.1	13.0	15.1	11.9	10.7	12.0	11.8	12.5
CP3530	12.7	14.5	15.1	14.7	16.2	13.3	11.4	14.3	14.3	14.1
Dagmar	13.1	14.5	15.8	15.6	16.4	12.4	11.5	14.8	15.9	14.4
Driver	12.0	13.9	15.0	13.9	15.7	12.5	11.7	13.4	14.2	13.6
Faller	11.7	13.3	14.9	13.6	15.2	12.2	11.1	12.1	13.3	13.0
Glenn	12.5	14.9	16.0	15.0	16.9	13.9	11.8	14.6	15.4	14.6
Lanning	12.6	14.6	16.3	15.3	16.7	13.4	12.0	13.1	13.2	14.1
LCS Ascent	11.5	13.4	13.8	13.6	15.4	12.0	11.0	13.5	13.6	13.1
LCS Buster	10.9	12.0	12.9	12.5	13.1	11.6	9.7	11.5	12.0	11.8
LCS Cannon	12.4	13.5	14.8	14.6	16.3	12.4	11.5	13.8	15.8	13.9
LCS Dual	12.3	13.2	15.0	13.9	16.2	12.0	11.1	13.1	13.2	13.3
LCS Hammer AX	12.0	13.9	14.3	14.4	15.5	12.2	11.4	13.7	13.6	13.4
LCS Rebel	12.4	14.5	15.4	14.6	16.5	12.5	12.7	14.0	14.0	14.1
LCS Trigger	11.0	12.1	13.0	12.1	13.1	11.3	9.4	11.4	12.6	11.8
MN-Rothsay	12.0	13.9	14.8	14.6	15.1	12.5	11.0	13.0	13.3	13.4
MN-Torgy	13.2	14.3	15.6	14.7	15.8	12.4	11.2	13.1	13.1	13.7
MN-Washburn	12.8	13.7	15.8	14.1	16.6	12.9	11.6	14.1	13.9	13.9
MS Barracuda	13.4	14.6	15.7	15.0	17.1	12.1	11.8	14.5	14.7	14.3
MS Charger	10.2	12.3	13.9	12.5	15.1	11.1	10.6	12.7	12.1	12.3
MS Cobra	11.9	14.3	15.6	15.0	17.0	13.1	12.2	14.2	14.2	14.2
MS Ranchero	11.9	13.7	14.9	14.2	15.7	12.6	10.4	13.5	13.3	13.4
ND Frohberg	12.7	13.5	15.4	14.2	16.0	13.5	11.9	13.9	14.9	14.0
ND Heron	11.8	14.8	15.9	15.1	16.8	13.4	11.8	14.6	15.5	14.4
ND VitPro	13.0	15.1	16.1	14.8	16.5	14.4	12.3	14.1	15.1	14.6
Shelly	12.3	13.3	14.9	14.1	15.2	12.6	10.7	12.9	13.1	13.2
SK Rush	12.8	15.0	16.0	14.9	16.6	13.2	11.6	13.9	14.2	14.2
SY 611CL2	11.9	14.1	15.3	14.6	16.3	13.0	11.7	13.7	13.6	13.8
SY Ingmar	13.3	14.5	15.6	15.0	15.9	14.2	12.6	14.4	15.1	14.5
SY Longmire	13.5	14.1	15.0	15.2	15.9	12.8	12.0	13.5	14.5	14.1
SY McCloud	14.6	14.4	15.7	15.0	16.1	13.9	12.4	14.5	14.6	14.6
SY Valda	11.3	13.2	15.0	14.1	15.4	12.9	11.0	13.4	12.9	13.2
TCG-Heartland	13.5	15.0	15.8	15.4	16.5	14.3	12.0	14.2	15.4	14.7
TCG-Spitfire	12.8	13.4	14.1	13.6	14.5	13.2	11.4	12.8	13.1	13.2
TCG-Wildcat	13.3	14.0	15.4	15.2	15.5	13.7	11.6	13.9	13.9	14.0
WB9590	12.0	14.5	15.3	15.0	16.8	13.5	11.8	13.8	14.9	14.2
Mean	12.4	14.0	15.2	14.3	15.9	12.8	11.5	13.4	13.9	13.7
CV%	7.7	1.3	2.0	2.8	2.1	3.5	4.0	4.8	4.4	3.3
LSD 0.05	1.3	0.4	0.3	0.6	0.4	0.5	0.6	1.0	1.0	0.4
LSD 0.10	1.1	0.3	0.3	0.5	0.3	0.4	0.5	0.9	0.8	0.4



**Table 5.** Yield of organic hard red spring wheat varieties grown at two locations in North Dakota, 2020-2022.

Variety	Carrington		Dickinson	Average
	2022	3 Yr.	2022	2022
	------(bu/a)-----			
Barlow	16.3	17.3	58.4	37.3
Bolles	16.2	16.8	48.8	32.5
Ceres	11.5	15.3	52.9	32.2
Dagmar	16.7	20.1	66.8	41.7
Dapps	17.5	15.7	54.9	36.2
Driver	19.0	--	51.9	35.4
Elgin-ND	19.6	19.9	52.8	36.2
FBC Dylan	14.6	17.5	59.2	36.9
Faller	20.5	21.0	59.9	40.2
Glenn	15.5	17.5	56.3	35.9
Lang-MN	19.1	20.3	62.1	40.6
Lanning	16.0	20.5	61.7	38.9
Linkert	19.9	--	55.2	37.5
MN Rothsay	14.8	--	--	--
MN Washburn	17.1	16.3	54.2	35.6
MN-Torgy	17.8	--	69.0	43.4
Mida	12.6	16.4	45.8	29.2
ND Frohberg	15.8	19.6	51.6	33.7
ND Heron	17.0	--	63.3	40.1
ND VitPro	17.5	16.8	62.2	39.8
Prosper	20.3	--	68.0	44.2
Red Fife	16.4	22.2	51.6	34.0
Shelly	17.2	17.5	59.6	38.4
Mean	16.9	18.3	57.5	37.3
CV%	9.6	--	14.1	--
LSD 0.05	2.7	--	11.5	--
LSD 0.10	2.2	--	9.6	--



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**Table 6.** Quality data from 2018-2021. The Wheat Quality Index is a weighted average developed to summarize the relative milling and baking quality of lines in the trial. Data from across years are from 2018-2021 for all varieties which were tested in a minimum of two years (four locations per year) across North Dakota.

Variety	Test Weight <sup>1</sup>	Vitreous Kernels <sup>2</sup>	Wheat Protein <sup>3</sup>	Farinograph Absorption <sup>4</sup>	Flour Extraction <sup>5</sup>	Farinograph Stability <sup>6</sup>	Loaf Volume <sup>7</sup>	WQI RANK <sup>8</sup>
	lb/bu	%	12% m.b.	%	%	min	cm <sup>3</sup>	
Bolles	61.3	80.1	16.8	65.4	64.6	22.8	980.9	1
WB9479	62.7	77.8	16.0	63.4	67.3	19.0	972.2	2
SY McCloud	63.1	75.7	15.4	67.0	67.0	11.2	978.2	3
Glenn	64.1	88.9	15.5	65.3	65.9	14.6	973.8	4
LCS Rebel	63.2	78.2	15.1	64.8	68.7	12.9	981.8	5
SY Longmire	62.4	77.2	15.1	65.1	67.5	12.4	1004.0	6
ND Frohberg	62.7	76.6	14.8	67.0	66.3	13.7	950.7	7
AAC Brandon	62.1	77.9	15.5	66.4	68.1	11.9	947.4	8
Dagmar	62.3	86.9	15.5	65.3	66.6	13.8	966.1	9
TCG-Heartland	63.1	75.6	15.5	64.3	67.9	15.0	946.5	10
ND VitPro	63.5	87.3	15.5	65.6	67.4	10.0	965.8	11
Lanning	61.4	83.3	15.4	64.3	66.4	11.3	1015.3	12
CP3530	61.7	68.8	14.7	64.8	68.3	11.3	995.4	13
SY Ingmar	62.7	78.7	15.2	63.7	67.7	13.3	974.5	14
MN-Rothsay	62.3	72.4	15.0	62.6	67.8	14.7	993.8	15
MN-Washburn	61.9	88.2	14.6	61.7	69.9	16.8	975.6	16
ND Hern	63.4	84.8	15.5	71.9	64.4	9.1	945.2	17
LCS Cannon	63.2	68.7	14.7	63.5	68.9	13.7	964.8	18
AP Murdock	61.7	62.3	14.8	65.1	67.6	13.6	949.5	19
Boost	61.4	80.6	15.2	65.7	66.8	10.2	953.3	20
WB9719	63.8	77.6	15.2	64.6	66.4	13.1	929.3	21
SY 611CL2	63.0	77.1	14.9	68.6	65.4	9.1	927.4	22
TCG-Spitfire	61.6	73.1	14.3	65.1	65.8	12.4	966.7	23
MS Ranchero	61.0	77.7	14.6	65.9	65.3	12.6	941.6	24
WB9590	62.4	76.4	15.5	63.9	67.3	13.8	915.4	25
MN-Torgy	62.5	70.3	15.1	62.9	66.2	15.3	938.4	26
TCG-Wildcat	62.9	78.4	14.9	64.5	67.3	8.9	946.9	27
Faller	61.7	69.9	14.4	64.6	68.4	10.3	931.7	28
Shelly	61.6	67.5	14.3	61.5	68.3	16.0	909.7	29
Driver	62.9	77.9	14.7	61.8	67.6	10.3	927.7	30
SY Valda	62.3	83.6	14.4	63.4	66.4	7.9	896.2	31
LCS Trigger	61.8	81.5	13.2	64.8	67.9	9.6	813.2	32
LCS Buster	60.1	68.0	13.2	58.6	68.9	15.1	864.3	33
Mean	62.4	77.2	15.0	64.6	67.2	12.9	949.8	17.0

<sup>1</sup> Test weight - Expressed in pounds (lbs) per bushel. A high test weight is desirable. A 58 lb test weight is required for a grade of US No. 1.

<sup>2</sup> Vitreous kernels - Expressed as a percentage of seeds having a vitreous-colored endosperm. A high percentage is desirable. US No. 1 DNS requires greater than 75% vitreous kernels.

<sup>3</sup> Wheat Protein - Measured by NIR at a 12% moisture basis. A high protein is desirable for baking quality.

<sup>4</sup> Farinograph Absorption - Measured by NIR at a 14% moisture basis. A measure of dough water absorption, expressed as percent. A high absorption is desirable.

<sup>5</sup> Flour Extraction - Percentage of milled flour recovered from cleaned and tempered wheat. A high flour extraction percentage is desirable.

<sup>6</sup> Farinograph Stability - A measure of dough strength expressed in minutes above the 500 Brabender unit line during mixing. A high stability is desirable.

<sup>7</sup> Loaf Volume - The volume of the pup loaf of bread, expressed in cubic centimeters. A high volume is desirable.

<sup>8</sup> Standardized means were used to calculate the Wheat Quality Index (WQI). The WQI is a weighted index calculated as: Test Weight (5%); Vitreous kernel (5%); Wheat Protein (10%); Flour Extraction (10%); Farinograph Absorption (23.3%); Farinograph Stability (23.3%) and Loaf Volume (23.3%). Adjusted means across locations were calculated for each trait using a mixed model. These means were standardized (mean=0 and standard deviation=1) to remove the effect of scale, which vary between traits.





**Table 7.** Quality data from 2021 from four locations across North Dakota. The Wheat Quality Index is a weighted average developed to summarize the relative milling and baking quality of lines in the trial. Data from 2021 are for all varieties which were tested in the 2022 trial. Data were collected from Carrington, Thompson, Hettinger, and Prosper, North Dakota.

Variety	Test Weight <sup>1</sup>	Vitreous Kernels <sup>2</sup>	Wheat Protein <sup>3</sup>	Farinograph Absorption <sup>4</sup>	Flour Extraction <sup>5</sup>	Farinograph Stability <sup>6</sup>	Loaf Volume <sup>7</sup>	WQI RANK <sup>8</sup>
	lb/bu	%	12% m.b.	%	%	min	cm <sup>3</sup>	
CP3530	61.4	91.2	15.1	64.5	70.3	18.5	1046.1	1
MS Cobra	62.2	93.5	15.0	65.5	68.4	16.2	1064.5	2
SY Longmire	62.5	93.6	14.6	63.8	68.5	20.9	1043.9	3
SY McCloud	63.4	93.5	15.4	66.6	68.5	16.9	967.9	4
Lanning	61.6	93.6	15.1	63.5	69.3	18.3	1040.7	5
WB9479	62.9	92.7	15.9	63.2	68.1	23.1	971.2	6
Dagmar	62.4	93.7	15.3	64.8	66.8	20.5	970.1	7
MN-Washburn	62.3	94.3	14.6	61.0	70.0	25.1	999.4	8
TCG-Heartland	63.0	91.9	15.7	63.6	67.7	20.3	958.1	9
CAG-Reckless	62.5	91.0	15.0	64.5	65.8	19.5	997.2	10
LCS Rebel	63.2	94.0	15.1	63.5	68.8	18.8	961.4	11
AP smith	61.8	90.0	14.9	62.4	66.9	22.6	1003.7	12
LCS Cannon	63.6	88.7	14.6	62.3	68.9	21.4	967.9	13
TCG Spitfire	61.3	91.7	14.6	64.7	67.0	17.1	982.0	14
Glenn	64.1	94.0	15.2	64.5	66.0	19.5	927.7	15
ND VitPro	63.3	94.2	15.5	64.8	67.0	14.5	945.1	16
Bolles	61.4	90.8	16.6	64.6	64.7	22.9	903.8	17
AP Murdock	61.5	88.1	14.8	63.6	67.9	18.2	955.9	18
SY 611CL2	63.0	93.5	14.7	67.5	65.4	14.0	948.3	19
ND Frohberg	62.7	92.4	14.8	66.1	66.0	18.9	889.7	20
MN-Rothsay	62.8	90.0	14.8	61.9	67.9	17.7	991.8	21
SY Ingmar	62.7	94.2	15.0	62.8	67.4	19.3	940.7	22
WB9590	62.7	90.6	15.2	63.5	67.3	19.1	920.1	23
MN-Torgy	62.9	92.8	14.9	61.8	67.1	20.9	961.4	24
Ascend-SD	61.4	94.2	15.0	63.1	66.2	15.0	1003.6	25
MS Ranchero	61.9	92.6	14.3	65.2	66.0	16.6	925.5	26
AP Gunsmoke CL2	61.5	92.3	15.4	61.5	67.7	18.6	945.1	27
TCG-Wildcat	62.7	93.8	14.7	63.3	67.7	12.7	945.1	28
ND Heron	63.6	93.7	15.5	71.5	63.8	12.0	886.4	29
Driver	63.1	91.3	14.4	60.6	68.8	15.0	951.6	30
Faller	61.6	89.6	14.4	64.0	68.3	14.7	870.2	31
CP3188	61.0	86.0	13.7	59.5	68.4	24.0	906.0	32
CAG-Justify	59.4	93.5	14.1	62.1	68.6	12.9	908.2	33
SY Valda	62.5	93.9	14.6	62.8	66.1	12.0	869.1	34
CP3099A	59.2	89.5	13.2	60.6	67.2	17.7	936.4	35
LCS Trigger	61.3	92.8	13.6	62.9	67.1	15.2	835.4	36
LCS Buster	60.2	85.3	13.0	56.6	69.0	20.2	834.3	37
Mean	62.0	92.1	14.8	63.3	67.5	17.9	955.6	

See footnotes below Table 6.

