AGRICULTURE
Golden Plains Area Newsletter

Trent Hollister, Area Director
Area 4-H Youth Development Specialist
Washington County Office
(970) 345-2287

Ron Meyer
Area Agronomy Specialist
Kit Carson County Office
(719) 346-5571

Scott Stinnett
4-H Youth Development / Livestock Specialist
Kit Carson County Office
(719) 346-5571

Catie Green
Area Agronomy Specialist
Sedgwick County Office
(970) 474-3479

Linda Langelo
Area Horticulture Specialist
Sedgwick County Office
(970) 474-3479

Travis Taylor
Area Livestock Specialist
Yuma County Office
(970) 332-4151

Kat Caswell
Area Agronomy Specialist
Central Plains Research Station
Akron
(970) 345-0508

Joel Schneekloth
Regional Water Resource Specialist
Central Great Plains Research Station,
Akron
(970) 345-0508

Annie Overlin
Regional Range Management Specialist
Southern Region Office, Pueblo
970-545-1845

Dr. Brent Young, PhD
Regional Agriculture and Business Management Specialist
Regional Engagement Center, Sterling
(970) 522-7207

Dennis Kaan
Eastern Region Director
Regional Engagement Center, Sterling
(970) 522-7207

October/December 2023

GOLDEN PLAINS AREA AG NEWSLETTER

Commodity Outlook Programs 2
Is Residue Removal Worth It? 3
Wheat Planting 4
Advances in Agriculture Technology 5
Hay Fire Prevention 7
Are You Wildfire Ready? 8
Body Condition Scoring at Weaning 9
Tree Planting Mistakes 10
Fall Lawn Fertilization & Weed Control 10

Web Site: http://goldenplains.extension.colostate.edu
Facebook: https://www.facebook.com/GPAExtension/

AG BUSINESS

Commodity Outlook Program
Brent Young, Regional ABM Specialist

AGRONOMY

Is Residue Removal Worth It?
Kat Caswell, Agronomy Specialist

Northeast Colorado had pockets of excellent wheat yields this summer. Greater wheat yields are associated with greater wheat straw left behind. As high hay prices persist, fields of wheat straw might appear to be a good opportunity for additional income. Before baling wheat straw, it is important to take account of the price of the nutrients that will be removed from the field, loss of snow catch and moisture retention, and the value of residue to erosion control.

Every plant product that is removed from the field takes nutrients with it. This would be why soil fertility declines over time if crops are harvested but no source of fertility is added. When soil nutrient removal exceeds the amount of fertility added, this is called mining the soil. For every bushel of wheat grain, approximately 1.5 lb. of nitrogen, .6 lb. of available phosphorus (P_2O_5), and 3.4 lb. of potassium (K_2O) are removed from the soil. Each ton of wheat straw removes 14 lb. of nitrogen, 3.3 lb. of available phosphorus, and 24 lb. of potassium. In general, for every pound of wheat grain produced, 1.3 pounds of straw is produced. If we convert this to bushels of grain and tons of straw, for every 1 bushel of grain (60 pounds), .04 of a ton (78 pounds) of straw is produced. For a yield of 65 Bu/ac of grain, there is approximately 2.5 tons of straw left behind. If straw is harvested at 50% efficiency and 1.25 tons of straw is removed, there is a removal of 17.5 lb. of nitrogen, 4 lb. of phosphorus, and 30 lb. of potassium.

While these nutrient removal amounts appear low per acre, this quickly adds up to additional fertilizer needed across the field for next year's crop. Based on current fertilizer prices, this would add to up to roughly $18/acre of additional cost next year. In general, fertilizer prices have been trending downwards this fall, making the nutrient replacement cost lower than it might have been in other years. This figure does not include the cost of micronutrients being used, running baling equipment, labor, hauling, and storage. Round bales of straw were selling for an average of $33 in Brush, CO in September, with the range of prices being $25 to $50. Based on the removal of 1.25 tons, we will assume that 2 round bales are produced per acre, giving an average auction price of $66 per acre in Brush. Using the Washington State University Straw Removal Calculator to incorporate the cost of other soil nutrients and operating costs, this results in a profit of approximately $11.50 per acre. At first glance, this does not appear to be a poor proposition, but this does not consider the larger farm crop management.

