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Precision Agriculture

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Precision Agriculture Technology Improving Crop Yield

By Anna Garcia

Agriculturists and researchers continue to develop technologies and strategies that decrease negative effects on crop performance and yield. Some examples of technology that is helping improve farming is precision agriculture, topography, and UAV.

Precision Agriculture is a management strategy that collects and analyzes temporal and spatial data to support management decisions. It is known to improve resource use efficiency, productivity, quality, profitability, and sustainability of agricultural production.

Topography is a landscape surface resulting from elevation data. According to North Dakota State University, the elevation data may come from actual surveys of the landscape with a laser transit, or from LIDAR (light detection and ranging) data or RTK (real-time kinematics)-GPS (global positioning satellite) signals. Topography is known to be one of the major factors affecting nutrition content and yield in the soil. In some regions, topographical land features can explain even mid-double-digit percentage of yield variability.

The impact of topography is important in precision agriculture management. Accurate elevation data and topographic attributes play a large part in precision agriculture, including site-specific applications of seed, fertilizer, and water, management zone delineation, designing contours or terraces and precision leveling plans, and planning soil and water conservation programs for enhanced profitability.

There are several precision agriculture software applications that can be used to carry out these management practices. Satellite images of growing crops can be accessed easily for almost all regional fields. For zone delineation, it is important to find an image from a year that is characteristic of a particular growing season. The normalized differential vegetative index band from the satellite in a growing crop when the rows are closed directly before flowering is a good time to use.

Hand-held active optical sensors are also available and can be attached to a sprayer or cultivator tool, allowing image data to be obtained during a normal field operation. These sensors result in maps that are finer resolution compared with a 30-m satellite image – although the images won't be as fine as an aerial photo. These types of sensors provide the same data with full sun as they would in the dark, even clouds passing would not change the data acquired.

In addition to this, sensors are being developed to allow their site-specific placement in specific field locations at the soil surface or within a crop canopy. According to North Dakota State University, "signals from these sensors can be transmitted via within-field repeater stations to a grower computer for real-time spatial sensing



Gautam Pradhan discusses precision agriculture, topography and UAVs at the WREC Field Day.

of micro-climatic measurements, such as canopy humidity and temperature levels, that might be important to initiate site-specific fungicide application."

At the Williston Research Extension Center (WREC), researchers are using precision agriculture practices to help aid crops in times of drought.

In North Dakota, drought is the single most crucial abiotic factor affecting yield and quality of dryland crops. With the help of precision ag practices, growers can help mitigate drought affected crops.

"Plant physiological traits such as the normalized difference vegetation index (NDVI), normalized difference red edge (NDRE), and canopy temperature (CT) are directly related to crop growth and yield; a stress tolerant crop usually has higher NDVI/NDRE and low CT as compared to a susceptible crop," said Gautam Pradhan, WREC Dryland Research agronomist.

These traits, along with plant height and green area index can help in the identification of high yielding drought tolerant genotypes from standing crops. Although, these traits are time sensitive; for example, the CT of a plant in the morning will be entirely different than in the afternoon. However, the collection of these data manually from thousands of plots requires a tremendous amount of time and labor, and breeders are not using these traits in genotype selection.

"Therefore, there is a need of an application of precision agriculture, i.e., an application of high throughput phenotyping system comprised of geographic information systems, remote sensing, and geographic positioning system, which enables the measurement of physiological/canopy data from thousands of plots quickly (within minutes), frequently (6-7 times during the growing season), and accurately georeferenced," said Pradhan.

Pradhan has been working with drones and sensors to collect data on plant traits. The data collected, will be correlated with growth and yield components, and help breeders to develop high yielding drought tolerant genotypes of spring wheat, and barley. "The long-term goal of this project is to create selection tools for cereal breeders that help in the rapid development of drought-tolerant varieties."

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Head Plans To Collect More Awards At Next Year's Fair

By Anna Garcia

Fourteen-year-old William Head had a successful first year at the Richland County Fair. He is a member of the North Road Renegades 4-H Club and shows steer, market lambs, and breeding sheep.

He had the 2022 Grand Champion market lamb, Grand Champion pen of two ewe lambs, Reserve Champion overall lamb breeding, Reserve Champion female lamb under one year, and Top of the Class market beef.

"I was very proud of myself this year! It really encouraged me to push myself harder next year. I have worked very hard all summer with my animals and hard work pays off," said Head.

This year, he decided to join 4-H because his mentor, Wyn Reimann inspired him, and he wanted to gain livestock experience.

His favorite 4-H projects thus far are market beef, sheep, and woodworking. "Being involved from the calving and lambing to the finished project made it very special for me."

Head is also thankful for the experience and the knowledge he has gained from his projects.

For the upcoming year, he hopes to continue working towards his goals. "I want to be more feed efficient with my beef project. I have already picked my next market steer out! I also want to work harder on getting my lambs set. My list of goals is long, but I know I can accomplish them with hard work and dedication."

Richland County Farm Bureau Annual Meeting Features National Speaker

Submitted by Rebecca Colnar

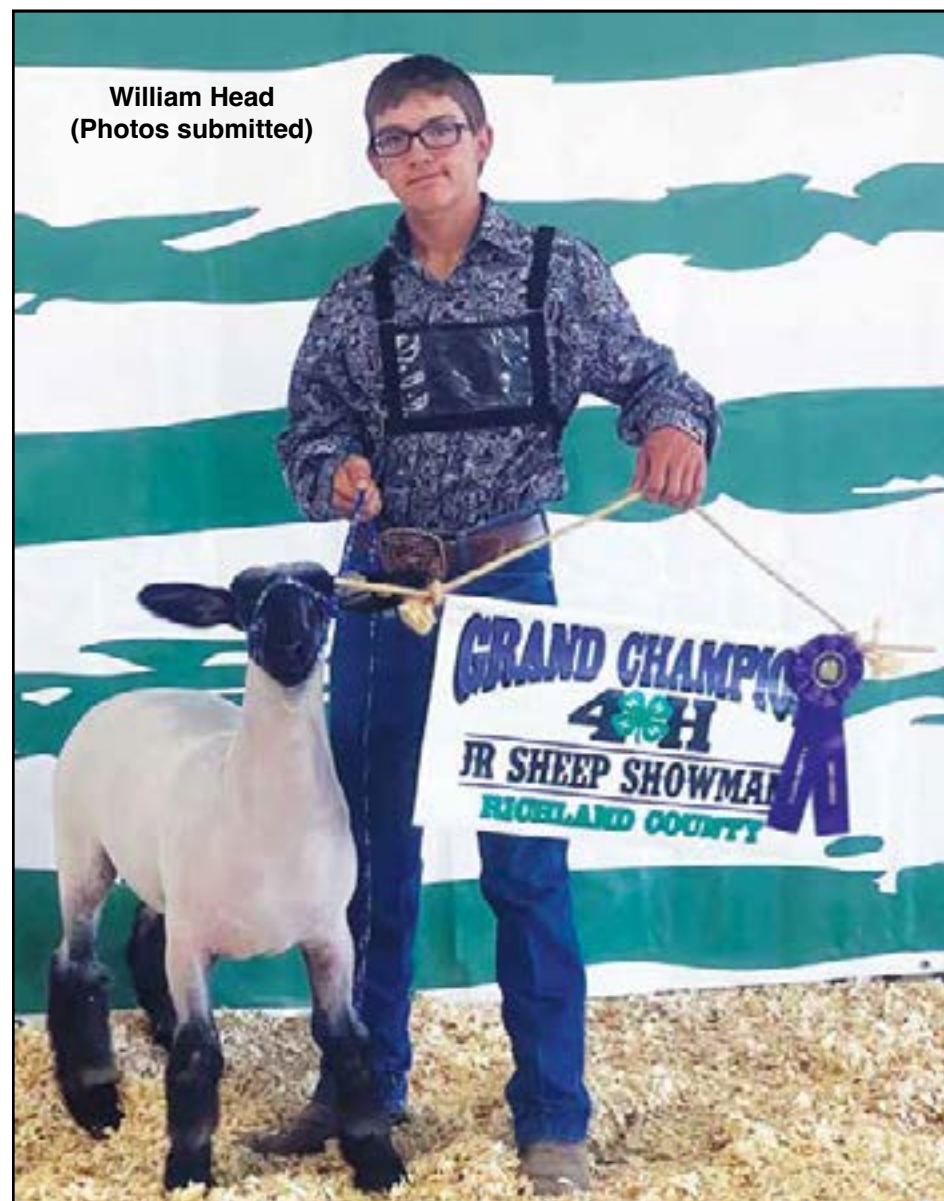
The Richland County Farm Bureau is holding its annual meeting Sept. 15 at the Elks Lodge, Sidney. The county Farm Bureau will elect officers and directors, select voting delegates for the Montana Farm Bureau Convention in November, and discuss new policy that will guide the organization in the coming year. Farm Bureau leaders and staff will provide brief updates on agriculture issues and programs Farm Bureau is working on at the local, state and national level.