# North Dakota barley yields 2022

Clair Keene

Barley was seeded on 740,000 acres in North Dakota in 2022, up from 580,000 acres in 2021. The average state yield was estimated at 73 bushels per acre, up from 51 bushels per acre during the drought of 2021. In much of the state, barley along with other crops were seeded late after April blizzards and May rains delayed planting. Barley yields in eastern North Dakota were good with variety trials averaging 95.5, 85.1, and 102.5 bushels per acre at Fargo, Carrington, and Langdon, respectively. In western North Dakota, trials at Glen Ullin, Hettinger, Minot, and Williston yielded 62.0, 99.4, 87.8, and 36.9 bushels per acre, respectively. AAC Synergy, ND Genesis, and Brewski were top yielders in eastern locations. In the west, ABI Cardinal was the highest yielding variety across all locations. CDC Austenson was only planted at Minot and Hettinger but was the highest yielding at both. No major issues with plump or protein were observed with trials averaging 92.4% plump and 11.0% protein in the east and 92% plump and 11.5% protein in the west.

**Table 1.** 2022 North Dakota barley variety descriptions.

Variety	Use <sup>1</sup>	Origin <sup>2</sup>	Year Released	Awn <sup>3</sup> Type	Rachilla		Height (inch)	Days to Head	Straw <sup>5</sup> Strength	Reaction to Disease <sup>6</sup>			
					Hair <sup>4</sup> Length	Aleurone Color				Stem Rust	Spot-form Net Blotch	Spot Blotch	Net Blotch
<b>Six-rowed</b>													
Tradition	M/F	BARI	2003	S	L	White	30	48	3	8	6	3	7
<b>Two-rowed</b>													
AAC Connect	M/F	Can.	2017	R	L	White	27	55	4	4	5	4	5
AAC Synergy	M/F	Syngenta	2015	R	L	White	29	55	4	4	3	4	4
ABI Cardinal	M/F	BARI	2019	R	S	White	28	56	4	NA	NA	4	6
Brewski	M	ND	2021	S	L	White	28	54	4	NA	NA	4	4
CDC Austenson	F	CDC	2009	R	S	White	29	57	2	NA	NA	2	2
CDC Churchill	M/F	CDC	2019	R	L	White	NA	NA	3	NA	3	3	NA
CDC Fraser	M/F	CDC	2016	R	L	White	27	56	2	NA	NA	4	4
Conlon <sup>7</sup>	M/F	ND	1996	S	L	White	28	49	5	8	4	6	3
Explorer	M	Secobra	NA	R	L	White	24	55	3	NA	NA	8	4
ND Genesis	M/F	ND	2015	S	L	White	30	52	4	8	4	4	6
Pinnacle	M/F	ND	2006	S	L	White	29	50	3	8	8	5	6

Bolded varieties were tested for the first time this year, so some ratings may change as new data become available.  
<sup>1</sup> M = malting; F = feed.  
<sup>2</sup> BARI = Busch Agricultural Resources Inc.; CDC = Crop Development Centre, University of Saskatchewan; ND = North Dakota State University  
<sup>3</sup> R = rough; S = smooth.  
<sup>4</sup> L = long S = short.  
<sup>5</sup> Straw Strength scores from 1-9, with 1 = strongest and 9 = weakest.  
<sup>6</sup> Disease reaction scores from 1-9, with 1 = resistant and 9 = very susceptible, NA – not available.  
<sup>7</sup> Lower DON accumulations than other varieties tested.

**Table 2.** Yield and test weight of barley varieties at three locations in eastern North Dakota, 2020-2022.

Variety	Fargo			Carrington			Langdon			Avg. eastern N.D.		
	Test	Yield		Test	Yield		Test	Yield		Test	Yield	
	Wt.	2022	3 Yr.	Wt.	2022	3 Yr.	Wt.	2022	3 Yr.	Wt.	2022	3 Yr.
	(lb/bu)	----(bu/a)----		(lb/bu)	----(bu/a)----		(lb/bu)	----(bu/a)----		(lb/bu)	----(bu/a)----	
<b>Six-rowed</b>												
Tradition	48.5	105.8	117.1	48.5	81.9	73.6	50.0	98.5	98.8	49.0	95.4	96.5
<b>Two-rowed</b>												
AAC Connect	49.9	93.6	103.0	46.9	86.7	74.3	49.5	100.1	105.5	48.8	93.5	94.3
AAC Synergy	49.9	104.2	103.2	48.8	94.0	77.1	50.5	105.2	109.8	49.7	101.1	96.7
ABI Cardinal	51.2	94.2	102.7	48.1	85.3	--	50.6	103.3	98.3	50.0	94.3	--
Brewski	49.5	99.0	100.1	46.7	87.8	--	50.1	108.6	--	48.8	98.5	--
CDC Austenson	--	--	--	52.6	89.7	--	--	--	--	--	--	--
CDC Fraser	49.2	91.1	97.5	47.2	81.4	--	49.4	105.2	--	48.6	92.6	--
Conlon	50.5	82.6	92.8	48.4	78.6	67.1	51.1	100.0	88.7	50.0	87.1	82.9
Explorer	54.2	81.5	95.8	47.7	85.5	73.2	48.9	105.6	95.1	50.3	90.9	88.0
ND Genesis	50.9	111.0	111.7	46.4	87.0	71.6	48.8	100.4	107.5	48.7	99.5	96.9
Pinnacle	49.4	92.0	100.0	48.2	78.5	70.7	51.6	98.5	96.2	49.7	89.7	89.0
Mean	50.3	95.5	102.4	48.1	85.1	72.5	50.1	102.5	100.0	49.4	94.2	92.0
CV %	--	7.8	--	2.1	8.6	--	1.1	5.0	--	2.4	6.1	--
LSD 0.05	--	11.8	--	1.4	10.5	--	0.8	7.6	--	NS	NS	--
LSD 0.10	--	9.9	--	1.2	8.8	--	0.7	6.3	--	1.7	NS	--



**Table 3.** Plump and protein of barley varieties at three locations in eastern North Dakota, 2022.

Variety	Fargo		Carrington		Langdon		Avg. eastern N.D.	
	Plump (%)	Protein (%)	Plump (%)	Protein (%)	Plump (%)	Protein (%)	Plump (%)	Protein (%)
<b>Six-rowed</b>								
Tradition	69.7	12.7	95	11.8	95	10.9	86.7	11.8
<b>Two-rowed</b>								
AAC Connect	81.1	12.0	90	11.1	95	10.3	88.6	11.1
AAC Synergy	87.1	12.3	96	10.9	97	10.4	93.3	11.2
ABI Cardinal	85.1	12.5	95	10.7	97	10.3	92.5	11.2
Brewski	91.6	11.2	96	11.0	96	10.1	94.7	10.8
CDC Austenson	--	--	92	10.8	--	--	--	--
CDC Fraser	88.7	13.1	95	11.1	97	10.3	93.5	11.5
Conlon	90.2	12.6	96	11.7	98	10.5	94.9	11.6
Explorer	91.4	11.5	93	10.8	95	9.7	93.2	10.7
ND Genesis	92.1	10.2	95	10.1	95	9.7	93.9	10.0
Pinnacle	85.0	10.9	96	10.2	97	10.0	92.6	10.4
Mean	86.2	11.9	95	10.9	96	10.2	92.4	11.0
CV %	--	--	2.1	4.6	1.8	4.6	--	--
LSD 0.05	--	--	2.8	0.7	2.4	0.7	--	--
LSD 0.10	--	--	2.4	0.6	2.0	0.6	--	--

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**Table 4.** Yield and test weight of barley varieties at four locations in western North Dakota, 2020-2022.

Variety	Glen Ullin			Hettinger			Minot			Williston			Avg. western N.D.		
	Test	Yield		Test	Yield		Test	Yield		Test	Yield		Test	Yield	
	Wt. (lb/bu)	2022	3 Yr.	Wt. (lb/bu)	2022	3 Yr.	Wt. (lb/bu)	2022	3 Yr.	Wt. (lb/bu)	2022	3 Yr.	Wt. (lb/bu)	2022	3 Yr. <sup>1</sup>
	---(bu/a)---			---(bu/a)---			---(bu/a)---			---(bu/a)---			---(bu/a)---		
<b>Six-rowed</b>															
Tradition	45.8	41.0	60.9	47.5	101.6	62.1	45.1	84.0	94.3	45.8	41.8	31.8	46.1	67.1	62.3
<b>Two-rowed</b>															
AAC Connect	44.4	62.1	--	47.0	94.6	61.3	45.8	90.0	104.6	45.4	41.2	31.0	45.6	72.0	--
AAC Synergy	46.0	56.9	79.4	47.8	103.4	64.1	44.5	85.1	101.7	45.2	42.1	31.4	45.9	71.9	69.1
ABI Cardinal	47.1	68.3	--	47.7	93.9	62.9	47.7	95.6	102.8	46.0	47.3	--	47.1	76.3	--
Brewski	45.4	74.0	--	47.1	105.1	70.0	45.6	82.5	--	43.9	37.1	--	45.5	74.7	--
CDC Austenson	--	--	--	50.1	111.9	--	47.1	94.4	--	--	--	--	--	--	--
CDC Fraser	45.8	63.8	--	46.9	101.2	--	46.0	86.4	--	45.5	37.7	--	46.0	72.3	--
Conlon	--	--	--	48.5	95.2	55.2	47.5	90.1	93.1	46.9	27.2	28.5	--	--	--
Explorer	--	--	--	46.6	105.3	67.6	47.5	93.0	103.4	46.7	41.6	35.0	--	--	--
ND Genesis	45.4	67.6	80.8	47.9	95.6	66.9	44.9	86.4	105.1	44.2	37.6	32.4	45.6	71.8	71.3
Pinnacle	--	--	--	46.2	85.7	59.9	45.2	78.8	99.0	46.6	34.0	31.4	--	--	--
Mean	45.7	62.0	73.7	47.6	99.4	63.3	46.1	87.8	100.5	45.6	36.9	31.6	46.0	72.3	67.6
CV %	1.3	8.3	--	1.6	5.2	--	1.6	4.9	--	1.4	8.5	--	1.7	8.5	--
LSD 0.05	0.9	7.4	--	0.9	6.1	--	1.2	7.4	--	1.1	5.2	--	1.2	NS	--
LSD 0.10	0.7	6.1	--	0.7	4.7	--	1.0	6.1	--	0.9	4.3	--	1.0	7.6	--

<sup>1</sup> Glen Ullin excluded from three-year average.

**Table 5.** Plump and protein of barley varieties at four locations in western North Dakota, 2022.

**Table 5. Plump and protein of barley varieties at four locations in western North Dakota, 2022.**

Variety	Glen Ullin		Hettinger		Minot		Williston		Avg. western N.D.	
	Plump	Protein	Plump	Protein	Plump	Protein	Plump	Protein	Plump	Protein
	------(%)-----									
<b>Six-rowed</b>										
Tradition	95	11.7	91	13.9	12.3	11.4	93	12.3		
<b>Two-rowed</b>										
AAC Connect	88	11.3	85	12.9	11.8	10.3	87	11.6		
AAC Synergy	93	10.6	92	12.4	12.9	10.8	92	11.7		
ABI Cardinal	95	11.2	90	12.4	11.9	9.9	93	11.4		
Brewski	95	9.8	90	11.7	11.6	11.2	93	11.1		
CDC Austenson	--	--	89	12.3	12.3	--	--	--		
CDC Fraser	96	11.5	91	12.4	12.9	11.3	94	12.0		
Conlon	--	--	95	13.1	12.7	11.0	--	--		
Explorer	--	--	86	13.6	11.8	10.2	--	--		
ND Genesis	94	9.6	92	11.2	10.8	9.7	93	10.3		
Pinnacle	--	--	85	11.7	10.7	9.5	--	--		
Mean	94	10.8	90	12.5	12.0	10.4	92	11.5		
CV %	2.0	4.0	3.1	5.8	3.4	5.5	--	--		
LSD 0.05	3	0.6	3.2	0.8	0.6	0.9	--	--		
LSD 0.10	2	0.5	2.5	0.7	0.5	0.8	--	--		



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**Venkat Chapara**

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# Preliminary Report 24

## 2022 Wheat, Barley, and Oats Variety Performance in Minnesota Preliminary Report

### Preface

Jochum Wiersma

'Dumbfounded' and 'befuddled' are the two adjectives that come to mind when reviewing the 2022 growing season. While there are parallels to the 2012 and 2013 growing seasons, the 2021 and 2022 growing seasons were extremer in every way compared to the aforementioned pair nearly a decade ago. The spring was cold and wet. Many producers commented to me that they could not recall ever getting started this late and with such difficult seedbed conditions. By the middle of May, only 5% of the spring wheat acres had been seeded. Two weeks later only half the acres had been seeded, compared to 2021, when the half way mark was reached four weeks earlier. Planting continued well past the date for full crop insurance coverage and ultimately, only a very limited number of acres were not seeded.