With the current fertilizer prices and higher hay prices, the initial impression is that baling straw doesn't look that bad. It will only take minors shifts in fertilizer prices and bale prices to take the profit per acre to 0 or into a net loss. Balancing the cost of nutrient removal versus the value of residue becomes increasingly delicate in fields with lower initial residue, lower soil organic matter, and lack of seasonal moisture norms. Several straw removal calculators are available through different universities to assist you in determining if this would remain profitable.

Northeast Colorado has only recently moved out of drought conditions. In an area that is prone to periods of low rainfall, high temperatures, and high winds, it is important to manage moisture conservation. Maintaining at least 30% ground cover through residue is associated with great soil

moisture. Taller stubble is also associated with greater snow catch, allowing for more moisture retentions during winter snows. A struggle in Colorado is retaining ground cover and residue during periods of high winds. Soil organic carbon benefits soil productivity over time and the regular removal of crop residues for a period of three years or more has been shown to have negative impacts on crop yields. The example of nutrient removal above assumes that half of the straw will be left behind in the field. As more straw is removed, the less residue is available, and the greater the amount of fertilizer will be required next year.

Given the early summer moisture this year, wheat growers may be tempted to manage more aggressively to produce any profit available to them. While fertilizer prices may remain lower this fall, the long-term impacts of removing straw regularly can have a great implication on that a slim margin of profit can pay for. As moisture is one of the largest driving factors of crop yield in eastern Colorado, carefully consider what the value of that straw might be at auction compared to its value in the field.

References

https://smallgrainscalculators.cahnrs.wsu.edu/StrawRemoval/Calculator
soils.org/files/certifications/certified/education/self-study/exam-pdfs/147.pdf
https://ag.colorado.gov/markets/hay-resources
https://www.dtnpf.com/agriculture/web/ag/crops/article/2023/09/13/majority-fertilizers-continue-lower

Wheat Planting
Ron Meyer, Area Agronomy Specialist

The first step when planning for a wheat crop is observation of last year's crop. Observing different fields, attending wheat field days, and researching wheat varieties will provide you with information regarding newer wheat varieties to find wheat varieties that fit your farming operation. Wheat varieties offer traits that have herbicide resistance, wheat stem sawfly tolerance, strong versus weak straw strength, and heat and drought tolerance. Finding varieties that fit your operation's needs can be found on-line at various websites such as industry sites or CSUCROPS.COM or COLORADOWHEAT.ORG.

As you plan, there are other decisions that can affect your wheat yields such as planting date, seeding rate, and seed size. Wheat has a wide window for optimum planting dates across Colorado. In the central part of eastern Colorado, planting early to mid-September has provided best results with September 15 being optimum most years.

Many producers favor early planting to ensure adequate stand establishment. But early planting can also increase the risk of Hessian fly infestations, wheat streak mosaic and barley yellow dwarf diseases. Waiting until later will greatly reduce these problems. Early planted wheat is also more likely to have excessive fall growth that uses valuable soil moisture. Yet, planting into moisture early will ensure a wheat stand before soil conditions dry.

Wheat planted too late may have a higher risk of winterkill and poor fall growth and tillering, which can lead to increased wind erosion. Delaying planting dates past the optimum time can also reduce yields. Studies at Garden City, KS show a 22 percent yield reduction by delaying the planting date from October 1 to November 1, and another 18 percent by delaying to December 1. As the planting date is delayed past the optimum, the seeding rate should be increased to compensate for the reduced wheat tillering potential.