The meeting's guest speaker is nationally known Glen Bloomstrom, Faith Community Engagement at Livingworks director, an international suicide intervention training company. After retiring as a colonel in 2011 and serving 30 years as an active-duty army chaplain, he now travels across the country conducting suicide prevention trainings and helping people be comfortable talking about the subject of mental health.

"We are thrilled to have Glen Bloomstrom join us to discuss this very serious issue in farm and ranch country," said Richland County President Canyon Rehbein. "Montana has the third highest rate of suicide in the nation and farmers and ranchers are regularly reported in the top 10 professions with the highest suicide rates. This is as important a topic as any for our annual meeting and we hope you'll join us and ask your neighbor to tag along, too."

The free event begins with a 5:30 p.m. social and 6 p.m. dinner with the meeting to follow.

For more information about the meeting, find the Richland County Farm Bureau on Facebook or call Canyon Rehbein: 406-480-4623



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Steer-A-Year Program Seeks Donations For 2022-23 Academic Year

MSU News Service

Bozeman - Montana State University's Steer-A-Year program is seeking donations of steers and feed as well as financial support for the 2022-23 academic year.

A student program in MSU's College of Agriculture combining academic courses with hands-on, technical experience, Steer-A-Year involves students in multiple aspects of raising cattle. Students spend the academic year feeding and managing steers, caring for them through the winter and spring, collecting data on feed efficiency and weight gain, and studying livestock marketing.

"Steer-A-Year is a valuable program for our students, as it gives them hands-on experience of raising cattle as well as proper preparation for their future careers," said Hannah DelCurto-Wyffels, the program's adviser and an instructor in the Department of Animal and Range Sciences. "There is so much to learn about the cattle industry and providing our students with a hands-on program of this caliber gives them the skills and knowledge needed to succeed."

Donated steers are housed at MSU's Bozeman Agriculture Research and Teaching Farm. After being cared for by the students through the academic year, the cattle are sold annually to MSU's Culinary Services, and the meat is served in both on-campus dining halls, Miller and Rendezvous.

Proceeds from those sales support travel and other costs for various student teams and clubs in the College of Agriculture, as well as opportunities for students to meet with commodity groups and industry professionals, such as the National Cattlemen's Beef Association, the Montana Stockgrowers Association and the Montana Farm Bureau Federation, allowing for additional networking and learning opportunities.

Steer-A-Year students raised 27 steers during the 2021-22 academic year, all of which were purchased by Culinary Services.

"There's so much to like about this program, including the opportunities and experiences our students get, ensuring our Culinary Services team is serving Montana beef and providing our producers with valuable comparative information"



The Steer-A-Year program, through the MSU College of Agriculture, gives students hands-on experience raising cattle and allows them to learn about marketing and beef science in real time.

said Carl Yeoman, Department of Animal and Range Sciences head. "Students caring for the cattle provide donors with regular reports on their donated animal's growth and health, as well as detailed information about meat quality after the steers are harvested."

Awards are given annually to the producer who donated the best initial feeder steer, the steer with the top rate of gain, the steer with the best feed efficiency and the steer that produces the best carcass.

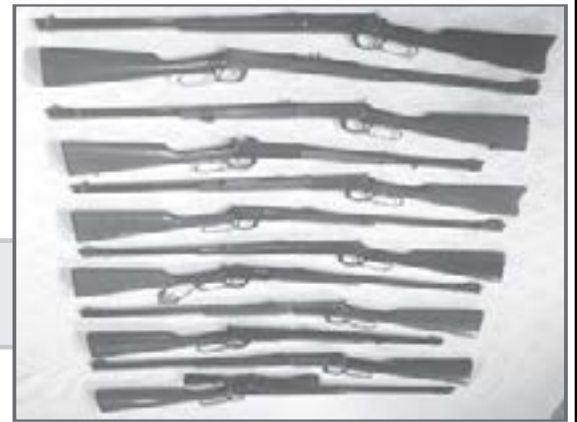
"The opportunity for our students to interact with regional cattle producers is an irreplaceable and crucial experience," DelCurto-Wyffels said. "The generosity of our supporters is truly what makes this program possible, and we thank them for investing in our students' futures."

DelCurto-Wyffels said that before donation, calves should be weaned, castrated and dehorned and weigh 500-800 pounds. The ideal pickup period for calves is during the first two weeks of November. Those interested in donating steers or feed, providing financial support or learning more about the Steer-A-Year program can contact Hannah DelCurto-Wyffels at 406-994-3752 or hannah.delcurto@montana.edu

GUN & COIN AUCTION

**SUNDAY, OCTOBER 2, 2022
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FOR MORE INFORMATION: RICK 406-939-1632 • Lunch will be available.**



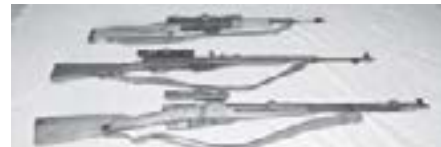
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- 1892 Winchester Octagon Rifle 25-20 W.C.F Made in 1905
- 1892 Winchester Round Barrell Rifle 32 W.C.F. (32-20) Made in 1908
- 1892 Winchester Octagon Rifle 25-20 W.C.F. Made in 1909
- 1892 Winchester Octagon Rifle 32 W.C.F. (32-20) Made in 1910
- 1892 Winchester Saddle Ring Carbine 25-20 W.C.F. Made in 1911
- 1892 Winchester Octagon Rifle 38 W.C.F. (38-40) Made in 1917
- 1892 Winchester Saddle Ring Carbine 32-20 Made in 1922
- 1892 Winchester Saddle Ring Carbine 25-20 W.C.F. Made in 1924
- 1894 Winchester Saddle Ring Carbine 30 W.C.F. (30-30) Made in 1942
- 1894 Winchester Saddle Ring Carbine 30 W.C.F. (30-30) Made in 1950
- 1892 Winchester Carbine 30-30 Made in 1954
- Winchester Model 69 22 Made from 1935-1963
- Winchester Model 250 22 Made from 1963-1973
- Savage Mark II 22 Presently Manufactured
- Great Western Arms 22 Made in 1956
- Ruger 2nd year of production, 4-digit serial # 41 Magnum Made in 1956
- Colt Frontier Scout 22 Made in 1960
- Jager Dakota 38-40
- Colt "Montana Centennial" 45 Long Colt Made in 1964
- Colt "Montana Centennial" 22 Made in 1964
- Smith & Wesson Model 686-4 357 Magnum
- Ruger LCP 380 Auto



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- 1 \$500.00 Bill Federal Reserve note 1934 series
- 1 \$500.00 Bill Federal Reserve, Redeemable in Gold on demand note 1928 series
- 9 Carson City (CC) Morgan Dollars 2-1878cc, 1882cc, 1883cc, 3-1890cc, 1891cc
- 1 1890 S United States \$20 Twenty Dollar Double Eagle Gold Coin awesome condition
- 4 bags of 5 Ike Dollars — dates varied.
- 1 Roll of 20 Ike Dollars- 1971 Dated
- 1 Roll of 20 Morgan Silver Dollars. Various dates — pre-1922
- 1 Roll of 20 Peace Silver Dollars. Various date — post 1921 to 1929
- 1 Roll of 20 Bi-Centennial half dollars.
- 1 Roll of 20 various dates from the 1970's half dollars
- 1 Roll of 20 various dates from the 1980's half dollar