The first half of June remained cooler than normal and allowed ample tillering for the earliest seeded wheat. The second half of June, however, broke with the first half of the month and set the trend for the remainder of the summer with average temperatures slightly to well above the climate normal. Relative humidity and dew points were higher too than they had been the past few seasons. The disease risk models in turn indicated moderate to high risk for not just tan spot but, more importantly, Fusarium head blight (FHB) just as the majority of the spring wheat crop reached anthesis.

Many, including me, were only hoping for something a bit better than last year's disappointing numbers while keeping their fingers crossed that incidence of FHB would be low enough to avoid discounts. That was until the first combines started rolling. Initial yield reports were astoundingly good, and concerns of discounts for low-test weight and/or presence of DON were unnecessary. The only surprises 2022 did yield were some reports of ergot in the earliest harvested spring wheat and barley and lodging in later seeded fields in the central Red River Valley due to Hessian fly.

USDA-NASS' initial spring wheat yield forecast for Minnesota on July 1 was 53 bu/acre or 13 bu/acre more than their 2021 forecast. USDA-NASS corrected their forecast upwards to 56 bu/acre one month later. In the September Small Grains Summary USDA-NASS reported Minnesota's average spring wheat yield to be 61 bu/acre or nearly 30% higher than the year before. The state's average barley yield increased year-over-year by the same percentage point to 72.0 bu/acre, while the state average for oat increased 2 bu/acre to 59 bu/acre. Acreage of all three commodities remain near historic lows with only 55,000, 140,000, and 1.2 million acres of barley, oats, and spring wheat harvested, respectively.

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## Introduction

Successful small grain production begins with selection of the best varieties for a particular farm or field. For that reason, varieties are compared in trial plots on the Minnesota Agricultural Experiment Station (MAES) sites at St. Paul, Waseca, Lamberton, Morris, and Crookston. In addition to these five MAES locations, trials are also planted at the Magnusson Research Farm near Roseau and with a number of farmer cooperators. The cooperator plots are handled so factors affecting yield and performance are as close to uniform for all entries at each location as possible.

The MAES 2022 Wheat, Barley, and Oat Variety Performance in Minnesota Preliminary Report 24 is presented under authority granted by the Hatch Act of 1887 to the Minnesota Agricultural Experiment Station to conduct performance trials on farm crops and interpret data for the public.

The MAES and the College of Food, Agricultural and Natural Resource Sciences (CFANS) grants permission to reproduce, print, and distribute the data in this publication - via the tables - only in their entirety, without rearrangement, manipulation, or reinterpretation. Permission is also granted to reproduce a maturity group sub-table provided the complete table headings and table notes are included. Use and reproduction of any material from this publication must credit the MAES and the CFANS as its source.

## Variety Classifications

Varieties are listed in the tables alphabetically. Seed of tested varieties can be eligible for certification, and use of certified seed is encouraged. However, certification does not imply a recommendation. The intellectual property rights of the breeders or owners of the variety are listed as either PVP, PVP(pending), PVP(94), patent, or none. PVP protection means that the a variety is protected under the Plant Variety Protection Act for a period of 20 years, while PVP(94) means that the variety is protected for 20 years with the additional stipulation that seed of the variety can only be sold as registered and certified classes of seed. PVP(pending) indicates that the PVP application has been made and that you should consider the variety to have the same intellectual property rights as those provided by PVP(94). The designation of 'Patent' means that the variety is protected by a utility patent and that farm-saved seed may be prohibited by the patent holder. The designation 'None' means that the breeder or owner never requested any intellectual property protection or that legal protection has expired. Registered and certified seed is available from seed dealers or from growers listed in the 'Minnesota Crop Improvement Association 2022 Directory', available through the Minnesota Crop Improvement Association office in St. Paul or online at <http://www.mncia.org>

## Interpretation of the Data

The presented data are the preliminary variety trial information for single (2022) and multiple year (2020-2022) comparisons in Minnesota. The yields are reported as a percentage of the location mean, with the overall mean (bu/acre) listed below. Two-year and especially one-year data are less reliable and should be interpreted with caution. In contrast, averages across multiple environments, whether they are different years and/or locations, provide a more reliable estimate of mean performance and are more predictive of what you may expect from the variety the next growing season. The least significant difference or LSD is a statistical method to determine whether the observed yield difference between any two varieties is due to true, genetic differences between the varieties or due to experimental error. If the difference in yield between two varieties equals or exceeds the LSD value, the higher yielding one was indeed superior in yield. If the difference is less, the yield difference may have been due to chance rather than genetic differences, and we are unable to differentiate the two varieties. The 5% or 10% unit indicates that, with either 95% or 90% confidence, the observed difference is indeed a true difference in performance. Lowering this confidence level will allow more varieties to appear different from each other, but also increases the chances that false conclusions are drawn.



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## SPRING WHEAT

James Anderson, Jochum Wiersma, Susan Reynolds, Nathan Stuart, Houston Lindell, Ruth Dill-Macky, James Kolmer, Matt Rouse, and Yue Jin.

MN-Torgy jumped from fifth to first place in its third year of production with just over a fifth of Minnesota's 1.2 million acres of HRSW. WB9590 was a close second with a slight increase in overall acreage and the most widely grown variety in much of the Red River Valley. SY Valda maintained its third place ranking with 11% of the acreage.

First-time entrants in the 2022 trials were Ascend-SD, CAG Recoil, CPX39120, LCS Ascent, MN-Rothsay, MS Charger, and ND-Heron. Ascend-SD and MN-Rothsay were tested under number in prior years and their 2 and 3 year averages are reported, respectively as well. WestBred did not enter any HRSW varieties in the University of Minnesota variety trial system. WB9479, WB9590, however, were included in the testing in 2022 as they each occupied more than 5% of the acreage in 2021.

The results of the variety performance evaluations for spring wheat are summarized in Tables 1 through 7. The varietal characteristics are presented in Tables 1 through 3. Tables 4, 5, and 6 present the relative grain yield of tested varieties in 1, 2, and 3-year comparisons. Table 7 presents the grain yield when fungal pathogens are controlled to the maximum extent possible compared to the same trials without the use of fungicides. The average yield across the six southern testing locations was 60 bu/acre in 2022. This average compares to a southern average of 56 bu/acre in 2021 and a three-year average of 58 bu/acre. The eight northern locations averaged 77 bu/acre in 2022 compared to 72 bu/acre last year and 85 bu/acre for the three-year average. Newcomers Ascend-SD, CP3099A, CP3119A, and MS Charger were among the highest yielding varieties in single year comparisons in both the north and southern portions of the state. LCS Trigger once again held the top spot for grain yield in both single and the multiple year comparisons. Higher yielding cultivars tend to be lower in grain protein. Variety selection is one approach to avoid discounts for low protein, but N fertility management remains paramount to maximize grain yield and grain protein.

Varieties with a lodging score of 2 and 3 are considered exceptionally good and will only lodge in extreme cases, while varieties with a rating of 4 or 5 have adequate straw strength most years. Increasing seeding rates generally increases the risk of lodging for all but the strongest and shortest semi-dwarf HRSW varieties. Conversely, lower seeding rates will lower the risk of lodging, but commonly results in lower grain yield potential. Linkert remains superior for straw strength varieties amongst public releases while MS-Washburn and MN-Rothsay are the only public release with a lodging rating of 3. Private releases that have superior lodging ratings include AP Smith, CP3915, MS Barracuda, SY Longmire and all entries in the variety trials from 21st Century Genetics (TCG) and WestBred.

Varieties with disease ratings of 4 or lower are considered the best defense against a particular disease. Varieties that are rated 7 or higher are likely to suffer significant economic losses under even moderate disease pressure. The foliar disease rating represents the total complex of leaf diseases other than the rusts, and includes the Septoria complex and tan spot. Although varieties may differ from their response to each of those diseases, the rating does not differentiate among them. Therefore, the rating should be used as a general indication and only for varietal selection in areas where these diseases historically have been a problem or if the previous crop is wheat or barley. Control of leaf diseases with fungicides may be warranted, even for those varieties with an above average rating.

Bacterial leaf streak (BLS) cannot be controlled with fungicides. Selection of more resistant varieties is the only recommended practice at this time if you have a history of problems with this disease. CAG Reckless, CP3530, CP3915, Driver, Dyna-Gro Ballistic, Lang-MN, LCS Trigger, MN-Torgy, MN-Washburn, ND Frohberg, SY Longmire, and TCG-Spifire provide the best resistance against BLS.

Lang-MN, LCS Buster, LCS Trigger, and MN-Torgy provide the best resistance against FHB while another fifteen varieties have a rating of 4 for FHB. Combined, this group of varieties includes some of the top yielders and varieties with higher grain protein.





## BARLEY

Kevin Smith, Ruth Dill-Macky, Jochum Wiersma,  
Brian Steffenson, Karen Beaubien and Ed Schiefelbein

The results of the variety performance evaluations for spring barley are summarized in Tables 8 through 12. The varietal characteristics and disease reactions are presented in Tables 8 and 9. Tables 10 through 12 present the relative grain yield of the tested varieties in single and multiple year comparisons. The average yield across the 13 testing locations was 101 bu/acre in 2022 (Table 12). This is up from a state average of 80 bu/A in 2021. The highest yields this year were recorded in Roseau with 132 bu/A (Table 10) while the lowest grain yields were recorded in St. Paul with 62 bu/A (Table 11).

Rasmusson was the highest yielding six-row variety and AAC Synergy, Brewski, and ND Genesis were the highest yielding two-row varieties based on the 2022 state average (Table 12). In general, the six-row varieties, except for Quest, had lower stem breakage (Table 8). In general, two-rows headed later than six-rows with the exception of Conlon which is the earliest maturity two-row variety tested.

Table 9 describes the reaction of this year's entries to five major diseases in the region. Disease reaction is based on data from at least two experiments (except spot blotch) and scored from 1–9; where 1 is most resistant and 9 is most susceptible. The varieties tested differed widely for resistance to spot blotch with most six-rows having good resistance (except Quest), while the two rows varied over the entire range of the rating scale 1-9. Net blotch can be an important disease and most varieties tested have good resistance with the exceptions of Brewski and Pinnacle. It is notable that Pinnacle is highly susceptible to net blotch. Conlon continues to be the variety with the best resistance to Fusarium head blight expressed as lower concentrations of vomitoxin or DON. All the varieties tested are generally susceptible (ratings from 3-6) to the QCCJ race of stem rust which has not been identified as a threat in the Midwest yet. All listed varieties carry stem rust resistance to the predominate Puccinia graminis f. sp. tritici race (MCCF). Most varieties possess pre-heading resistance to stem rust; thus, they will not likely incur much damage unless the disease epidemic is severe. Bacterial Leaf Streak (BLS) cannot be controlled by fungicides and there are some modest differences (ratings from 3-6) in resistance among the tested varieties.



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## OATS

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Entries in the state oat variety trial were evaluated in 9 locations. In addition, entries were evaluated for disease resistance to crown rust, barley yellow dwarf virus (BYDV), and smut in dedicated, inoculated nurseries. The results of the variety evaluations are summarized in Tables 13 to 17. The origin and agronomic characteristics of the tested oat varieties are listed in Table 13. Maturity, height, and test weight data are presented as statewide averages from 2020-2022 except where noted. Lodging data is also a statewide average from the same period, but only from locations where lodging was present. Maturity, height, and lodging are important considerations for variety selection based on the intended location and expected end use of the crop.

Crown rust continues to be a major limiting factor to oat production in Minnesota that must be managed to achieve optimal yield. Buckthorn (*Rhamnus cathartica* L.), the alternate host of crown rust is widespread in Minnesota, allowing for a persistent and particularly aggressive pathogen population. Rust in all yield trials was managed through treatment with a propiconazole-based fungicide when the flag leaf was fully extended (Feekes 9) to evaluate the yield potential with little to no disease. Crown rust and other disease resistance ratings are listed in Table 14. All disease scores were converted to a 1-9 scale. A score of 1 is very resistant and a score of 9 is very susceptible. The most economical way of controlling crown rust is through resistant varieties; however, application of fungicide to a variety with rating of 4 or greater is prudent if crown rust is present in the lower canopy at Feekes 9. MN-Pearl, SD Buffalo and Warrior appear to be the best varieties for crown rust resistance.

Other important diseases include BYDV and smut which were evaluated in inoculated nurseries at the University of Illinois and the University of Minnesota, respectively. We observed little difference among the tested varieties for resistance to BYDV (ratings from 3-4). Most varieties tested had good resistance to smut with the exceptions of SD Buffalo and ND Heart. A seed treatment and certified seed should be used to manage smut. Choose the varieties with the lowest disease ratings in an organic production system and plant as early as possible to reduce the risk of yield losses caused by these diseases.

For grain production, lodging and grain quality traits should be considered when choosing a variety (Table 13). Oat varieties with high protein and low oil are preferred in the food market. High test weight, as a proxy for milling yield, is very important in both the food and feed markets. Contact your local elevator or buyer and ask whether they prefer particular varieties.