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- Colt Python 357 Pistol & Black Leather Holster
- Smith & Wesson 357 Highway Patrolman, model 28-2
- Taurus 9mm Para, two clips
- 1944 Military 7.62x54 w/Bayonet & 1944 Russian Scope
- SKS 762.39 Semi Auto Rifle & 4x28 Scope (cleaning kit in butt)
- Mac 90 Sporter 7.62x39 Semi Auto Rifle & Bushnell 4x32 Scope
- Springfield Armory 30 caliber M1 Rifle
- Savage 250-3000 Take-down model, lever action
- Strum Ruger Mini 14 caliber 223, semi-auto & Weaver K-4 Scope
- Stevens Gallery #80 22 Pump
- Savage 222/20 gauge, 3" chamber Over/Under & Weaver K-1.5-1 Scope
- Remington Fieldmaster 22 Semi Auto, model 572 & Bushnell Sportview Scope
- Browning Bar 7mm Rem, Semi Auto & 3-9x40 Nikon Scope
- Maverick 270 WIN, Bolt Action, 3-9x40 BSA Scope
- Weatherby Vanguard 300 WIN mag, Bolt Action & 3x9 Redfield Scope
- Browning Invector BPS, Special Steel, 12-gauge Pump Shotgun
- Mossberg 12-gauge Pump Shotgun
- Stevens 12-gauge 3" chamber, single shot model 940E Savage Arms
- Stevens 12-gauge Pump Shotgun, model 820B (stock & butt needs to be reattached)
- Crossman Air BB Gun
- BB Gun w/American Eagle 4 power Scope
- Metal Gun Cabinet (holds 22 rifles)
- Target Shooting Stand w/ attached stool
- Gun Shooting Stand
- Bushnell Spotting Scope w/Tripod
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- Henry Golden Boy 22, Lever Action (New)
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- Remington 22 SL & LR, Pump, model 572 & Weaver 3x6 Scope
- Remington 12-gauge Pump Shotgun, model 870 Express
- Coast to Coast 12-gauge Pump Shotgun, model 367 series A
- Savage 223 Rem, Bolt Action, model 112 w/bull barrel & BDC 3x9 Long Range Nikon Scope & Bipod
- Savage 25-06 Model 111, bolt action with Leopold 4-16 scope serial # G476406
- Rssi Citadel 12 ga, 3"auto with 2 clips serial# 18RSS15017
- 410 SS Snake Charmer serial# 40390
- Winchester model 69A 22 SL or LR bolt action with clip
- Springfield XD-9 Sub-Compact 9mm, mod.2, handgun with clip
- Savage 340 bolt action 30-30 with clip and Bushnell 3x9 scope
- Savage 325-C 30-30 bolt action with clip and Redfield scope
- Weatherby 25-06 Mark V ultra-lite, FL barrel bolt action with Leopold scope serial # WBO21674
- Smith & Wesson SS 9mm handgun with clip serial # 5906
- Stoeger double barrel 20 ga 3" coach gun serial # 416611
- Ruger Black Hawk 327 magnum cylinder handgun serial # 38-02074



AUCTIONEER'S NOTE: There are some unique rifles in this auction. The Winchester Lever Action Rifles are in very good to excellent condition. Remember this sale is SUNDAY, OCTOBER 2, 2022! We hope to see you there. Rick

All information is from sources deemed reliable, but is not guaranteed by the Sellers or the Auctioneers. Offering is subject to error, omission, and approval of purchase by owner. We urge independent verification of each and every item submitted to the satisfaction of any prospective buyer. It is every potential bidder/purchaser's sole responsibility to accomplish his or her due diligence in whatever manner he or she deems advisable. Announcements made sale day take precedence over any printed materials. The items sell "As is-Where is." R-K Statewide Auction Service and its auctioneers are acting solely as auctioneers for the Sellers.



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Consider Planting Winter Wheat This Year

A benefit of planting winter wheat is providing living cover over the winter to hold soil in place & prevent it from blowing.

By NDSU Agriculture Communication

“There is increased interest in planting winter wheat this year and for good reason,” says Clair Keene, North Dakota State University (NDSU) Extension agronomist.

“With many prevent plant acres in the state, good soil moisture heading into the end of the growing season, severe drought in much of the Southern Plains and higher wheat prices than we’ve been accustomed to the last few years, 2022 is shaping up to be favorable for growing winter wheat,” says Keene.

In addition to the positive market conditions, some other benefits of planting winter wheat include providing living cover over the winter to hold soil in place and prevent it from blowing, providing competition with winter annual weeds that emerge late in the fall or early in the spring, and spreading out the workload of harvest next year.

When choosing a winter wheat variety, pay attention to winter hardiness ratings as well as yield to ensure your selection has the best possible chance of surviving a North Dakota winter.

The recommended seeding dates for winter wheat are Sept. 1-15 north of North Dakota Highway 200 and Sept. 15-30 in the southern half of the state. Planting



Agronomic, milling and baking characteristics of selected hard red winter wheat varieties												
Milling and baking values were evaluated from samples at three locations (Casselton, Dickinson, Minot) in 2021.												
Variety	Straw Strength ¹	Winter Hardiness ²	2021 Yield (bu/a)		Test Weight (lb/bu)	Protein 12% mb (%)	1000 Kernel wt (g)	Falling number ³ (sec)	Milling extraction ⁴ (%)	Farinograph abs ⁵ (%)	Farinograph stability ⁶ (min)	Loaf volume ⁷ (cc)
Draper	NA	NA	122.7	29.4	61.5	14.0	27.8	423	73.2	60.2	5.4	1062
Ideal	4	4	116.6	25.5	62.1	13.8	29.6	444	72.0	59.6	18.4	1025
Jerry	5	3	115.9	28	60.6	14.3	32.5	455	75.8	60.7	7.1	987
ND Noreen	4	3	119.4	27.5	63.2	14.4	34.0	415	72.0	60.1	7.5	1048
Northern	4	5	126.7	31.6	61.4	14.0	30.9	474	75.5	63.1	6.9	1075
SD Andes	NA	NA	122.9	30.3	62.3	14.0	32.4	460	72.7	60.3	6.9	1060
SY Monument	4	3	115.1	30.4	59.7	13.6	31.2	396	73.5	59.7	18.2	928
SY Wolf	3	6	107.8	25.9	61.8	14.0	31.2	414	72.1	60.7	7.7	998
WB4309	NA	NA	119.1	32.7	60.9	13.9	29.2	433	72.5	61.4	16.0	973
WB4462	4	4	110.3	30.5	60.2	14.4	34.1	445	71.9	59.4	6.9	925
Winner	NA	NA	120.3	30.8	61.5	14.0	32.8	454	70.0	59.9	9.5	1008
Mean			117.9	29.3	61.4	14.0	31.4	437.5	72.8	60.5	10.0	1008.2

¹Straw strength: 1 = strongest, 9 = weakest.

²Relative winter hardiness rating: 1 = excellent, 10 = no survival.

³Falling number: Expressed in seconds at 14% moisture basis. Low falling number indicates sprout damage.

⁴Milling extraction: Percent of milled flour recovered from cleaned and tempered wheat. A high percentage is desirable.

⁵Farinograph absorption: A measure of dough water absorption, expressed as a percent. A high absorption is desirable.

⁶Farinograph stability: A measure of dough strength. A high stability is desirable.

⁷Loaf volume: Volume of a pup loaf of bread expressed in cubic centimeters. A high volume is desirable.

NDSU’s Agronomy Seed Farm in Casselton trials multiple varieties of hard red winter wheat. (NDSU photo)

too early increases the risk of wheat streak mosaic virus and may reduce winter survival.

“If you are interested in trying a new public variety, consider ND Noreen, the first release from the newly re-established NDSU hard red winter wheat breeding program,” says Keene.

Noreen has excellent winter hardiness and good straw strength. In the 2021 small plot trials, Noreen yielded 119 bushels per acre at the NDSU Agronomy Seed Farm in Casselton and 27 bushels per acre at the NDSU Hettinger Research Extension Center. When grown for foundation seed production at the Agronomy Seed Farm in 2021, Noreen yielded 98 bushels per acre over 25 acres.

To purchase foundation seed or for information on certified seed for ND Noreen, contact NDSU Agronomy Seed Farm Director, Brian Otteson at 701-347-4743.

Agronomic, milling and baking characteristics of selected hard red winter wheat varieties. (NDSU photo)

Managing Wheat Streak Mosaic Disease By Eliminating The Green Bridge

By Marley Manoukian,
MSU Richland County Extension Agent

If you are preparing to plant winter wheat soon, it is important to consider green bridge control to prevent wheat streak mosaic (WSM). Wheat streak mosaic is a viral disease that impacts small grains, including spring wheat and winter wheat, as well as durum, barley, oats, and corn, among other crops. Symptoms of WSM include yellow streaking and mottling, which usually affects the entire plant. Early infections lead to plant stunting. Wheat streak mosaic impacts can range from insignificant up to 100% yield loss.

This viral disease is transmitted by the wheat curl mite. The wheat curl mite, along with the WSM virus, survive on the green bridge in between crops. The green bridge is the presence of any green plant material between the harvest of one crop and the planting of the next. Green bridge hosts of WSM virus include volunteer wheat, corn, as well as cheatgrass. Having these hosts in your area increases the risk for WSM, as wheat curl mites can travel several miles in the wind. Because of this, termination of the green bridge is key. Herbicide options include glyphosate and paraquat. Glyphosate can take up to 2 weeks as it kills slowly, causing the plants to be a host for the wheat curl mites for those 2 weeks following an application. Paraquat is fast acting and reduces the time that wheat curl mites can survive on those plants to 2 to 5 days. Tilling and swathing are also options to eliminate the green bridge and wheat curl mite populations in just a few days.

If you have any questions, contact the MSU Richland County Extension Office at 406-433-1206 or marley.manoukian@montana.edu.



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NDRA Championship Finals Rodeo In Watford City Sept. 23-24

By Anna Garcia

The NDRA Championship Finals Rodeo will take place at the McKenzie County fairgrounds located in Watford City on Friday, Sept. 23 and Saturday, Sept. 24. The rodeo will start at 7 p.m. CT on Friday and 6 p.m. CT on Saturday. The event will have concessions and beer gardens, lots of vendors, and Junior Wild Pony Race (with buckle & prize money awarded to the champion).

The Finals Rodeo will feature the top contestants in each standard event and pit them against the top stock in the state. Events that will be at the finals rodeo is bareback and saddle bronc riding, lady's breakaway and barrels, men's breakaway and bull riding, team roping, steer wrestling, and tie-down roping.

On Friday and Saturday night, there will be concessions and beer gardens, and the Junior Wild Pony Race.

The NDRA is one of North Dakota's largest rodeo entities; it was formed in 1953 and is made up of over 500 members that compete in rodeos across the state of North Dakota and puts on 15 to 25 rodeos a year. The NDRA rodeos bring in cowboys and cowgirls from Montana, North Dakota, South Dakota, Wyoming, Nebraska, and Minnesota. The NDRA averages about 200 contestants per rodeo.

Everyone is welcome to come out and watch rodeo finalists compete for the 2022 NDRA Championship state titles!

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energized

- Downed power lines can energize the ground up to **35 feet away**. Even more in wet conditions.
- **Never drive over** downed power lines or through water that is in contact with them.
- **Never try to move** a downed power line.
- If you see a downed line, **call 911**.

If a vehicle or farm equipment contacts a power line or utility pole, stay away and call 911.

- Consider **all lines** to be live and dangerous.
- Stay in place or inside your vehicle unless you see fire or smoke.
- Warn others to stay at least **35 feet away**.
- **Tell others** not to approach vehicle, downed lines, or anything that may be in contact with downed lines.
- **Call 911**



In the event of fire or smoke

- **Do not** touch the ground and vehicle at the **same time**.
- Jump from vehicle with your **feet together**.
- **Shuffle away**, avoid lifting your feet.

If a vehicle contacts a power line
or utility pole...

**stay away
and call 911**

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GUN & HOUSEHOLD AUCTION

RICHARD COFFMAN ESTATE

SATURDAY, SEPTEMBER 24, 2022 • 10:00 A.M.

LOCATION: MILES CITY, MT-CUSTER COUNTY FAIRGROUNDS
FOR MORE INFORMATION: TOM CLARKE, TRUSTEE 406-853-3353
Lunch will be available.



BROWNING GUN SAFE

HOUSEHOLD & SHOP

- Oblong Table & 6 Chairs
- Matching China Hutch & Small Cabinet
- Many Misc. Bookcases
- Rolltop Desk
- (2) Computer Desk
- Desk & 2 Office Chairs
- (2) Matching Lamps
- 5-piece Bedroom Set (king bed, armoire, double mirror dresser, 2-nightstands)
- 4-piece Bedroom Set (queen bed, vanity w/mirror, chest of drawers, 2-nightstands)
- 2 & 3 drawer Steel File Cabinets
- (3) 4-drawer Steel File Cabinets
- Round & Rectangular Coffee Table
- (3) End Tables
- Maytag Washing Machine
- Kenmore Front-load Dryer
- Globe & Stand
- Radio w/CD
- Many Wrist Watches
- Glassware, Dishes, Pots & Pans
- Kitchen Utensils
- Card Tables
- (3) Vacuum Cleaners
- (5) Walkers
- Conn Cornet
- Fiddle
- Lots of Toy Model Cars
- Toro Lawn Mower
- Stihl Gas Leaf Blower
- B&D Hedge Trimmer
- Stack-on Toolbox
- Portable Air Tank
- Sander
- (2) Skil Saws
- Jump Starter
- Army Cans
- Aluminum Step Ladder
- Wet/Dry Vac
- Extension Cords
- Misc. Shop Tools

CONSIGNED

- Browning 10-gauge, pump w/choke Tubes
- Winchester model 70 wood, perfect 223 w 4x12 scope (nearly new)
- Ruger 10/22 model 22 with 3x9 Scope, 25 round clip
- 1500 rounds of 22 Shells
- Approx. 150 rounds of Weatherby 340 mag.
- Approx. 150 Brass of Weatherby 340 mag
- Approx. 20 boxes of 10-gauge mag
- Scopes from 3x9 to 5x2
- (10) soft shell rifle cases
- Misc. Hunting Items