Tables 15 through 17 present the relative grain yield of the tested varieties in single and multiple year comparisons. For 2022, the highest yields were in Roseau and the lowest yields in Waseca. WIX10305-4 followed by SD Buffalo and Hayden were the top yielding varieties in statewide averages for 2022. These same three varieties performed well in both the northern and southern regions in 2021. Some varieties perform differently in the north and south. For example, in 2022 MN-Pearl was the highest yielding variety in the north but yielded lower in the south. In general, earlier maturing varieties perform better in southern Minnesota because flowering can occur when it is cooler. Similarly, later performing varieties tend to perform better in northern Minnesota.





**Table 1. Origin and agronomic characteristics of hard red spring wheat varieties in Minnesota in single-year (2022) and multiple-year comparisons.**

Entry	Origin <sup>1</sup>	Legal Status	Desired Stand (Plants/Acre) <sup>2</sup>	Days to Heading <sup>3</sup>	Height Inches <sup>3</sup>	Straw Strength <sup>4</sup>
AP Gunsmoke CL2 <sup>5</sup>	2021 AgriPro/Syngenta	PVP (94)	1.3	49.0	26.5	5
AP Murdock	2020 AgriPro/Syngenta	PVP (94)	1.3	48.8	25.0	5
AP Smith	2021 AgriPro/Syngenta	PVP (94)	1.3	51.7	24.3	2
Ascend-SD	2021 SDSU	PVP (94) pending	1.3	50.0	29.4	5-6
Bolles	2015 MN	PVP (94)	1.3	51.3	28.1	4
CAG Justify	2021 Champions Alliance Group	PVP (94)	1.2	51.1	27.5	5
CAG Reckless	2021 Champions Alliance Group	PVP (94)	1.3	49.8	28.2	5
CAG Recoil	2022 Champions Alliance Group	PVP (94) pending	1.3	55.2	27.2	3-4
CP3099A	2020 CROPLAN	PVP (94) pending	1.3	53.8	28.6	4-5
CP3119A	2021 CROPLAN	PVP (94) pending	1.3	54.8	27.9	2-3
CP3188	2020 CROPLAN	PVP (94) pending	1.3	50.2	28.3	5
CP3530	2015 CROPLAN	Patented	1.3	50.8	29.5	5
CP3915	2019 CROPLAN	PVP (94) pending	1.3	49.9	26.4	3
CPX39120	2023 CROPLAN	PVP (94) pending	1.3	57.6	29.5	5
Driver	2020 SDSU	PVP (94)	1.3	50.5	28.9	4
Dyna-Gro Ambush	2016 Dyna-Gro	PVP (94)	1.5	50.6	27.8	5
Dyna-Gro Ballistic	2018 Dyna-Gro	PVP (94)	1.5	48.2	27.4	5
Dyna-Gro Commander	2019 Dyna-Gro	PVP (94)	1.5	48.5	26.7	4
Lang-MN	2017 MN	PVP (94)	1.3	50.9	27.8	4
LCS Ascent	2022 Limagrain Cereal Seeds	PVP (94)	1.4	47.3	27.9	5
LCS Buster	2020 Limagrain Cereal Seeds	PVP (94)	1.3	52.8	27.5	4-5
LCS Cannon	2018 Limagrain Cereal Seeds	PVP (94)	1.4	46.8	27.8	4
LCS Dual	2021 Limagrain Cereal Seeds	PVP (94)	1.4	48.3	28.1	3-4
LCS Trigger	2016 Limagrain Cereal Seeds	PVP (94)	1.3	53.3	27.4	5
Linkert	2013 MN	PVP (94)	1.3	49.5	25.8	2
MN-Rothsay	2022 MN	PVP (94) pending	1.3	51.4	25.4	3
MN-Torgy	2020 MN	PVP (94)	1.3	50.7	26.1	4
MN-Washburn	2019 MN	PVP (94)	1.3	50.8	26.8	3
MS Barracuda	2018 Meridian Seeds	PVP (94)	1.3	46.8	26.6	3
MS Charger	2023 Meridian Seeds	PVP (94) pending	1.3	48.2	26.7	4-5
MS Cobra	2022 Meridian Seeds	PVP (94)	1.3	48.6	26.7	3-4
MS Rancho	2020 Meridian Seeds	PVP (94)	1.3	53.3	28.5	6
ND Frohberg	2020 NDSU	PVP (94)	1.3	49.5	28.7	5
ND Heron	2021 NDSU	PVP (94) pending	1.3	47.7	28.7	5-6
Prosper	2011 NDSU	PVP (94)	1.3	50.8	27.5	6
Shelly	2016 MN	PVP (94)	1.3	50.9	25.7	5
SY 611 CL2 <sup>5</sup>	2019 AgriPro/Syngenta	PVP (94)	1.3	48.6	24.9	4
SY Longmire <sup>6</sup>	2019 AgriPro/Syngenta	PVP (94)	1.3	50.0	26.3	3
SY McCloud	2019 AgriPro/Syngenta	PVP (94)	1.3	49.3	26.6	4
SY Valda	2015 AgriPro/Syngenta	PVP (94)	1.3	50.4	25.2	5
TCG-Heartland	2019 21st Century Genetics	PVP (94), Patent pending	1.6	47.8	24.4	3
TCG-Spitfire	2016 21st Century Genetics	PVP (94)	1.5	51.7	27.5	3
TCG-Wildcat	2020 21st Century Genetics	PVP (94), Patent pending	1.5	50.3	26.5	3
WB9479	2017 WestBred	Patented, PVP (94)	1.3	48.6	24.7	3
WB9590	2017 WestBred	Patented, PVP (94)	1.3	48.6	23.9	3

**Mean**

<sup>1</sup> Abbreviations: MN = Minnesota Agricultural Experiment Station; NDSU = North Dakota State University Research Foundation; SDSU = South Dakota

<sup>2</sup> Our standard seeding rate is designed to achieve a desired stand of 1.3 million plants/acre, assuming a 20% stand loss and adjusting for the germination

<sup>3</sup> 2022 data

<sup>4</sup> 1-9 scale in which 1 is the strongest straw and 9 is the weakest. Based on 2014-2022 data. The rating of newer entries may change by as much as one rating point as more data are collected.

<sup>5</sup> AP Gunsmoke CL2 and SY 611 CL2 have tolerance to Beyond® herbicide.

<sup>6</sup> SY Longmire has solid stems.

**Table 2. Grain quality of hard red spring wheat varieties in Minnesota in single-year (2022) and multiple-year comparisons.**

Entry	Test Weight (lb/Bu)		Protein (%) <sup>1</sup>		Baking	Pre-Harvest
	2022	2 yr	2022	2 yr	Quality <sup>2</sup>	Sprouting <sup>3</sup>
AP Gunsmoke CL2	58.7	59.7	15.7	15.3	5	3
AP Murdock	59.4	60.2	14.2	14.5	5	1
AP Smith	58.8	60.2	15.5	15.2	3	4
Ascend-SD	59.1	60.3	15.2	14.8	-	4
Bolles	58.9	60.1	16.8	16.7	1	1
CAG Justify	58.2	58.7	13.8	13.9	-	3
CAG Reckless	59.9	61.1	15.1	15.0	-	4
CAG Recoil	59.2	-	14.6	-	-	1
CP3099A	57.0	58.1	13.1	13.0	6	1
CP3119A	54.5	55.8	13.9	13.6	-	3
CP3188	57.3	58.5	13.8	13.6	-	1
CP3530	59.5	60.1	15.2	15.1	3	1
CP3915	59.0	60.6	15.2	15.1	4	1
CPX39120	52.6	-	13.9	-	-	2
Driver	60.5	61.8	14.8	14.4	6	3
Dyna-Gro Ambush	58.6	60.5	14.4	14.6	2	3
Dyna-Gro Ballistic	60.2	60.6	14.9	14.5	5	3
Dyna-Gro Commander	59.1	60.6	15.2	15.0	6	1
Lang-MN	59.9	60.8	15.2	15.1	3	1
LCS Ascent	59.8	-	14.6	-	-	2
LCS Buster	56.8	57.9	12.6	12.7	7	4
LCS Cannon	60.8	62.1	14.8	14.7	4	3
LCS Dual	59.2	-	14.6	-	-	2
LCS Trigger	59.4	60.2	13.1	13.3	7	2
Linkert	60.0	61.3	15.6	15.7	1	1
MN-Rothsay	59.5	60.7	14.8	14.8	5	2
MN-Torgy	59.5	61.0	15.1	15.2	4	1
MN-Washburn	58.8	60.2	14.8	14.6	3	1
MS Barracuda	58.6	60.4	15.9	15.4	4	3
MS Charger	58.9	-	13.6	-	-	1
MS Cobra	58.9	60.6	15.1	14.9	-	4
MS Rancho	56.9	59.0	15.0	14.5	6	4
ND Froberg	59.8	61.0	15.0	14.9	3	4
ND Heron	60.5	-	15.3	-	-	1
Prosper	59.4	60.2	14.1	14.2	5	1
Shelly	58.9	60.6	14.7	14.4	5	1
SY 611 CL2	59.1	60.7	15.1	14.9	6	2
SY Longmire	58.0	60.0	15.8	15.3	3	3
SY McCloud	60.7	61.8	15.4	15.5	3	2
SY Valda	59.1	60.5	14.7	14.4	6	2
TCG-Heartland	59.2	60.9	15.6	15.5	2	1
TCG-Spitfire	58.2	59.5	14.3	14.2	3	4
TCG-Wildcat	60.0	61.1	15.2	15.0	4	1
WB9479	58.6	60.3	16.1	15.9	2	1
WB9590	58.8	60.4	15.7	15.5	4	1
<b>Mean</b>	58.8	60.1	14.9	14.8		
<b>No. Environments</b>	6	17	6	17		

<sup>1</sup> 12% moisture basis.

<sup>2</sup> 2014-2021 crop years, where applicable

<sup>3</sup> 1-9 scale in which 1 is best and 9 is worst. Values of 1-2 should be considered as resistant.



**Table 3. Disease reactions<sup>1</sup> of hard red spring wheat varieties in Minnesota in multiple-year comparisons.**

Entry	Leaf Rust	Stripe Rust <sup>2</sup>	Stem Rust <sup>3</sup>	Bacterial Leaf Streak <sup>4</sup>	Other Leaf Diseases <sup>5</sup>	Scab
AP Gunsmoke CL2	3	–	1	8	7	5
AP Murdock	3	–	1	4	6	7
AP Smith	6	–	1	4	5	6
Ascend-SD	3	–	1	2-3	6	4
Bolles	2	1	2	4	4	5
CAG Justify	3	–	2	4-5	4	4
CAG Reckless	1	–	1	3	5	4
CAG Recoil	2	–	2	2-3	5	–
CP3099A	6	–	8	6-7	4	5-6
CP3119A	5	–	2	6-7	4	5-6
CP3188	1	–	6	6-7	6	5
CP3530	7	3	1	3	6	4
CP3915	1	–	1	2	5	4
CPX39120	7	–	6	4-5	3	–
Driver	3	–	1	3	4	4
Dyna-Gro Ambush	4	–	2	4	4	4
Dyna-Gro Ballistic	4	–	3	3	4	5
Dyna-Gro Commander	2	–	1	4	6	5
Lang-MN	1	–	2	3	4	3
LCS Ascent	4	–	1-2	6-7	5	–
LCS Buster	3	–	1	4	3	3
LCS Cannon	4	–	2	5	7	5
LCS Dual	3	–	1-2	5	4	–
LCS Trigger	1	–	2	2	3	3
Linkert	3	1	1	5	5	5
MN-Rothsay	4	–	2	4	3	4
MN-Torgy	3	–	1	3	4	3
MN-Washburn	1	2	1	3	4	4
MS Barracuda	6	–	2	7	5	5
MS Charger	–	–	2	5	6	–
MS Cobra	2	–	1	4-5	4	5
MS Rancho	3	–	1	6	3	4
ND Frohberg	3	–	1	3	5	5
ND Heron	5	–	1-2	5	4	–
Prosper	6	5	2	4	5	5
Shelly	5	1	2	6	4	4
SY 611 CL2	4	–	5	4	4	4
SY Longmire	5	–	1	3	5	7
SY McCloud	3	–	1	6	6	4
SY Valda	4	2	1	4	5	4
TCG-Heartland	3	–	2	5	6	6
TCG-Spitfire	4	–	2	3	5	6
TCG-Wildcat	3	–	3	6	7	7
WB9479	6	–	2	6	6	7
WB9590	6	–	2	6	6	7

<sup>1</sup> 1-9 scale where 1=most resistant, 9=most susceptible.

<sup>2</sup> Based on natural infections in 2015 at Kimball, Lamberton, and Waseca.

<sup>3</sup> Stem rust levels have been very low in production fields in recent years, even on susceptible varieties.

<sup>4</sup> Bacterial leaf streak symptoms are highly variable from one environment to the next. The rating of entries may change as more data is collected.

<sup>5</sup> Combined rating of tan spot and septoria.