- | HANDGUNS | RIFLES & SHOTGUNS |
|---|--|
| 1. COLT MK IV/SERIES 90 PISTOL | 1. REMINGTON MODEL 17, 12 GAUGE, PUMP SHOTGUN |
| 2. CHAMBERLAIN 357 MAG REVOLVER | 2. WINCHESTER 30-30, LEVER ACTION, COMMEMORATIVE CARBINE, SADDLE RING |
| 3. AMERICAN ARMS 38 CAL. REVOLVER | 3. MARLIN 30-30, LEVER ACTION, MODEL 336, CARBINE, SADDLE RING, MICRO-GROOVE BARREL |
| 4. FRONTIER 357 MAG REVOLVER | 4. WINCHESTER 22S OR 22L, PUMP, MODEL 62A |
| 5. AMERICAN ARMS 45 CAL. REVOLVER | 5. US CARBINE 30 CALIBUR |
| 6. SMITH & WESSON 38 SPECIAL REVOLVER | 6. MARLIN 22S OR 22L, LEVER ACTION, MODEL 39 CENTURY LTD. |
| 7. RUGER 22 CAL. SINGLE 6 REVOLVER | 7. WINCHESTER SUPREME, OVER/UNDER, 12-GAUGE, 3", INVECTOR |
| 8. STOEGER 38 CAL. REVOLVER | 8. REMINGTON WINGMASTER 12—GAUGE PUMP, MODEL 870, MAGNUM |
| 9. CHARLES DALY 357 MAG REVOLVER | 9. MARLIN 22S OR 22L, LEVER ACTION, GOLDEN 39A MOUNTIE, MICRO-GROOVE BARREL, REDFIELD SITE |
| 10. SMITH & WESSON 44 CAL. REVOLVER | 10. JP SAUER & SOHN (GERMANY) 12-GAUGE DOUBLE BARREL SIDE-BY-SIDE |
| 11. BOUNTY HUNTER 22 CAL. REVOLVER | 11. REMINGTON SINGLE BARREL, 12-GAUGE, MODEL 1100 |
| 12. EL PATRON 357 MAG REVOLVER | 12. REMINGTON 308 WIN, MODEL 700, BOLT ACTION, TASSCO SCOPE |
| 13. MOUNTAIN GUN 44 CAL. REVOLVER | 13. MAJID ROSSI INNER ARMS (BRAZIL) 22 LR PUMP |
| 14. COLT 357 MAG REVOLVER | 14. MARLIN 357 OR 38 SPL LEVER ACTION, MODEL 1894CP |
| 15. SMITH & WESSON 22 CAL. REVOLVER | 15. WINCHESTER 30-30, LEVER ACTION, CARBINE, SADDLE RING, MODEL 90 |
| 16. RUGER 38 CAL. S&W NOSE REVOLVER | 16. ITHICA 12-GAUGE, PUMP ACTION, MODEL 37 |
| 17. RUGER 44 CAL. REVOLVER, BLACKHAWK | 17. WINCHESTER 12-GAUGE, PUMP ACTION, MODEL 12 |
| 18. TAURUS "JUDGE" 410/45 CAL. REVOLVER | 18. RUGER 22 LR CARBINE, BOLT ACTION, MODEL 10 |
| 19. STOEGER 45 CAL. REVOLVER | 19. WINCHESTER 223 BOLT ACTION, MODEL 70, BURRIS SCOPE |
| 20. COLT & SMITH & WESSON 38 CAL. REVOLVER | 20. RUGER 22LR BOLT ACTION, MODEL 77, TASSCO SCOPE |
| 21. SMITH & WESSON 38 CAL. REVOLVER | 21. COLT 45 CAL., LEVER ACTION, OCTAGON BARREL |
| 22. COLT 45 CAL. REVOLVER | 22. SAVAGE 223 WIN, LEVER ACTION |
| 23. TAURUS 44 CAL. REVOLVER | 23. HENRY 44 CAL/44SPL, LEVER ACTION, OCTAGON BARREL, BRASS PLATED |
| 24. UBERTI 357 MAG REVOLVER | 24. WINCHESTER 410 SHOTGUN, LEVER ACTION, MODEL 9410 |
| 25. RUGER NEW VAQUERO 357 MAG REVOLVER | 25. STUEGG/UBERTI (ITALY) 357 MAG, LEVER ACTION, OCTAGON BARREL |
| 26. RUGER VAQUERO 45 CAL. REVOLVER, PEARL HANDLE | 26. SAUER 300 LEVER ACTION, MODEL 99 |
| 27. COLT 45 CAL. REVOLVER | 27. TAURUS 22LR PUMP ACTION, MODEL 62 |
| 28. COLT 38 CAL. REVOLVER | 28. STURM RUGER 44 CAL. CARBINE, BOLT ACTION |
| 29. LAWMAN 357 MAG S&W NOSE REVOLVER | 29. STOEGER CONDOR (BRAZIL), 20-GAUGE OVER/UNDER SHOTGUN, 3" |
| 30. TAURUS 38SPL S&W NOSE REVOLVER | 30. RUGER 22 LR BOLT ACTION, MODEL 10 |
| 31. ROSSI 38SPL S&W NOSE REVOLVER | 31. AMADIO ROSSI (BRAZIL), 20-GAUGE, SIDE-BY-SIDE |
| 32. SMITH & WESSON 38SPL S&W NOSE REVOLVER | 32. E.R. AMANTINO (BRAZIL) 410, OVER/UNDER, 3" |
| 33. DOUBLE EAGLE 22LR, 2-BARREL | 33. DAISY BB GUN, PUMP |
| 34. BROWNING 380 BLACK LABEL SEMI AUTO | |
| 35. COLT WALTHER 380, SEMI AUTO | |
| 36. WALTHER 22LR, SEMI AUTO | |
| 37. COLT 45 CAL. REVOLVER (mfrd. 560 units after Sheriff Garretts, serial number 55683) | |
| 38. COLT 45 CAL. REVOLVER | |
| 39. SMITH & WESSON 357 CAL. REVOLVER, 4" BARREL | |
| 40. COLT "Marshall" 38 SPL REVOLVER, ROUND BUTT | |
| 41. COLT "TROOPER" 22 LR REVOLVER (SAME FRAME AS PYTHON) | |
| 42. STRUM RUGER 357 CAL. BLACKHAWK, PEARL HANDLE | |
| 43. COLT "COWBOY" 45 CAL. REVOLVER, MODEL 1873 | |
| 44. COLT "ARMY" 357 MAG REVOLVER, MODEL 1873 | |
| 45. SMITH & WESSON 357 MAG REVOLVER | |
| 46. STRUM RUGER 357 MAG, BLACKHAWK REVOLVER & HOLSTER | |
| 47. SMITH & WESSON 357 MAG REVOLVER | |
| 48. SMITH & WESSON 22 LR REVOLVER & HOLSTER | |
| 49. COLT "DETECTIVE SPL" 38 SPL & HOLSTER, IVORY GRIPS (carried by Richard 1963-1980) | |
| 50. COLT 45 CAL. REVOLVER | |
| 51. STRUM RUGER 44 REVOLVER, BLACKHAWK, 6 1/2" BARREL | |
| 52. COLT "PEACEMAKER" 22LR REVOLVER | |
| 53. UBERTI 45 CAL. REVOLVER, MODEL 1873 | |
| 54. UBERTI "LIBERTY" 357 MAG REVOLVER, MODEL 1873 | |
| 55. COLT "NEW FRONTIER SCOUT" 22LR REVOLVER | |
| 56. COLT 45 CAL. REVOLVER, MODEL 1873, NICKEL FINISH, 3 1/2" BARREL & HOLSTER | |
| 57. UBERTI 33 SPL BRASS GRIP & TRIGGER FRAME, MODEL 1872 | |
| 58. UBERTI 44 CAL. BRASS GRIP & TRIGGER FRAME, MODEL 1851 | |
| 59. INTERARMS "VIRGINIA DRAGON" 44 CAL. 60, COLT 45 CAL. MODEL 1909 | |
| 60. COLT 38 CAL. MODEL 1894 | |
| 61. COLT 38 CAL. MODEL 1894 | |
| 62. LOTS OF AMMUNITION | |



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AUCTIONEER'S NOTE: Richard's guns are in very good to excellent condition. We will start the sale with household and shop and move on to the firearms. There is a nice variety of items at this sale. We hope to see you September 24th! ~Rick

MSU Extension Shares Considerations For Fertilizing Winter Wheat

From MSU News Service

Bozeman - As winter wheat harvest in Montana comes to a close, producers may be thinking about fertilizer decisions for upcoming winter wheat seeding. Nitrogen, phosphorus, potassium, sulfur and chloride should all be considered in fertility programs, according to Clain Jones, Montana State University Extension soil fertility specialist and Department of Land Resources and Environmental Sciences professor in the College of Agriculture.

Phosphorous and potassium

Phosphorus and potassium are immobile nutrients in the soil and tend to be relatively stable in a field over time, Jones said. Thus, the timing of soil testing for phosphorous and potassium is less important than for more mobile nutrients, like nitrogen.

"These nutrients are best applied below the soil surface near winter wheat seed because placing them in the root zone will maximize availability to the crop," Jones said. Producers should base phosphorus and potassium fertilizer applications on fall soil tests in the top 6 inches for "Olsen P" and "exchangeable K," two lab tests that estimate the amount of each nutrient available to plants.

According to Jones, phosphorus is important for healthy root growth and successful overwintering of winter wheat. If soil tests show Olsen P levels of less than 24 parts per million, then winter wheat can benefit from phosphorous fertilizer. Previous MSU research has found that because phosphorous can help winter wheat survive Montana's harsh winters, phosphorous fertilizer is needed for winter wheat more than most other crops grown in the state, which need Olsen P levels to be approximately 16 parts per million.

Phosphorus fertilizers can be applied in fairly high amounts in the seed row as long as minimal nitrogen and potassium are applied with the seed, Jones said. Common phosphorous fertilizer sources are monoammonium phosphate (MAP; 11-52-0) and liquid ammonium phosphate (10-34-0).

Potassium deficiencies are generally rare in Montana but can occur in coarse-textured soils or in fields where straw is frequently removed. Soil potassium test levels above 250 parts per million are adequate for winter wheat production. However, winter wheat can respond to potassium fertilizer (potash; 0-0-60) at potassium test levels above 250 parts per million, especially in no-till soils that tend to be cooler than tilled soils in spring.

"Potash is best used with a subsurface-banded application to get the potassium in the root zone," Jones said. "If applied in-furrow with the seed, limit the total amount of nitrogen and K₂O, or potassium oxide, to less than 20 pounds per acre. Potash is also effective when broadcast at seeding."

Chloride

Chloride is a micronutrient that winter wheat producers should consider in fertility programs. Certain winter wheat varieties (Bobcat, CDC Falcon, Raptor, Peregrine and Promontory) are susceptible to physiological leaf spots in chloride-deficient soils, according to Uta McKelvy, MSU Extension plant pathologist and Department of Plant Sciences and Plant Pathology assistant research professor.

"Physiological leaf spots closely resemble fungal leaf spots such as tan spot, but they are not caused by pathogens," McKelvy said. She pointed out that "physiological leaf spots tend to develop most severely on the flag leaf, although it may be observed before flag leaf emergence. In contrast, fungal leaf spots are mostly found on older leaves lower in the canopy. Physiological leaf spots may also occur more uniformly across a field, while fungal leaf spots are generally associated with areas of high residue in the field.

"Distinguishing between physiological leaf spots and fungal leaf spots is diffi-

cult but important when deciding if a fungicide application is necessary," McKelvy added. She recommended individuals contact their local Extension agent for help identifying physiological leaf spots. Whole plant samples can also be sent to MSU's Schutter Diagnostic Lab to identify the cause of leaf spots.

"If planting a variety known to display physiological leaf spots, or if physiological leaf spots have been observed in a field before, producers should consider applying 10-20 pounds potash per acre, which contains 4.5-9 pounds chloride per acre, to mitigate chloride deficiency," Jones said.