**Table 4. Relative grain yield of hard red spring wheat varieties in northern Minnesota locations in single-year**

Entry	Crookston			Fergus Falls			Hallock			Oklee		
	2022	2 Yr	3 Yr	2022	2 Yr	3 Yr	2022	2 Yr	3 Yr	2022	2 Yr	3 Yr
AP Gunsmoke CL2	95	100	102	102	101	101	99	100	101	102	105	110
AP Murdock	108	102	103	89	89	92	90	91	94	103	94	102
AP Smith	101	100	100	91	98	98	92	96	94	120	110	105
Ascend-SD	102	97	-	111	109	-	99	101	-	91	100	-
Bolles	96	94	94	91	96	94	90	89	91	89	90	91
CAG Justify	96	94	-	99	105	-	115	112	-	96	101	-
CAG Reckless	91	100	-	95	101	-	101	103	-	93	98	-
CAG Recoil	106	-	-	101	-	-	97	-	-	93	-	-
CP3099A	119	107	-	115	118	-	114	113	-	122	131	-
CP3119A	93	100	-	100	108	-	109	104	-	119	117	-
CP3188	105	108	-	90	99	-	91	96	-	98	102	-
CP3530	97	88	90	94	97	97	109	101	105	96	93	96
CP3915	97	93	96	96	96	98	98	102	99	100	97	94
CPX39120	66	-	-	106	-	-	95	-	-	105	-	-
Driver	105	103	102	107	108	107	102	102	107	108	114	112
Dyna-Gro Ambush	92	102	103	103	105	103	110	103	104	112	101	103
Dyna-Gro Ballistic	99	98	101	103	105	106	100	101	102	94	105	105
Dyna-Gro Commander	102	103	100	87	93	96	97	97	99	100	98	99
Lang-MN	105	104	103	102	98	99	102	100	101	92	91	93
LCS Ascent	97	-	-	95	-	-	105	-	-	104	-	-
LCS Buster	113	104	104	110	109	112	112	109	110	107	109	116
LCS Cannon	97	93	95	96	94	96	87	94	93	99	100	102
LCS Dual	102	-	-	102	-	-	105	-	-	84	-	-
LCS Trigger	111	106	108	107	102	108	117	109	116	119	110	114
Linkert	100	104	100	84	88	91	88	95	96	88	83	87
MN-Rothsay	106	111	110	98	100	103	114	107	106	107	107	107
MN-Torgy	105	105	105	99	99	102	106	102	100	82	88	95
MN-Washburn	101	97	97	113	102	101	99	100	100	80	88	92
MS Barracuda	97	91	92	97	96	96	90	96	96	92	101	102
MS Charger	116	-	-	108	-	-	106	-	-	109	-	-
MS Cobra	102	101	-	90	100	-	99	100	-	99	94	-
MS Ranchero	86	101	101	110	104	101	111	106	107	94	97	100
ND Frohberg	88	100	98	94	95	99	97	93	92	86	95	97
ND Heron	94	-	-	96	-	-	94	-	-	99	-	-
Prosper	92	93	98	115	113	112	106	104	105	109	106	108
Shelly	102	100	102	105	107	108	109	106	108	99	100	103
SY 611 CL2	98	96	98	107	110	108	93	99	97	108	105	108
SY Longmire	94	93	95	92	97	97	98	97	96	93	96	95
SY McCloud	106	107	102	99	98	99	92	97	100	94	97	99
SY Valda	91	92	96	106	101	103	108	107	108	105	107	105
TCG-Heartland	94	97	98	93	93	96	89	91	90	91	93	94
TCG-Spitfire	108	103	105	101	109	109	96	100	98	101	97	100
TCG-Wildcat	108	100	101	88	97	99	99	99	99	99	100	99
WB9479	100	99	103	89	90	92	97	94	97	93	95	99
WB9590	100	99	104	105	104	103	102	98	105	106	98	101
Mean (Bu/Acre)	96.1	76.9	74.6	83.9	79.1	80.1	82.3	77.3	72.8	71.8	70.8	73.5
LSD (0.10)	9.0	9.5	6.2	14.6	6.4	4.3	20.0	6.0	5.1	18.9	7.5	5.7



**(2022) and multiple-year comparisons (2020-2022).**

Perley			Roseau			Stephen			Strathcona		
2022	2 Yr	3 Yr	2022	2 Yr	3 Yr	2022	2 Yr	3 Yr	2022	2 Yr	3 Yr
82	94	93	101	101	101	94	97	98	102	104	101
117	108	108	103	99	102	110	100	106	113	105	111
102	101	99	91	93	97	99	100	102	93	98	95
101	99	-	113	107	-	117	111	-	120	109	-
89	96	97	91	95	95	100	94	94	87	88	88
102	104	-	120	110	-	105	104	-	115	108	-
97	100	-	106	105	-	104	105	-	104	104	-
113	-	-	86	-	-	98	-	-	95	-	-
103	103	-	121	115	-	106	111	-	115	107	-
79	85	-	101	112	-	89	105	-	111	105	-
95	101	-	107	106	-	98	103	-	106	105	-
102	99	100	117	111	106	107	106	104	112	107	109
105	103	101	99	95	103	103	96	98	117	110	102
84	-	-	74	-	-	70	-	-	96	-	-
106	107	108	116	108	105	99	100	103	102	103	100
94	98	101	103	103	100	112	101	104	107	105	106
87	92	96	95	98	106	107	105	107	104	102	100
106	104	101	99	101	101	98	97	101	102	105	105
94	95	95	99	93	97	98	100	97	95	94	102
91	-	-	110	-	-	105	-	-	105	-	-
107	108	111	99	100	109	107	107	110	100	99	104
104	104	107	109	109	104	104	105	102	104	106	105
102	-	-	97	-	-	99	-	-	98	-	-
125	115	118	116	105	110	110	108	110	114	107	110
89	89	89	91	89	90	93	96	92	91	94	90
105	107	106	108	104	105	109	104	105	100	100	102
103	103	101	103	97	100	116	108	111	93	96	99
103	101	100	93	98	90	106	98	99	101	97	90
94	97	93	100	102	98	93	92	93	92	100	103
101	-	-	110	-	-	97	-	-	109	-	-
93	98	-	97	101	-	95	94	-	94	97	-
90	95	97	96	101	105	87	88	97	109	105	113
88	92	92	105	102	99	84	88	88	89	95	96
86	-	-	111	-	-	94	-	-	93	-	-
94	101	101	98	102	105	109	110	111	104	99	99
102	97	96	115	107	102	105	103	101	107	105	108
113	106	104	107	104	105	103	98	101	97	99	98
97	98	98	84	90	90	96	100	100	103	101	92
99	97	97	102	104	103	92	91	88	95	97	99
113	105	106	102	105	103	107	107	111	97	99	102
94	87	94	77	90	92	93	89	96	80	88	88
111	113	111	91	94	97	106	105	103	92	97	98
100	103	103	109	104	107	105	98	104	105	107	106
96	98	94	91	92	92	96	92	96	105	104	104
95	97	100	102	101	103	97	92	93	104	102	105
96.9	91.1	83.1	80.8	86.0	86.0	89.5	79.8	77.1	83.8	72.3	71.3
7.9	7.4	5.9	10.6	7.2	6.2	11.4	7.0	5.6	19.3	9.1	7.1



**Table 5. Relative grain yield of hard red spring wheat varieties in southern Minnesota locations in single-year (2022) and multiple-year comparisons (2020-2022).**

Entry	Becker			Benson <sup>1</sup>	Le Center			Lamberton			Morris			St. Paul			Waseca <sup>2</sup>	
	2022	2 Yr	3 Yr	2 Yr	2022	2 Yr	3 Yr	2022	2 Yr	3 Yr	2022	2 Yr	3 Yr	2022	2 Yr	3 Yr	2022	2 Yr
AP Gunsмоke CL2	106	105	105	100	98	103	104	114	110	99	118	111	109	108	98	97	101	103
AP Murdock	95	99	99	93	102	98	102	100	99	101	115	103	104	80	94	100	110	113
AP Smith	102	98	98	104	98	100	99	99	101	101	94	99	104	96	100	97	103	101
Ascend-SD	121	115	-	-	104	103	-	111	108	-	133	124	-	97	99	-	123	-
Bolles	95	88	89	100	90	90	89	88	89	94	95	98	98	88	94	95	96	95
CAG Justify	104	97	-	-	105	97	-	114	107	-	133	130	-	110	108	-	115	-
CAG Reckless	112	118	-	-	96	96	-	109	104	-	118	110	-	113	111	-	99	-
CAG Recoil	75	-	-	-	107	-	-	93	-	-	106	-	-	87	-	-	104	-
CP3099A	94	98	-	-	110	101	-	116	118	-	96	115	-	93	92	-	112	-
CP3119A	90	104	-	-	114	110	-	90	100	-	76	100	-	92	91	-	101	-
CP3188	99	103	-	-	103	106	-	90	106	-	114	119	-	97	102	-	98	-
CP3530	98	97	97	107	107	108	107	101	100	100	107	101	100	108	105	103	108	101
CP3915	101	104	105	94	94	95	96	106	103	105	89	93	96	116	97	92	85	87
CPX39120	63	-	-	-	121	-	-	106	-	-	84	-	-	75	-	-	74	-
Driver	107	106	106	103	103	102	100	107	113	112	111	108	108	122	112	107	96	103
Dyna-Gro Ambush	109	102	102	104	106	108	107	111	103	100	110	88	96	104	110	109	112	112
Dyna-Gro Ballistic	92	101	101	105	99	101	103	105	101	104	105	106	106	113	99	101	104	104
Dyna-Gro Commander	96	103	103	112	96	101	102	90	93	96	107	104	109	110	113	110	112	117
Lang-MN	95	97	97	95	93	96	96	92	94	94	99	99	101	102	108	104	106	104
LCS Ascent	115	-	-	-	101	-	-	99	-	-	112	-	-	117	-	-	97	-
LCS Buster	106	114	115	105	108	104	105	104	103	108	99	97	104	100	105	103	111	116
LCS Cannon	123	114	114	101	98	104	107	106	104	104	116	93	101	137	126	123	111	113
LCS Dual	118	-	-	-	97	-	-	106	-	-	107	-	-	99	-	-	120	-
LCS Trigger	98	105	106	118	109	112	112	110	114	117	112	118	124	100	110	107	116	123
Linkert	104	102	102	97	89	94	93	97	95	94	96	93	93	109	105	102	90	87
MN-Rothsay	101	105	105	107	93	97	98	87	89	95	94	98	104	89	97	99	111	104
MN-Torgy	107	107	107	102	101	103	105	106	101	105	92	98	102	64	87	92	105	100
MN-Washburn	97	96	96	93	99	99	102	103	100	101	100	105	102	101	101	96	84	97
MS Barracuda	113	105	105	95	98	103	105	94	97	99	92	82	85	126	121	116	99	103
MS Charger	124	-	-	-	107	-	-	113	-	-	113	-	-	121	-	-	116	-
MS Cobra	110	105	-	-	98	101	-	103	102	-	87	94	-	116	115	-	104	-
MS Rancho	83	87	87	102	91	96	95	81	89	91	68	79	87	78	90	99	78	92
ND Frohberg	103	102	103	104	89	95	96	97	97	98	104	103	105	111	106	104	105	105
ND Heron	109	-	-	-	90	-	-	93	-	-	95	-	-	121	-	-	98	-
Prosper	97	103	104	105	102	103	105	105	101	107	118	119	115	96	92	97	92	96
Shelly	91	94	94	107	97	101	104	110	106	104	96	103	107	107	112	105	95	96
SY 611 CL2	116	111	112	98	96	96	93	97	99	97	99	96	95	103	96	97	106	97
SY Longmire	78	90	90	94	95	96	95	89	98	103	89	101	99	98	81	83	77	76
SY McCloud	107	97	97	93	100	102	100	101	100	94	96	89	90	104	98	100	78	84
SY Valda	101	98	99	102	110	108	107	100	102	101	102	100	101	115	108	103	106	107
TCG-Heartland	101	97	97	95	98	98	98	88	93	94	86	87	87	107	99	99	105	104
TCG-Spitfire	112	110	111	109	113	110	107	111	115	119	108	106	114	110	102	100	108	100
TCG-Wildcat	115	112	112	96	103	103	104	104	109	109	123	114	111	92	100	100	104	102
WB9479	100	96	96	92	94	98	98	99	93	92	93	89	90	105	99	97	102	102
WB9590	107	98	99	98	99	100	103	88	96	99	98	92	94	112	104	105	100	103
Mean (Bu/Acre)	58.8	50.5	50.4	72.7	82.7	76.8	77.0	60.3	60.1	60.8	57.0	55.8	52.6	52.4	50.5	58.8	38.1	42.2
LSD (0.10)	18.9	10.9	7.6	6.6	11.8	6.0	3.6	12.8	7.0	5.9	18.4	13.2	8.6	15.8	12.2	7.8	13.9	6.7

1 2022 was abandoned due to early season flooding. 2 year data is 2020-2021  
 2 2021 Waseca was discarded due to excessive within trial variation. 2 year is the mean of 2020 and 2022.