He added that chloride is very mobile, so it can be applied as a broadcast application if there are concerns with salt damage if applied in the seed row. To verify that cereals have chloride deficiency, a whole plant sample or just flag leaves can be analyzed for chloride. Tissue levels of chloride below 0.1% are likely deficient, although once the flag leaf has physiological leaf spots, even a rescue treatment of chloride will not reverse the physiological leaf spots. Jones pointed out that chloride tissue testing can still be useful to identify the need for chloride in future growing seasons.

Nitrogen and sulfur

Producers should wait to apply nitrogen and sulfur until spring, Jones said, as these nutrients can leach in shallow or coarse soils, and test levels can change dramatically over winter. MSU fertilizer guidelines for nitrogen are based on spring soil nitrate tests.

"This can require producers or their advisers to soil sample twice: once in the fall for phosphorous and potassium and again in the spring for nitrogen," Jones said. "Since this is not very practical, fall nitrate levels can be adjusted based on typical differences between fall and spring nitrate on a farm." He added that he has generally found that nitrate increases about 15 to 25 lbs. per acre from late summer to early spring, but on shallow soils in wet years, nitrate levels can decrease over winter. Over- or under-applying nitrogen can affect the bottom line much more than the cost of soil sampling and analysis.

Soil sulfur tests often do not predict crop response to sulfur fertilizer very well, according to Jones. Therefore, producers should consider other factors to determine if sulfur fertilization is necessary. Sulfur deficiency is more likely in coarse, shallow soils and in soils with low organic matter. "If past yields or protein levels have been unexpectedly low and don't respond to additional nitrogen fertilizer, sulfur may be deficient," Jones said. Strip trials with gypsum or ammonium sulfate can determine if winter wheat is responsive to sulfur in a given field.

More resources available

MSU Extension has several resources for making fertilizer decisions available at store.msuextension.org, including Montana Wheat Production Guide, Fertilizer Guidelines for Montana Crops, Interpretation of Soil Test Reports for Agriculture and Developing Fertilizer Recommendations for Agriculture.

The MSU Fertilizer Recommendation tool (sarc.montana.edu/php/soiltest) and the Economic Nitrogen Calculator (msuextension.org/econtools/nitrogen/index.html) are online tools to help calculate fertilizer requirements. Questions about this or other soil fertility topics may be directed to Jones at clainj@montana.edu or 406-994-6076 or may be addressed by visiting the MSU Extension soil fertility website at landresources.montana.edu/soilfertility.

For questions on identifying physiological leaf spots and crop diseases, contact McKelvy at uta.mckelvy@montana.edu or call 406-994-5572. Information on sample submission to the Schutter Diagnostic Lab can be found on the lab's website at diagnostics.montana.edu/contact.html.

Sustainable Oils Is World's Leading Camelina Seed Company



By Anna Garcia

Sustainable Oils LLC, a company headquartered in Great Falls, is known to be the world's leading camelina seed company for renewable diesel production.

According to susoils.com, it owns an industry leading portfolio of property rights, including patents and production know-how, to produce its proprietary varieties of camelina as a nonfood based ultra-low carbon biofuels feedstock. Renewable diesel made from Sustainable Oils Camelina is a high-demand drop-in fuel that meets all specifications for modern engines, similar to diesel produced from petroleum.

Tavin Schneider, Sustainable Oils assistant breeder, works to support the breeding program through field and chamber trialing, quality testing, and project management.

Sustainable Oils has recently acquired a refinery in Bakersfield, CA, and they are looking to increase the acres of camelina grown in Montana. Sustainable Oils is also looking at winter varieties and herbicide resistant varieties in camelina.

2022 was the first year that the company grew camelina commercially in eastern Montana. In 2021, growers in Montana, Kansas and Colorado planted Sustainable Oils Camelina with favorable results.

"We look forward to working with those farmers again and are also looking to increase our acreages there in 2023. We currently have delivery points in Wolf Point and Glendive to support our farmers in the region," said Schneider.

MSU is conducting a fertility trial, evaluating many different nitrogen and sulfur rates applied to camelina production. "Fertilizer expenses are a major consideration when growers are making cropping decisions. We believe camelina fertility requirements will be relatively low when compared to other crops," added Schneider.

The company targets fallow acres across Montana and the high plains. By targeting fallow acres, they are offering the opportunity to turn otherwise idle land into profitable acres for growers.

"Our team works closely with camelina producers to establish, manage, harvest, and deliver their crop."

Their breeding efforts focus on developing varieties suited for specific soil and environmental conditions, improving the oil profiles for more efficient refining, and including tolerance traits to make more acres available for camelina production.

For more information on Sustainable Oils, visit their website at <https://susoils.com>.

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McNally Family Takes Home Champion Titles At Richland Co. Fair



The McNally family poses with Brynlee's reserve champion market hog during the Richland County Fair. Visit roundupweb.com for more photos.

By Anna Garcia

The McNally family had a successful season at the Richland County Fair. Seventeen-year-old Cooper McNally had the 2022 Grand Champion market hog, breeding gilt, and he won the Champion of Champions title with his gilt. He was also titled 2022 Grand Champion Senior Showman for both hogs and beef projects and he won the Round Robin.

His 9-year-old sister Brynlee had the 2022 Reserve Champion market hog, goat, and steer. She was also the 2022 Grand Champion Novice Pig and Goat Showman and Reserve Champion Novice Beef Showman.

On top of this, their cousin Avery Johnson was awarded the Grand Champion Jr. Hog Showman and won the Jr. Round Robin.

"We got our hopes up this year. We had a set of pigs that we knew were pretty good and the goat was one I raised myself, so it was nice seeing it do that well," Cooper said. "It feels pretty awesome to have such a successful fair."

Cooper works hard towards achieving his goals and 'making the best better'. "You have to go into it with a goal and if you don't achieve that goal, you can't give up on it because there is always next year, which means that there is always more work that can be done."

This past year, there were several challenges that made things difficult ex-

plained Cooper. "We have had plenty of challenges, as far as the blizzards earlier in the year. We had to have pigs back on the trailer and we got the steers later than I expected, but the success we had at the fair really built back from everything that went wrong in the beginning of the year."

The McNally's had 13 pigs in the barn and 3 steers that they worked with almost every day. "As a family, we definitely put in a lot of hours into these projects."

Cooper and Brynlee's 8-year-old sister, Kree, also helps work with the animals.

"I love working with my sisters. My favorite part about raising livestock is that my whole family is involved in it. It has been really cool watching my sisters grow up into it and enjoy it."

Cooper has always had a passion for livestock and is thankful for the opportunity to be involved in the ag industry. "I would like to make a career out of raising livestock one day and I think it is pretty awesome that we have the opportunity to do all this stuff."

For the past nine years, he has shown animals at the county fair, attended clinics, and competed in jackpots and several livestock shows. "Our goal is to always have quality animals that are hard to get around. We are just hoping to hang up as many banners as we can."



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Wed, Sept 14..... All Class Cattle Sale 9:00

**Wed, Sept 21 ... ACCS & Yearling Special/
Customer Appreciation BBQ 12:00**

Wed, Sept 28..... All Class Cattle Sale 9:00

Fri, Sept 30..... Sheep Sale 10:00

Wed, Oct 5 All Class Cattle Sale 8:00

Wed, Oct 12 All Class Cattle Sale 8:00

Wed, Oct 19 All Class Cattle Sale 8:00

Wed, Oct 26 Feeder Calf & Yearling Special Only 8:00

Sat, Oct 29 Weigh Ups & Bred Cow Special Only 8:00

Wed, Nov 2..... Feeder Calf Special Only 8:00

Sat, Nov 5..... Weigh Ups & Bred Cow Special 8:00

Wed, Nov 9..... Feeder Calf Special Only 8:00

Sat, Nov 12..... Weigh Ups & Bred Cow Special 8:00

Wed, Nov 16..... Feeder Calf Special Only 8:00

Sat, Nov 19..... Bred Cow Special & Weigh Up Special 8:00

Tim Larson: 406-480-2666 **Dustin Cymbaluk:** 701-220-0813 **Terry Moe:** 701-580-2426 **Al Franzen:** 406-489-7444 **Christy Albin:** Office Manager

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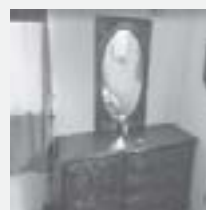
SATURDAY, SEPTEMBER 17, 2022 10:00 A.M.

LOCATION: FROM GLENDIVE, MT- TAKE HWY 200 SOUTH TO DRY CREEK ROAD (AIRPORT ROAD) FOR 1 MILE.
FOR MORE INFORMATION: PAM 406-385-7956 • LUNCH WILL BE AVAILABLE.