**Table 6. Relative grain yield of hard red spring wheat varieties in Minnesota in single-year (2022) and multiple-year comparisons (2020-2022).**

Entry	State			North			South		
	2022	2 Yr	3 Yr	2022	2 Yr	3 Yr	2022	2 Yr	3 Yr
AP Gunsmoke CL2	100	101	101	97	100	101	107	104	102
AP Murdock	103	98	102	104	99	102	100	98	101
AP Smith	98	100	99	98	99	99	98	100	100
Ascend-SD	109	106	-	107	104	-	114	110	-
Bolles	92	93	93	92	93	93	92	93	94
CAG Justify	108	106	-	106	105	-	113	108	-
CAG Reckless	102	103	-	99	102	-	107	105	-
CAG Recoil	98	-	-	99	-	-	96	-	-
CP3099A	111	110	-	114	113	-	104	106	-
CP3119A	98	104	-	99	104	-	95	102	-
CP3188	99	104	-	99	102	-	100	107	-
CP3530	104	101	102	104	100	101	105	103	103
CP3915	101	98	98	102	99	99	99	97	96
CPX39120	88	-	-	86	-	-	91	-	-
Driver	106	106	105	105	105	105	108	107	105
Dyna-Gro Ambush	105	102	103	104	102	103	108	103	104
Dyna-Gro Ballistic	100	101	103	99	100	103	102	101	104
Dyna-Gro Commander	100	101	102	99	100	100	101	104	106
Lang-MN	98	97	98	98	97	98	97	98	98
LCS Ascent	103	-	-	101	-	-	107	-	-
LCS Buster	106	105	109	107	106	109	105	105	107
LCS Cannon	105	103	103	100	101	100	114	108	109
LCS Dual	102	-	-	99	-	-	107	-	-
LCS Trigger	112	109	113	115	108	112	107	112	115
Linkert	93	94	93	91	92	92	97	96	96
MN-Rothsay	102	103	104	106	105	105	95	98	101
MN-Torgy	100	100	102	101	100	102	96	100	102
MN-Washburn	99	98	97	100	98	96	98	99	99
MS Barracuda	97	98	98	94	97	97	103	100	101
MS Charger	110	-	-	107	-	-	115	-	-
MS Cobra	98	99	-	96	98	-	102	102	-
MS Rancho	92	96	99	97	99	102	81	90	94
ND Frohberg	94	97	97	91	95	95	100	101	102
ND Heron	97	-	-	96	-	-	100	-	-
Prosper	103	103	105	103	103	105	102	103	105
Shelly	103	103	103	105	103	103	100	102	103
SY 611 CL2	103	102	101	103	102	102	102	100	98
SY Longmire	93	95	94	95	96	95	89	93	93
SY McCloud	98	98	97	98	99	98	99	96	95
SY Valda	104	103	104	104	103	104	106	103	103
TCG-Heartland	92	92	94	89	91	94	97	95	96
TCG-Spitfire	104	105	105	101	103	103	111	109	109
TCG-Wildcat	103	103	103	102	101	102	107	106	105
WB9479	97	95	96	96	95	97	98	95	95
WB9590	101	99	101	101	99	102	100	98	100
<b>Mean (Bu/Acre)</b>	73.9	69.8	69.9	85.6	79.2	77.3	58.2	57.2	59.9
<b>LSD (0.10)</b>	3.1	2.2	1.6	3.6	2.6	2.0	5.3	3.7	2.6
<b>No. Environments</b>	14	28	42	8	16	24	6	12	18



**Table 7. Grain yield (bushels per acre) of hard red spring wheat varieties grown under conventional and intensive management.**

Entry	North						South						State					
	2022		2-year		3-year		2022		2-year		3-year		2022		2-year		3-year	
	Conv	Int	Conv	Int	Conv	Int	Conv	Int	Conv	Int	Conv	Int	Conv	Int	Conv	Int	Conv	Int
AP Gunsmoke CL2	86.6	103.3	81.6	93.4	81.4	90.4	68.0	71.9	64.2	71.2	58.8	64.8	77.3	87.6	72.9	82.3	70.1	77.6
AP Murdock	93.4	108.4	81.6	89.8	82.6	90.4	62.8	65.3	58.7	63.4	58.1	60.6	78.1	86.8	70.1	76.6	70.3	75.5
AP Smith	85.2	97.7	78.4	85.7	78.9	82.8	56.5	65.0	58.1	66.5	57.8	61.4	70.8	81.3	68.2	76.1	68.4	72.1
Ascend-SD	94.4	104.2	83.5	95.5	-	-	71.4	75.3	67.3	72.9	-	-	82.9	89.7	75.4	84.2	-	-
Bolles	82.7	95.5	76.8	85.2	76.0	81.1	53.8	60.1	54.1	60.7	54.4	59.2	68.2	77.8	65.4	72.9	65.2	70.1
CAG Justify	94.8	108.5	83.3	98.6	-	-	72.2	68.4	68.5	69.3	-	-	83.5	88.4	75.9	84.0	-	-
CAG Reckless	86.4	94.1	83.5	88.0	-	-	66.4	68.1	62.2	64.6	-	-	76.4	81.1	72.8	76.3	-	-
CAG Recoil	86.0	95.3	-	-	-	-	58.3	61.2	-	-	-	-	72.2	78.2	-	-	-	-
CP3099A	106.1	116.2	90.5	102.2	-	-	62.3	68.7	67.4	78.1	-	-	84.2	92.4	79.0	90.2	-	-
CP3119A	85.6	104.2	86.4	102.6	-	-	49.0	58.4	58.1	68.0	-	-	67.3	81.3	72.3	85.3	-	-
CP3188	93.7	106.6	87.1	97.9	-	-	59.7	66.3	65.2	70.0	-	-	76.7	86.5	76.1	84.0	-	-
CP3530	93.7	103.3	81.5	89.6	78.9	88.3	60.9	59.9	58.4	62.2	56.7	60.4	77.3	81.6	70.0	75.9	67.8	74.4
CP3915	86.6	103.1	76.7	92.2	80.4	90.3	57.2	64.9	56.9	66.3	57.2	62.8	71.9	84.0	66.8	79.3	68.8	76.6
CPX39120	61.2	92.4	-	-	-	-	55.8	62.7	-	-	-	-	58.5	77.6	-	-	-	-
Driver	97.1	103.1	85.8	95.6	83.1	88.1	63.8	68.1	64.1	66.9	62.4	62.8	80.5	85.6	75.0	81.2	72.8	75.5
Dyna-Gro Ambush	85.6	101.0	83.3	89.7	81.4	85.3	64.6	72.9	55.4	68.6	55.8	64.0	75.1	86.9	69.3	79.2	68.6	74.6
Dyna-Gro Ballistic	85.9	99.5	79.8	93.4	83.0	89.3	61.4	67.5	59.9	67.2	59.7	66.0	73.7	83.5	69.8	80.3	71.4	77.6
Dyna-Gro Commander	88.8	101.0	83.0	92.0	80.8	87.1	57.9	63.3	57.2	64.1	58.0	61.8	73.3	82.2	70.1	78.1	69.4	74.5
Lang-MN	90.3	98.5	80.0	85.9	79.9	83.9	55.9	62.8	55.7	63.9	55.0	61.3	73.1	80.6	67.9	74.9	67.5	72.6
LCS Ascent	91.3	104.8	-	-	-	-	61.7	71.9	-	-	-	-	76.5	88.3	-	-	-	-
LCS Buster	94.2	107.6	83.3	97.7	85.5	94.0	59.6	69.0	58.2	73.8	60.4	70.2	76.9	88.3	70.8	85.7	73.0	82.1
LCS Cannon	90.5	102.8	82.8	92.6	80.1	87.9	65.1	69.9	57.1	70.8	58.1	66.2	77.8	86.4	70.0	81.7	69.1	77.1
LCS Dual	88.5	98.8	-	-	-	-	62.6	67.8	-	-	-	-	75.6	83.3	-	-	-	-
LCS Trigger	100.4	111.2	85.8	97.0	87.9	92.9	65.2	75.6	67.0	76.4	67.8	74.8	82.8	93.4	76.4	86.7	77.9	83.9
Linkert	84.9	93.4	78.4	81.5	76.2	80.8	56.4	64.1	54.7	65.2	53.1	60.5	70.6	78.8	66.5	73.4	64.7	70.7
MN-Rothsay	94.6	106.8	87.3	92.8	86.2	89.0	52.9	60.8	54.1	64.7	56.4	61.0	73.7	83.8	70.7	78.8	71.3	75.0
MN-Torgy	92.3	101.6	82.1	87.6	82.3	85.4	58.2	66.1	57.5	66.4	58.9	61.9	75.2	83.8	69.8	77.0	70.6	73.7
MN-Washburn	86.4	100.0	79.4	87.3	75.1	88.3	59.4	67.3	59.4	66.7	57.7	61.9	72.9	83.6	69.4	77.0	66.4	75.1
MS Barracuda	87.1	104.0	78.9	92.0	76.4	85.0	54.6	63.2	51.9	62.3	52.6	58.4	70.9	83.6	65.4	77.1	64.5	71.7
MS Charger	100.3	108.9	-	-	-	-	66.3	73.0	-	-	-	-	83.3	90.9	-	-	-	-
MS Cobra	88.3	98.0	82.1	89.2	-	-	55.9	62.5	56.7	64.6	-	-	72.1	80.2	69.4	76.9	-	-
MS Ranchero	79.9	85.2	82.2	83.4	82.8	81.5	44.0	60.8	48.9	62.3	50.6	56.9	62.0	73.0	65.5	72.9	66.7	69.2
ND Frohberg	84.5	90.7	82.1	85.8	79.3	81.7	58.7	65.6	57.9	63.8	57.9	61.0	71.6	78.2	70.0	74.8	68.6	71.4
ND Heron	90.0	94.6	-	-	-	-	55.1	65.4	-	-	-	-	72.5	80.0	-	-	-	-
Prosper	84.0	105.2	79.6	94.4	81.5	91.6	65.1	71.7	63.5	71.7	62.6	68.3	74.6	88.4	71.6	83.0	72.1	80.0
Shelly	95.4	106.7	84.5	94.7	81.9	92.6	60.8	64.6	60.6	69.0	59.9	63.0	78.1	85.6	72.5	81.8	70.9	77.8
SY 611 CL2	90.6	102.1	81.5	90.9	81.7	88.3	57.4	64.3	56.7	65.0	54.8	60.7	74.0	83.2	69.1	77.9	68.3	74.5
SY Longmire	79.4	92.0	74.5	84.4	74.1	82.9	52.1	52.5	57.8	60.8	57.4	59.0	65.8	72.3	66.1	72.6	65.7	70.9
SY McCloud	92.0	100.8	85.8	86.9	82.2	83.9	58.0	65.4	54.8	64.5	52.4	58.7	75.0	83.1	70.3	75.7	67.3	71.3
SY Valda	85.1	102.1	80.4	93.1	79.8	90.2	59.2	72.3	58.7	72.1	57.2	66.0	72.1	87.2	69.6	82.6	68.5	78.1
TCG-Heartland	76.2	92.8	75.7	84.1	76.4	83.6	51.2	61.2	52.2	65.1	51.4	58.9	63.7	77.0	63.9	74.6	63.9	71.2
TCG-Spitfire	88.3	103.5	80.1	94.7	80.8	92.9	64.3	69.6	64.1	72.3	66.5	70.6	76.3	86.5	72.1	83.5	73.7	81.8
TCG-Wildcat	95.9	107.6	83.5	94.6	83.5	91.5	66.4	75.4	64.8	69.2	62.3	65.3	81.1	91.5	74.1	81.9	72.9	78.4
WB9479	84.9	97.1	77.5	85.2	77.8	82.6	56.3	64.4	52.8	63.6	51.8	58.5	70.6	80.8	65.2	74.4	64.8	70.6
WB9590	89.1	105.4	81.8	94.2	83.2	91.9	54.5	66.4	54.6	63.4	54.9	60.8	71.8	85.9	68.2	78.8	69.0	76.4
Mean (Bu/Acre)	88.4	100.5	81.4	90.6	80.3	86.7	58.7	65.7	58.0	66.5	56.8	62.1	73.6	83.1	69.7	78.5	68.5	74.4
LSD (0.10)	6.2	5.3	4.8	4.1	3.5	3.4	4.3	4.3	4.0	3.9	2.8	2.9	3.9	3.4	3.1	2.8	2.3	2.2
No. Environments	2	2	4	4	6	6	2	2	4	4	6	6	4	4	8	8	12	12



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**Table 8. Agronomic characteristics of malting barley varieties, 2020-2022.**

Variety	Origin <sup>1</sup>	Year of Release	PVP status	Heading (DAP)	Height (inches)	Stem Breakage (%)
<b>2-row</b>						
AAC Connect	AAFC	2017	Yes	58	25	8
AAC Synergy	AAFC	2012	Yes	59	26	6
ABI Cardinal	ABI	2021	Yes	59	25	16
Brewski	ND	2019	NA	58	26	14
Conlon	ND	1996	Yes	54	26	43
ND Genesis	ND	2015	Yes	57	28	18
Pinnacle	ND	2007	Yes	56	26	24
<b>6-row</b>						
Lacey	MN	2000	Yes	55	27	0
Quest	MN	2010	Yes	55	29	47
Rasmusson	MN	2008	Yes	54	26	2
Robust	MN	1984	Expired	55	29	5
Tradition	ABI	2003	Yes	54	27	0
<b>No. of Environments</b>				8	8	7

<sup>1</sup> Agriculture and Agri-Food Canada (AAFC), Anheuser-Busch InBev (ABI), North Dakota State University (ND), University of Minnesota (MN)

**Table 9. Disease reactions of barley varieties in multiple year comparisons.**

Variety	DON <sup>1, 2</sup>	Spot Blotch <sup>1,3</sup>	Net Blotch <sup>1,4</sup>	Stem Rust <sup>1,5</sup>	Bacterial Leaf Streak <sup>1</sup>
<b>2-row</b>					
AAC Connect	5	1	1	4	3
AAC Synergy	8	2	1	5	3
ABI Cardinal	7	5	2	5	5
Brewski	6	3	6	4	4
Conlon	3	9	2	3	6
ND Genesis	5	3	2	6	5
Pinnacle	5	6	9	6	6
<b>6-row</b>					
Lacey	7	1	2	4	5
Quest	5	6	2	4	6
Rasmusson	9	1	2	5	5
Robust	7	1	2	4	5
Tradition	4	2	1	5	6
<b>No. of environments</b>	4	1	2	3	3

<sup>1</sup>Trait measured on a scale from 0-9 where 0=resistant and 9=susceptible.  
<sup>2</sup>Deoxynivalenol (DON) is the mycotoxin produced by the Fusarium head blight pathogen  
<sup>3</sup>Data is for 2020 only  
<sup>4</sup>Data for 2020 and 2022 only.  
<sup>5</sup>Data is for stem rust pathogen QCCJ. All lines were resistant to stem rust pathogen MCCF in years tested.



**Table 10. Relative grain yield (percent of the mean of the trial) of barley varieties in northern Minnesota locations in single-year (2022) and multiple year comparisons (2020-2022).**

Variety	Crookston		Hallock		Oklee		Perley		Roseau		Stephen		Strathcona
	2022	2 yr <sup>1</sup>	2022	3 yr	2022	3 yr	2022	3 yr	2022	2 yr <sup>1</sup>	2022	3 yr	2 yr <sup>2</sup>
<b>2-row</b>													
AAC Connect	102	103	107	109	92	95	101	105	99	98	113	103	131
AAC Synergy	107	103	107	106	102	103	113	105	97	99	120	113	125
ABI Cardinal	79	94	104	109	105	101	105	100	96	100	108	98	126
Brewski	109	106	106	106	112	111	98	96	108	107	110	99	76
Conlon	87	85	94	95	91	91	86	89	97	100	82	100	67
ND Genesis	116	112	109	99	98	104	104	110	107	106	116	106	89
Pinnacle	91	99	91	96	108	105	99	105	112	112	97	104	110
<b>6-row</b>													
Lacey	98	99	88	86	92	97	89	93	98	99	80	95	97
Quest	106	101	95	89	105	99	100	96	90	86	89	93	101
Rasmusson	111	108	97	103	102	99	102	98	104	106	96	90	111
Robust	96	95	98	95	93	91	97	95	96	90	96	100	79
Tradition	96	94	104	107	100	104	104	108	97	95	94	99	88
<b>Mean (bu/acre)</b>	102	95	120	106	108	97	122	110	132	103	103	99	74
<b>LSD( 0.05)</b>	20.7	19.1	11.1	14	17.1	11.5	11.2	14.6	14.4	10.5	10.9	19.7	51.5
<sup>1</sup> Trial data is from 2022 and 2021 only													
<sup>2</sup> Trial data is from 2021 and 2020 only													

**Table 11. Relative grain yield (percent of the mean of the trial) of barley varieties in southern Minnesota locations in single-year (2022) and multiple year comparisons (2020-2022).**

Variety	Becker		Fergus Falls		Lamberton		Le Center		New Ulm		Rochester		St. Paul	
	2022	2 yr <sup>1</sup>	2022	3 yr	2022	3 yr	2022	3 yr	2022	3 yr	2022	3 yr	2022	3 yr
<b>2-row</b>														
AAC Connect	103	99	103	104	95	98	109	104	101	104	97	91	96	105
AAC Synergy	102	110	100	100	99	104	89	95	108	95	109	103	103	110
ABI Cardinal	107	111	88	99	99	96	99	95	97	97	76	78	100	104
Brewski	106	118	95	104	99	108	100	99	93	96	104	95	111	121
Conlon	87	81	85	88	76	79	91	94	103	94	76	81	63	69
ND Genesis	88	94	116	105	108	101	93	102	82	98	106	103	102	103
Pinnacle	99	105	107	103	101	97	103	105	100	102	103	106	95	106
<b>6-row</b>														
Lacey	84	86	97	96	103	106	98	99	102	106	109	110	111	102
Quest	112	113	102	97	113	101	104	104	105	101	107	105	92	89
Rasmusson	121	111	113	107	104	111	104	103	105	108	113	118	118	107
Robust	81	76	87	91	96	95	95	92	100	95	99	102	99	88
Tradition	109	96	107	104	108	106	115	109	104	103	100	107	109	98
<b>Mean (bu/acre)</b>	96	65	125	107	70	66	103	93	82	84	82	91	62	69
<b>LSD( 0.050)</b>	14.3	20.8	12.9	14.7	9.7	13.1	16.5	10.6	16.1	16.8	13.1	16.8	12	13.7
<sup>1</sup> Trial data is from 2022 and 2021 only														





**Table 12. Relative grain yield (percent of the mean of the trial) of barley varieties in a single-year (2022) and multiple year comparisons (2020-2022).**

Variety	State			North			South		
	2022	2 yr	3 yr	2022	2 yr	3 yr	2022	2 yr	3 yr
<b>2-row</b>									
AAC Connect	102	103	103	102	104	105	101	103	101
AAC Synergy	104	102	104	107	105	107	101	98	101
ABI Cardinal	97	99	100	100	101	103	95	95	96
Brewski	104	102	103	107	102	102	100	102	104
Conlon	87	90	88	90	93	91	85	87	85
ND Genesis	104	105	103	108	107	104	100	102	102
Pinnacle	101	103	104	100	103	104	102	104	103
<b>6-row</b>									
Lacey	95	98	98	91	95	94	99	101	101
Quest	101	99	98	97	95	94	105	105	101
Rasmusson	106	106	105	102	102	101	111	109	109
Robust	95	93	93	96	94	93	93	91	92
Tradition	103	101	102	99	98	101	107	103	104
<b>Mean (bu/acre)</b>	101	90	90	113	101	99	90	79	83
<b>LSD(0.05)</b>	6.3	4.5	4.7	8.8	6.1	7.5	8	6.2	5.5
<b>No. of environments</b>	13	27	38	6	13	18	7	14	20

**Table 13. Origin and agronomic characteristics of oat varieties in Minnesota in multiple-year comparisons (2020-2022).**

Variety	Origin	Year of Release	Legal Status	Seed Color	Days to Heading (days)	Plant Height (inches)	Straw Strength <sup>4</sup> (1-9)	Test Weight (lbs/bu)	Grain Protein <sup>5,6</sup> (%)	Grain Oil <sup>5,6</sup> (%)	Grain Beta-glucan <sup>5,6</sup> (%)
Antigo	WI	2017	PVP(94)	Yellow	53.7	29.2	2	36.6	14.5	7.3	4.3
CS Camden <sup>1</sup>	Meridian Seeds	2013	PVP(94)	White	59.8	30	2.1	31.6	12.4	6.6	4.4
Deon	MN	2014	PVP(94)	Yellow	59.9	32.8	2.9	35	12.2	7.1	3.8
Esker 2020	WI	2020	PVP(94)	Yellow	55.4	29.9	2.2	32.4	12.6	6.2	4.2
George <sup>2</sup>	WI	2021	Pending	Yellow	62.6	33.8	4	32	-	-	-
Hayden	SD	2015	PVP(94)	White	58.6	32.2	2.9	34.8	11.9	7.3	4.5
MN Pearl	MN	2018	PVP(94)	White	57.8	31.5	4.2	35	11.2	7.4	4.1
ND Heart	ND	2020	PVP(94)	White	57.9	32	3.5	34.2	13.9	6.7	5
Reins	IL	2016	PVP(94)	White	54.1	24.2	0.9	35.7	13.8	6.3	4.2
Rushmore	SD	2020	PVP(94)	White	56	31	2	36.4	13.2	6.2	4.1
Saddle	SD	2018	PVP(94)	White	53.5	27.9	1	33.5	13.5	5.9	4
SD Buffalo	SD	2021	NA	White	56.5	31.7	2.3	34.8	12.6	7.2	4.5
Shelby 427	SD	2011	PVP(94)	White	55.1	31.8	2.2	35.7	12.5	7.2	4.1
Streaker <sup>3</sup>	SD	2016	PVP(94)	Hulless	56.1	31.1	4.2	44	13.3	7.4	4.2
Sumo	SD	2017	PVP(94)	White	51.6	29.7	2	35	14.5	6	3.8
Warrior	SD	2019	PVP(94)	White	56.6	29.5	1.4	35	12.8	6.5	4.1
WIX10305-4	WI	2022	NA	Yellow	59.8	29.3	1.4	32	14.6	6.8	4.4

<sup>1</sup> Line developed by Lantmannen Seed in Sweden.

<sup>2</sup> Line tested in 2021 and 2022

<sup>3</sup> Hulless oat

<sup>4</sup> 1-9 scale where 1=most resistant, 9=most susceptible

<sup>5</sup> 12% Grain moisture

<sup>6</sup> Trait measured for 3 locations in 2020



**Table 14. Disease characteristics of oat varieties.**

Variety	Crown Rust <sup>2</sup> (1-9)	Loose Smut <sup>3</sup> (1-9)	BYDV <sup>4</sup> (1-9)
Antigo	4	3	4
CS Camden	5	2	4
Deon	5	1	4
Esker 2020	4	1	3
George <sup>1</sup>	4	3	-
Hayden	5	12	3
MN Pearl	3	1	4
ND Heart <sup>1</sup>	4	6	4
Reins	5	1	4
Rushmore	4	2	4
Saddle	4	1	4
SD Buffalo	3	2	-
Shelby 427	5	1	4
Streaker	4	3	4
Sumo	4	2	4
Warrior	3	2	4
WIX10305-4	4	2	-

<sup>1</sup>Line tested in 2021 and 2022  
<sup>2</sup>Tested in 2020, 2021, and 2022 with a mixed race population of crown rust; 1 = most resistant, 9 = most susceptible. Data is from 2020 and 2022 only; 2021 trial failed due to drought  
<sup>3</sup>Tested in 2020 and 2021; 1 = most resistant, 9 = most susceptible. Data based on 2020 trial; 2021 trial had very low disease pressure due to drought  
<sup>4</sup>Tested in 2021; 1 = most resistant, 9 = most susceptible

**Table 15. Relative grain yield of oat varieties in northern Minnesota locations in single-year (2022) and multiple-year comparisons (2020-2022).**

Variety	Crookston		Fergus Falls <sup>4</sup>		Roseau		Stephen	
	2022	3 yr	2022	2 yr	2022	3 yr	2022	3 yr
	-----(% of mean)-----							
Antigo	88	91	61	81	82	76	94	87
CS Camden	104	112	112	112	115	104	118	116
Deon	109	107	107	100	112	118	98	108
Esker 2020	107	108	90	91	112	103	96	97
George <sup>1</sup>	88	-	104	-	94	-	98	-
Hayden	110	113	116	113	111	113	106	107
MN Pearl	114	113	124	118	114	113	106	113
ND Heart	97	102	94	98	87	92	82	94
Reins	98	93	84	92	94	95	105	97
Rushmore	104	103	102	107	113	116	112	115
Saddle	100	93	93	92	101	102	111	101
SD Buffalo	113	109	113	111	111	113	113	112
Shelby 427	88	93	81	93	86	89	97	98
Streaker <sup>2</sup>	76	73	89	91	77	76	72	72
Sumo	80	78	97	80	84	88	97	87
Warrior	113	107	135	121	97	105	90	98
WIX10305-4	110	106	97	100	110	98	105	99
<b>Mean (bu/acre)</b>	187	157	135	124	189	136	177	149
<b>LSD (0.05)<sup>3</sup></b>	29.8	20.2	27.4	24.8	28.5	21.7	30.6	24.1

<sup>1</sup>Line tested in 2021 and 2022 only  
<sup>2</sup>Hulless oat  
<sup>3</sup>A large LSD suggests large variability from year to year for the specific location  
<sup>4</sup>Line tested in 2021 and 2022 only

**Table 16. Relative grain yield of oat varieties in southern Minnesota locations in single-year (2022) and multiple-year comparisons (2020-2022).**

Variety	Becker <sup>3</sup>		Lamberton		Le Center		Rochester		St. Paul <sup>4</sup>	Waseca	
	2022	2 yr	2022	3 yr	2022	3 yr	2022	3 yr	2020	2022	3 yr
Antigo	110	97	89	91	101	101	86	98	85	78	85
CS Camden	124	118	106	100	105	104	84	85	101	121	120
Deon	86	90	118	114	104	105	115	111	111	93	107
Esker 2020	105	108	109	111	104	97	115	103	102	111	109
George <sup>1</sup>	90	100	103	-	86	-	112	-	-	103	-
Hayden	107	111	116	103	113	113	108	112	120	92	105
MN Pearl	90	95	97	108	97	101	103	102	130	104	119
ND Heart	87	90	101	99	99	98	83	91	92	106	88
Reins	102	97	87	93	95	97	69	86	103	88	97
Rushmore	87	92	95	103	103	109	107	111	100	114	110
Saddle	110	102	94	89	98	100	104	103	98	89	79
SD Buffalo	114	109	103	112	101	103	128	117	106	100	109
Shelby 427	93	100	91	86	96	103	104	106	105	81	91
Streaker <sup>2</sup>	65	67	75	73	81	81	69	73	78	82	82
Sumo	98	97	93	102	94	91	91	93	81	75	89
Warrior	118	112	100	108	104	97	99	100	114	104	98
WIX10305-4	114	114	121	109	121	100	124	107	75	157	114
Mean (bu/acre)	100	91	125	114	136	130	149	137	126	80	82
LSD (0.05) <sup>5</sup>	21.4	19.9	19.4	21.1	27.4	16.9	28.4	22.2	13	16.7	19.8

<sup>1</sup>Line tested in 2021 and 2022 only  
<sup>2</sup>Hulless oat  
<sup>3</sup>Location was tested in 2021 and 2022  
<sup>4</sup>Location was tested in 2020 only  
<sup>5</sup>A large LSD suggests large variability from year to year for the specific location

**Table 17. Relative grain yield of oat varieties in Minnesota in single-year (2022) and multiple-year comparisons (2020-2022).**

Variety	North			South			State		
	2022	2 yr	3 yr	2022	2 yr	3 yr	2022	2 yr	3 yr
	-----(% of mean)-----								
Antigo	82	83	84	93	94	94	87	88	89
CS Camden	112	111	111	105	104	102	109	108	107
Deon	107	110	108	105	107	107	106	108	108
Esker 2020	102	101	100	109	106	105	105	104	102
George <sup>1</sup>	95	98	-	99	96	-	97	97	-
Hayden	111	110	112	108	111	110	110	110	111
MN Pearl	114	114	114	98	102	107	107	108	111
ND Heart	90	94	97	94	93	94	92	94	95
Reins	96	91	94	87	91	94	92	91	94
Rushmore	108	107	110	101	102	106	105	105	108
Saddle	102	98	97	99	95	96	100	97	96
SD Buffalo	113	111	111	110	109	110	111	110	110
Shelby 427	89	92	93	94	99	98	91	95	96
Streaker <sup>2</sup>	78	77	77	74	76	76	76	76	77
Sumo	89	88	83	91	92	93	90	90	88
Warrior	107	108	107	104	103	103	106	105	105
WIX10305-4	106	108	101	125	117	105	115	112	103
Mean (bu/acre)	172	141	141	118	106	113	142	122	126
LSD (0.05)	20.3	13.3	11.1	16.1	10.4	9.2	13.4	8.5	7.3
# of environments	4	8	12	5	10	15	9	18	27

<sup>1</sup>Line tested in 2021 and 2022 only  
<sup>2</sup>Hulless oat

# Do you know what's in your

# SOIL?

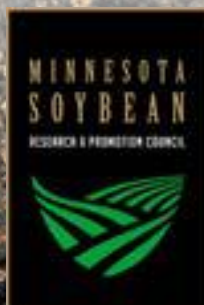
The Minnesota Soybean Research & Promotion Council, which oversees the investments of soybean checkoff dollars, invites you to join us at this year's Prairie Grains Conference on Dec. 7-8, 2022. Hear the latest updates in soybean research, and attend a breakout session on new research considerations in soilborne pathogen management.