VEHICLES, TRAILER, BOAT, & ATV

- 2010 Buick Lucerne CXL Car, 3.8 liter engine, 60,680 miles
- 1978 Dodge 20' Tioga Motorhome, 67,862 miles
- 2003 GMC 1/2 ton SLT Z71 Extended Cab Pickup, 4x4, fiberglass topper, 123,500 miles
- 1995 Ford F150 XLT Extended Cab Pickup, 4x4, auto (transmission bad), topper, 100,352 miles
- 16' Car Trailer w/ramps
- Small ATV Trailer
- Aluminum Boat w/Trailer
- Polaris Sportsman 400, liquid cooled, 4x4 w/electric winch, 3,157 miles



HOUSEHOLD

- Table & 6 Chairs
- Sewing Machine w/cabinet
- Matching Couch & Loveseat
- (3) Recliners
- Electric Lift Chair
- (3) End Tables
- Coffee Table
- Large Folding Table
- Entertainment Center
- Flat Screen TV
- Card Table & Chairs
- (2) Small Lamps
- Piano Bench
- Printer
- Trundle Bed
- Dresser
- 4-piece Bedroom Set (queen bed, 2-dressers, nightstand, headboard)
- 4-piece Bedroom Set (queen bed, dresser w/mirror, amoire, nightstand)
- Patio Table w/5 Chairs
- Round Patio Table
- Treadmill
- Exercise Bike
- Many more misc. items



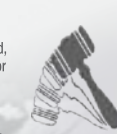
MACHINERY & SHOP

- JD 2305 HST Tractor, diesel, 3 pt., &
- JD 200 CX Front-end Loader
- JD E140 Riding Lawn Mower, 48" cut, rear bagger
- JD LA135 Riding Lawn Mower, rear bagger
- JD 110 Riding Lawn Mower
- Swisher 60" pull-behind Mower, 13.5 hp OHV engine
- Yardman 6.5 21" cut, 6-speed Lawn Mower
- (3) JD model A Tractors (parts) 1-wide front & JD Front-end Loader
- 3 pt. Back Blade
- 3 pt. Disc
- 3 pt. Small Ditcher
- Drag Harrow
- JD Snowblower & Tiller (fits on tractor)
- McCormick PTO Side Mower
- Side-Delivery Rake
- Dump Rake
- Large Work Bench
- Schumacher Battery Charger
- Honda Generator w/wheels
- Bench model 5-speed Drill Press
- Rigid 300 Pipe Threader
- Ladders
- Electric Grinder
- Portable Air Tank
- Approx. (10) Sheets of Sheet Metal
- Lots of New Copper Tubing (some insulated)
- Lots of New Pipe, PVC Fittings, Vent Pipe
- Many Parts Bins
- Pipe & Open-end Wrenches
- Socket Sets
- Drills, Saws
- Toolboxes
- Extension Cords
- Army Cans
- Blow Torch
- AC Gauges
- Misc. Oil
- Few Tonka Toys



AUCTIONEER'S NOTE

Willie owned and operated a business called, "Willie's Heating and Air Conditioning". Prior to having his own business, he worked 30-years for Wagner's Heating and Air Conditioning. Many of the items at this sale are new. There is a wide variety of items from Tractors, Vehicles, Shop and Household. We hope to see you on Saturday, September 17th! ~Rick



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Rick Kniepkamp



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MSU Doctoral Students Receive Awards From International Precision Agriculture Society

By Meaghan MacDonald-Pool
MSU News Service

Bozeman - A Montana State University doctoral student and Ph.D. graduate recently received honors for their research on precision agriculture in Montana.

Sasha Loewen and Paul Hegedus in the College of Agriculture received Graduate Student of the Year awards from the International Society of Precision Agriculture. Both were recognized at the organization's annual meeting held at the end of June in Minneapolis. ISPA is a nonprofit professional scientific organization with a mission to advance the science of precision agriculture globally. Hegedus graduated in May with a Ph.D. in ecology and environmental sciences, and Loewen will graduate in December.

"These awards are a significant international recognition of the quality of research conducted by these students and for MSU as an agricultural research institution" said Bruce Maxwell, Department of Land Resources and Environmental Sciences professor. Both Hegedus and Loewen were researchers in his lab.

Loewen and Hegedus research seeding and nitrogen fertilizer rates, respectively, and how producers can use that data to precisely manage their fields. Both seed and fertilizer can be tailored for the most appropriate amounts for specific places in a field. For instance, if there is a weed patch, producers can raise seeding rates there to increase competition. Or if there is a hilltop with poor growth, they can decrease seeding rates.

Additionally, Loewen and Hegedus have developed an on-farm precision experiment framework since 2015. The framework is a digital decision support tool where producers can upload data from their fields and receive management recommendations. Hegedus oversaw the process of organizing and storing producer information and putting it into analysis-ready data sets so that he and Loewen can model crop yields and grain protein numbers. The team also measured crop yield and grain protein data at harvest time to add to the accuracy of what the field is producing. With this information producers can make educated decisions on how to manage their seed and fertilizer input for future seasons.

"We also gather a bunch of satellite imagery data. One of the principles of this framework is we only use freely available data producers would gather from their day-to-day operations or online sources," Hegedus said.

Both Loewen and Hegedus came to MSU after switching from a different program and into the ag world. Loewen, from Manitoba, Canada, received his bachelor's in anthropology and a master's in molecular genetics. He focused



Paul Hegedus (Photo submitted)



Sasha Loewen (Photo submitted)

on agriculture for his Ph.D. when the farm he and his father run went organic in 2016. He said the switch was a very eye-opening process for him, and he had to essentially relearn everything he knew about the farming business. He worked in an ag research lab at the University of Manitoba before landing in Maxwell's lab.

Hegedus, originally from Seattle, received his bachelor's from MSU in environmental science with a land rehabilitation focus. He worked with Maxwell on genotype modeling of weed populations. Hegedus said he liked working with data and modeling and found the transition into his doctoral program seamless.

Both Hegedus and Loewen believe in the possibilities that precision agriculture present and are passionate about showing Montana producers how effective they can be if they applied it to their farms.

"A lot of farmers we work with are older, over 50 or 60, and view digital technology as something a younger demographic enjoys. However, it's interesting that these older farmers are still willing to work with their data and use it not to replace their decision making but to augment and complement it," Loewen said.

"At Montana State, we believe in the power of precision agriculture and how it can take Montana farming into the future," said Sreekala Bajwa, College of Agriculture vice president of agriculture and dean and Montana Agricultural Experiment Station director. "Sasha and Paul's awards are examples of how researchers at MSU work directly with producers and how their research can have positive outcomes with saving people money, expanding their yield and beyond. Congratulations to them both and we thank them for their contributions to the precision agriculture field."

Sen. Hoeven Announces Partnership Between NDSU, USDA ARS and Grand Farm

A federal appropriation will develop a partnership between NDSU, USDA ARS and Grand Farm.



U.S. Sen. Hoeven announces a federal appropriation that will develop a partnership between NDSU, USDA ARS and Grand Farm. (Photo courtesy of Emerging Prairie)

By NDSU Agriculture Communication

U.S. Sen. John Hoeven announced a federal appropriation that will develop a partnership between North Dakota State University, the U.S. Department of Agriculture Agricultural Research Service and Grand Farm around research development and educational opportunities in agriculture technology. This announcement occurred at an event held at NDSU.

“Grand Farm is about leveraging North Dakota’s global leadership in agriculture and the dynamic technology sector that we’ve built in our state to develop and implement the next generation of precision agriculture,” said Senator Hoeven. “That means reducing producers’ input costs, improving their yields and empowering them to continue providing the highest quality, lowest cost food supply in the world. Moreover, by building upon the intersection of agriculture and technology, North Dakota will be positioned to realize new opportunities for investment and job growth for years to come.”

“This important partnership between NDSU, Grand Farm and the USDA will provide more opportunities for students to gain experience in a variety of agriculture technology related careers,” said NDSU President David Cook. “I look forward to this work leading to other exciting partnerships between NDSU and the private sector.”

“This exciting project highlights North Dakota’s leadership in agriculture technology and demonstrates our state’s top-tier research capabilities,” said Mark

Watne, North Dakota Farmers Union president and Grand Farm board member. “We are thankful for Sen. Hoeven’s leadership in making this project a reality. Grand Farm is committed to working with NDSU and USDA ARS alongside growers and industry partners to advance these technologies and make sure they are relevant and valuable to those who will ultimately use them.”

Grand Farm, led by Emerging Prairie, enables technology to feed the world by bringing together stakeholders to facilitate collaboration on innovations solving some of the world’s largest challenges in agriculture technology.