## Soybean Research Reporting Sessions - December 8, 2022

Time	Title/Presenter
7:15 a.m.	P&K in a Long-Term Wheat and Soybean Crop Rotation. <i>Dave Grafstrom</i>
7:35 a.m.	An Abundance of MN Soybean Research: Disease, Pest, and Crop Management. <i>Angie Peltier</i>
8:00 a.m.	Evaluating soybean varieties to identify genetic and architectural sources of resistance against white mold. <i>Megan McCaghey and Ashish Ranjan</i>
8:25 a.m.	Soybean Weed Management Research update. <i>David Kee</i>

## Soybean Breakout Session - December 8, 2022

11:15 a.m.	Soybean architecture, environmental drivers of disease, and new research considerations in soilborne pathogen management. <i>Megan McCaghey, Ph.D.</i>
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Syngenta Data, 2020-2022

## Three-Year Northeast Summary, Northern Plains Ranked by Three-Year Yield Average



Variety	Yield bu/ac			Protein % 3-yr Avg	Economic Return <sup>1</sup>		Agronomics and Disease				
	3-yr Avg	2-yr Avg	2022		\$/Bu	Gross \$/A	Heading 1-9	Height 1-9	Lodging 1-9	BLS 1-9	FHB 1-9
<b>SY Valda</b>	<b>77.2</b>	78.7	79.4	14.1	8.90	\$687.60	5	5	5	4	4
MN-Torgy	77.2	76.4	77.6	15.3	9.49	\$732.30	6	6	4	3	NA
Faller	77.1	75.6	73.8	14.3	9.01	\$694.90	6	6	7	3	3
<b>SY 611 CL<sup>2</sup></b>	<b>76.5</b>	77.5	77.1	15.0	9.32	\$713.00	5	4	4	4	3
Shelly	75.3	77.9	79.4	14.0	8.85	\$666.50	6	5	6	5	4
<b>AP Murdock</b>	<b>74.6</b>	73.5	76.0	14.7	9.19	\$684.90	4	4	4	4	4
<b>AP Smith</b>	<b>73.1</b>	74.6	78.4	14.9	9.31	\$680.00	6	4	2	3	4
LCS Cannon	72.8	73.9	74.7	15.0	9.36	\$691.80	2	4	4	4	3
<b>SY Ingmar</b>	<b>72.1</b>	74.0	76.6	15.5	9.57	\$690.30	5	5	3	3	3
<b>SY McCloud</b>	<b>70.3</b>	74.2	75.7	15.9	9.79	\$688.20	4	5	4	5	4
<b>AP Gunsmoke CL<sup>2</sup></b>	<b>69.8</b>	72.7	71.2	14.9	9.27	\$647.20	5	5	4	5	4
<b>SY Longmire</b>	<b>69.7</b>	73.5	74.9	14.9	9.31	\$648.50	5	5	5	4	5
<b>SY Soren</b>	<b>66.3</b>	68.2	68.1	15.9	9.79	\$648.70	4	4	3	5	4
ND VitPro	65.4	65.6	65.9	15.4	9.56	\$626.70	4	5	6	3	4

2020 Locations: Cando, Glyndon, McVillie, Park River, ND; and Crookston, MN; 2021 Locations: Crookston and Glyndon, MN; 2022 Locations: McVillie, Thompson, and Park River, ND; Warren, MN

## Three-Year West Summary, Northern Plains Ranked by Three-Year Yield Average

Variety	Yield bu/ac			Protein % 3-yr Avg	Economic Return <sup>1</sup>		Agronomics and Disease				
	3-yr Avg	2-yr Avg	2022		\$/Bu	Gross \$/A	Heading 1-9	Height 1-9	Lodging 1-9	BLS 1-9	FHB 1-9
Faller	75.5	65.1	86.1	14.1	8.90	\$672.40	6	6	7	3	3
Shelly	72.5	66.2	88.5	14.5	9.11	\$660.30	6	5	6	5	4
<b>SY Valda</b>	<b>71.4</b>	63.7	84.7	14.8	9.25	\$660.10	5	5	5	4	4
<b>AP Gunsmoke CL<sup>2</sup></b>	<b>67.9</b>	63.2	81.5	15.3	9.50	\$644.50	5	5	4	5	4
<b>SY 611 CL<sup>2</sup></b>	<b>67.3</b>	61.8	81.1	15.3	9.48	\$637.70	5	4	4	4	3
<b>AP Smith</b>	<b>66.9</b>	60.9	79.7	15.3	9.48	\$634.00	6	4	2	3	4
Vida	66.7	61.2	79.2	15.0	9.35	\$624.30	6	6	4	5	5
<b>SY McCloud</b>	<b>65.5</b>	59.9	77.2	15.8	9.75	\$639.00	4	5	4	5	4
<b>AP Murdock</b>	<b>65.5</b>	59.6	78.7	15.0	9.36	\$613.20	4	4	4	4	4
<b>SY Ingmar</b>	<b>65.3</b>	58.4	75.7	15.6	9.65	\$630.20	5	5	3	3	3
<b>SY Rockford</b>	<b>65.2</b>	63.5	83.0	15.4	9.56	\$623.60	6	6	4	7	3
Lanning	64.8	59.8	77.9	15.3	9.48	\$614.20	4	5	4	5	5
<b>SY Longmire</b>	<b>64.3</b>	58.4	75.1	15.1	9.41	\$604.70	5	5	5	4	5
Reeder	63.5	56.9	72.5	15.6	9.62	\$611.10	4	6	5	4	
LCS Cannon	62.7	57.6	75.7	15.3	9.49	\$594.40	2	4	4	4	3
Glenn	61.8	56.7	75.0	15.5	9.60	\$593.60	3	6	7	4	3
ND VitPro	60.4	54.7	71.5	16.1	9.84	\$594.40	4	5	6	3	4

2020 Locations: New Leipzig, Coleharbor, and Kenmare, ND; 2021 Locations: New Leipzig, Velva, ND; 2022 Locations: Berthold, New Leipzig, and Velva, ND

Numerical ratings: Heading: 1= early; Height: 1 = short; Lodging: 1 = no lodging; Disease 1 = tolerant

<sup>1</sup> Economic return calculated using October local cash grain price of \$8.84 for 14% protein and 10-year average MGE protein discount/premium up to 16% protein (Mendota Wheat & Milling Associates, 2022).

These agronomic assessments are made by Syngenta scientists and reflect each variety's relative performance within these characteristics through the 2022 crop year. Specific conditions may cause variations within those characteristics. These relative protection values are based on current pest and disease populations. These have been known to shift periodically and may cause changes in specific evaluations. Resistance to many other diseases and pests is sensitive to environmental conditions, plant development stages and the presence and intensity of other diseases which may result in specific evaluation inconsistencies. This chart is updated annually to reflect the most current trends.

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Syngenta Data, 2020-2022



**Three-Year South Dakota Summary, Northern Plains**  
**Ranked by Three-Year Yield Average**

Variety	Yield bu/ac			Protein % 3-yr Avg	Economic Return <sup>1</sup>		Agronomics and Disease				
	3-yr Avg	2-yr Avg	2022		\$/Bu	Gross \$/A	Heading 1-9	Height 1-9	Lodging 1-9	BLS 1-9	FHB 1-9
LCS Trigger	55.7	51.8	57.1	14.0	8.85	\$493.1	6	6	6	3	2
<b>SY Valda</b>	<b>52.4</b>	48.7	52.9	15.3	9.48	\$496.8	5	5	5	4	4
CP3530	51.6	49.4	50.1	15.2	9.44	\$486.9	6	6	6	4	3
<b>AP Gunsmoke CL<sup>2</sup></b>	<b>49.1</b>	47.4	49.0	15.8	9.75	\$478.6	5	5	3	5	4
<b>AP Murdock</b>	<b>48.9</b>	46.6	53.1	15.4	9.54	\$466.2	4	4	4	4	4
<b>AP Revolution</b>	<b>48.7</b>	47.6	53.2	15.9	9.77	\$475.6	4	4	4	3	3
Prevail	48.2	46.5	52.2	15.4	9.52	\$458.3	4	6	5	5	4

Numerical ratings: Heading: 1= early; Height: 1 = short; Lodging: 1 = no lodging; Disease 1 = tolerant

2020 Locations: Agar, Northville, and Selby, SD; 2021 Locations: Northville and Selby, SD; 2022 Locations: Agar, Northville, Selby, and Webster, SD

<sup>1</sup> Economic return calculated using October local cash grain price of \$8.84 for 14% protein and 10-year average MGE protein discount/premium up to 16% protein (Mendota Wheat & Milling Associates, 2022).

These agronomic assessments are made by Syngenta scientists and reflect each variety's relative performance within these characteristics through the 2022 crop year. Specific conditions may cause variations within those characteristics. These relative protection values are based on current pest and disease populations. These have been known to shift periodically and may cause changes in specific evaluations. Resistance to many other diseases and pests is sensitive to environmental conditions, plant development stages and the presence and intensity of other diseases which may result in specific evaluation inconsistencies. This chart is updated annually to reflect the most current trends.

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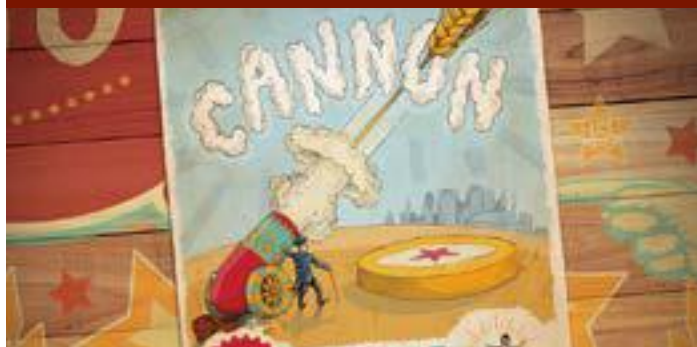


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# ACROSS THE PRAIRIE

By Prairie Grains Magazine staff

## Grand Farm Innovation Facility breaks ground



As harvest season nears its end, North Dakota is welcoming its newest home for ag innovation. In October, ground broke on the Grand Farm Innovation Facility near Casselton. Focusing on creating tomorrow's agricultural technologies, the facility will host agricultural technology entrepreneurs and researchers to advance autonomous agriculture and other technology.

Established by the non-profit Emerging Prairie, funds for the project have been generated from both private and public sectors.

The state Commerce Department awarded Grand Farm a \$10 million matching grant that will be matched by donations to reach \$20 million for the project. Attendees of the groundbreaking ceremony, where a remote-controlled Bobcat machine was used instead of a shovel, included Gov. Doug Burgum, U.S. Sen. John Hoeven, former Gov. Jack Dalrymple and former U.S. Secretary of Ag and former Gov. Ed Schafer. Building construction will be completed in 2023.

## Updated website helps growers find farms, land

An online tool from the Minnesota Department of Agriculture (MDA) to connect current farmers considering retirement with beginning farmers looking for land has undergone a major upgrade.

Minnesota FarmLink, a listing service for Minnesota farms and land parcels for sale or rent, now offers users the ability to post, edit and delete their own listings. Visitors to the site also now have the opportunity to browse the listings without logging in to an account.

In addition to listings of farms and land parcels for sale or rent, FarmLink also has categories for Beginning/Emerging Farmers looking to work alongside a current farm owner on future ownership transition, current farmers looking for successors, job seekers and job postings, and mentorship/internship postings and seekers.



More information about FarmLink is available at [mda.state.mn.us/](http://mda.state.mn.us/). Specific questions regarding FarmLink should be directed to Jim Ostlie at 320-842-6910 or email [Jim.Ostlie@state.mn.us](mailto:Jim.Ostlie@state.mn.us).

## Two USDA programs open for 2023 crop year enrollment

Enrollment for USDA's Agriculture Risk Coverage (ARC) and Price Loss Coverage (PLC) programs for the 2023 crop year is now open; producers have until March 15, 2023, to register. More than \$255 million has been issued to producers with 2021 crops that triggered payments through ARC or PLC.

Producers can elect coverage and enroll in ARC-County (ARC-CO) or PLC, which provide crop by crop protection, or ARC-Individual (ARC-IC), which protects the entire farm. If producers fail to submit their election by the March 15, 2023, deadline, their election remains the same as their 2022 election.

ARC and PLC are part of a broader safety net provided by USDA, which also include crop insurance and marketing assistance loans. As a reminder, ARC and PLC elections and enrollments can impact eligibility for some crop insurance products.

For more information on ARC and PLC, visit the ARC and PLC webpage or contact your local USDA Service Center.

## US wheat production slightly higher than 2021

Despite winter wheat production impacted by drought or near-drought conditions in the southern and southwestern U.S. Plains and spring wheat production impacted by planting delays in the northern U.S. Plains, domestic wheat production is slightly higher than 2021 at 1.65 billion bushels from a harvested area of 37.2 million acres. Though there were reductions in planting area for all wheat types, better yields balanced overall production numbers.

Spring wheat raked in 482.9 million bushels compared to 151.34 million in 2021 and averaged 46.2 bushels per acre. Because of a lower rate of abandonment compared to last year, the negative effects of a decline in planted area were minimized.

Winter wheat, all types, totaled 1.104 billion bushels, down 124 million from last year, with an average yield of 47 bushels per acre. Harvested area was down 2 million acres, likely due to abandonment because of weather problems.

Wheat ranks third among U.S. field crops in planted acreage and production – behind corn and soybeans – and wheat area has increased in the last two years with elevated prices incentivizing growers to plant additional wheat.



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