NDSU Agricultural Affairs works to meet the needs of people on a local and global level by educating students with interests in agriculture, food systems and natural resources; extending NDSU information to all North Dakota citizens; and advancing scientific knowledge through innovative research.

Speakers at the press conference included U.S. Sen. John Hoeven, N.D. Rep. Michael Howe, USDA ARS deputy administrator Marlen Eve, NDSU student body president and recent Grand Farm intern Christian Walth, NDSU President David Cook, Grand Farm board member Mark Watne, and agriculture technology entrepreneur Barry Batcheller.

Additional coverage of the press conference is available on the following Facebook pages: Grand Farm, NDSU College of Agriculture, Food Systems and Natural Resources and North Dakota Agricultural Experiment Station.

Grasshopper Problem Persists For Producers

By Anna Garcia

Farmers across the region have experienced significant losses due to the sky-rocketing grasshopper population.

"The population levels this summer have met the USDA-APHIS projection and, in some areas, have greatly exceeded it. The late snowstorms and cool

and wet weather this spring helped combat grasshoppers early on by 1) delaying their hatching, and 2) allowing the grass to grow and get a head start before the grasshoppers had finished hatching," explained MSU Richland County Extension Agent Marley Manoukian.

Grasshoppers thrive in dry weather conditions; outbreaks are usually followed by several years of hot, dry summers and warm falls; these conditions allow grasshopper populations to increase slowly.

"Grasshoppers are responsible for loss of production as well as loss of profit, whether that be through yield loss or through the high input costs of spraying to control the grasshoppers," said Manoukian.

Many producers have struggled with grasshoppers on their pastureland, as the pests compete with grazing livestock for forage. They feed on the desirable forage, leaving the less desirable plants behind. Their feeding, if coupled with drought conditions, is prone to causing long-term deterioration of the forage plants/rangeland. The pests can reduce the quality of rangeland in the same way as cattle overgrazing. Ranchers can help deter grasshopper damage by properly managing their range through proper stocking rates and using insecticides suitable for their operation.

"Grasshoppers may have caused decreased yield or quality in hay, depending on the population levels in that region. Dryland grass hay production may be of lower quality, as the majority of the damage was to the leaves, which are the most nutrient dense part of the plant. Damage in other hay production varies from minimum damage on the leaves to varying degrees of defoliation," said Manoukian.

Thankfully, many hay cuttings were successfully harvested before the grasshopper problem escalated. Other parts of North Dakota and Eastern Montana were not as fortunate.

"McKenzie County hay yields are actually very high this year. Pastureland may be affected some, but because of the plethora of crops around McKenzie County, hoppers are going to choose those over competing with livestock," NDSU McKenzie County Extension Agent Devan Leo.

Grasshoppers and locusts can also wipe out crops and keep them from maturing into an actual, tangible crop. The pests migrate and consume almost any plant they come upon. According to www.ndsu.edu, row crop producers should be aware of the potential for grasshoppers to move into row crops after small grains have started to dry down.

The best thing producers can do is to consider spraying to keep the populations down. Both low and high labeled rates of all insecticides provide control of grasshoppers and prevent economic yield loss.

"Chemical options are available, however, because of the high demand for such products this year, supply was limited," added Manoukian.

Insecticide options include carbaryl such as Sevin, pyrethroids such as Warrior and Mustang Maxx, lambda-cyhalothrin such as Warrior II, and diflubenzuron such as Dimilin, among others.

Leo explained, "Many farmers have been applying insecticide since June to control hoppers. They have been very proactive in controlling the problem that could escalate into a disaster. Overall, I am optimistic for our farmers harvesting a yielding crop before the hoppers present any real problems other than an extreme nuisance."

Producers dealing with grasshopper issues, are encouraged to contact local crop-dusting companies to discuss spraying options. Local crop-dusting companies include Sidney Air Service Inc; Mehling Spraying Services, Fairview; Trower Aviation, Scobey; Aero Spraying Service Inc, Williston; and Taylor Ag Services, Inc, Watford City.



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NDSU's Soybean Iron Chlorosis Ratings Available

Farmers should consider soybean iron chlorosis ratings when selecting soybean varieties for the 2023 growing season.

By NDSU Agriculture Communication

North Dakota State University's soybean breeding program conducts research every growing season on the tolerance of soybean varieties to iron deficiency chlorosis (IDC).

"If farmers had IDC in their fields this year, they should consider using the NDSU tolerance ratings generated in 2022 and previous years, to select soybean varieties for 2023, to minimize the chlorosis in their fields," says Hans Kandel, NDSU Extension agronomist.

During the summer of 2022, NDSU's soybean breeding program tested 225 Enlist, GT27, Roundup Ready and Xtend soybean varieties, as well as 32 conventional varieties, for IDC tolerance.

The test results are based on a replicated trial conducted at a location with a history of IDC. Visual ratings were given, three times during the growing season, at two week intervals and ratings were averaged. The ratings were based on a 1 to 5 scale, with 1 indicating no chlorosis and 5 being the most severe chlorosis.

"Soybean varieties differ genetically in how tolerant they are to IDC symptoms," says Carrie Miranda, NDSU soybean breeder. "The chlorosis expression differs from field to field and this year our trial location had severe IDC."

"The data generated is intended to compare varieties against each other for the specific conditions this year. The most tolerant varieties will have the lowest IDC rating," Miranda continued.

This summer's tests showed significant differences among soybean varieties. For example, the average ratings for the conventional group of varieties tested, ranged from 2.3 (most tolerant) to 4.4 (the least tolerant variety). The test results are available at <https://www.ag.ndsu.edu/varietytrials/soybean>.

The IDC symptoms appear as yellowing leaf tissue between the veins while the veins may remain green. In a severely affected plant, the tissue will become brown and tissue may die. Plants with chlorosis are often stunted and growth and development are slow compared to healthy plants. Soybean plants may grow out of the chlorosis and become green again; however, yields are usually reduced due to IDC.



An iron chlorosis rating scale is used to evaluate IDC tolerance. (NDSU photo)

Although IDC tolerance in soybean varieties is important, it is also critical to consider other variety traits and yield. Varieties with similar IDC tolerance can vary greatly in their yield potential.

Most of the Research Extension Centers in North Dakota conduct soybean variety trials and results will be reported on the NDSU variety trial website at <https://www.ag.ndsu.edu/varietytrials/> and the via the soybean variety selection tool at <https://vt.ag.ndsu.edu/>.

Importance of Testing For Nitrates

By Marley Manoukian, MSU Richland County Extension Agent

As the time to harvest your annual forages draws near and because nitrate toxicity can be fatal for your livestock, it is important to understand the need for nitrate testing.

Cereal crops are known to accumulate nitrates with oats being the top accumulator, along with wheat, barley, rye, triticale, spelt, and others. Other problematic crops include sorghum, sudangrass, millet, and corn. Many weed species can accumulate nitrates, as well, such as kochia, pigweed, lambsquarter, quackgrass, and Russian thistle. If you are growing any of these crops for forage or have forage that has a large amount of these weeds, you should consider testing for nitrates.

Nitrate is a form of nitrogen, which is essential for plant growth and development. This is the form that is taken up by a plant's roots. Under normal growing conditions, plants will turn this nitrate into nitrite, then to ammonia, and then to amino acids to build proteins. However, in some cases, nitrates are taken up faster than the plant can convert them to protein. This accumulation varies greatly by management, soil fertility, part of the plant, plant maturity, and growing conditions. Any condition that stresses the plant can increase nitrate accumulation, including

drought, disease, hail, soils high in nitrate or deficient in minerals, shade, herbicide damage, frost, or over fertilized soils. Insect damage, from insects such as grasshoppers, is another stressor that can increase nitrate accumulation. Even under the most ideal conditions, nitrates can still be unpredictable. Therefore, it is important to get your forages tested, prior to harvesting them.

Within the rumen of an animal, nitrates are typically converted to nitrite by rumen microbes, then into ammonia, and that ammonia is then used as a protein source for the rumen microbes. When there is a large influx of nitrates into the rumen, nitrite accumulates faster than it can be converted into ammonia. This nitrite is absorbed into the bloodstream and reduces the blood's oxygen carrying capacity, which can ultimately lead to suffocation and death. Other symptoms of nitrate toxicity include weight loss, abortion, weakness, and reduced performance. Because of the high risk and speed of nitrate toxicity, the best treatment is prevention, making it extremely important to have your forages tested.

Here at the Extension Office, we offer a free in-house semi-quantitative nitrate test that provides same day results. If you have any questions or need to have a nitrate test done, stop by the office or call 406-433-1206.

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