Advances in Agricultural Technology
Ron Meyer, Area Agronomy Specialist

Plant scientists have been employing science to improve crops for centuries. David Harris from the University of London believes that gatherers began selectively breeding wheat about 12,500 B.C. Cutting edible grasses with rock-edged sickles they took the grain-bearing grasses home. Only the strongest kernels of wheat or barley were left on the stalk. Those kernels fell to the soil nearest the Neolithic campsites, and after sprouting and growing, they produced plants with stronger and heartier kernels. Thus began an unintentional plant breeding program selecting different and better plants.

As knowledge improved, science improved. Plant scientists (Agronomists by today's title) advanced varieties and traits, one gene at a time. Early plant breeders selected varieties that yielded better and had improved qualities for processing needs or human preferences (plants that tasted better). A striking breakthrough occurred in 1866 when an agronomist monk named Gregor Mendel crossed pea plants and became known as the "Father of Genetics". As it turned out, traits for peas could be easily manipulated using cross pollination techniques. Scientists quickly adopted the discovered cross pollination strategies to create plant hybrids. These new hybrids were selected to produce plants that yielded higher, produced stronger stalks, and had superior quality characteristics. The new hybrids not only benefited farmers planting them (in the form of higher yields), but also consumers who noticed better and healthier food.

In 1953 scientists discovered a long molecule found in all living things called DNA which contained genetic "codes" for traits and characteristics. Later it was discovered that desirable DNA (rust tolerance, higher yields, etc.) could be transferred to new plants with success. As a result, agronomists now found individual genes that produced positive outcomes (better yield) that could be transferred from one plant to another with greater accuracy and with less time. But plant breeding was still a "hit and miss" science. Agronomists knew which gene they wanted to advance but needed multiple tries to finally get the desired result. This required lots of cross pollination and then further back crossing to finally achieve success. As a result, it sometimes took as many as 15 years to get a new and improved plant variety released.

In 1973, another scientific agronomic breakthrough was found. Plant scientists discovered how to successfully transfer a gene from one species into a completely different plant species. This discovery was thought impossible by many in the scientific community and a new science was immediately born: **biotechnology**. Scientifically referred to as transgenic crops or Genetically Modified Organisms (GMO), this new science continues to produce better and healthier plants today.

In 1996, the first commercially available GMO crops were planted. The new GMO crop was an herbicide tolerant soybean and the herbicide applied was glyphosate. The new discovery has now made controlling weeds much less difficult for producers who adopted the new technology. Herbicide tolerance in other crops followed. Glyphosate resistant corn was widely adopted by corn farmers looking for an easier method to control weeds. Another innovation occurred when an insecticide producing trait was inserted into corn plants. Known as BT corn, the trait enabled corn plants to produce a naturally occurring insecticide, eliminating chemical insecticide applications to control insects that attack corn plants. BT corn does not require farmers to apply insecticides to corn plants to control some insects, as the plant now makes its own insect controlling agent. BT is also used in organic agriculture for insect control.

So how does transgenic technology work? Early methods used a 22-caliber pistol's bullet that was dipped into DNA material and shot into young corn plant material. The result didn't always work but when it did, the corn plant's DNA accepted the foreign genes and began to replicate and multiply the new gene. From there, corn plants were tested to make sure they contained the desired traits. Current improved research uses a natural soil borne bacterium to transfer the desired trait (genes) from one species to the next.

Plant breeders also work with non-transgenic methods to transfer desirable traits from one plant to the next generation. Wheat and sunflower are two crops that are not GMO or transgenic, which means that more traditional plant breeding techniques are employed. To employ new technologies more efficiently with non-transgenic crops, plant breeders have discovered better and faster methods for transferring desirable plant traits to the next generation. DNA Marker-Assisted Selection (MAS) is one technology that is currently being employed. DNA markers (genetic markers) have now been found that allow a plant breeder to more efficiently select specific traits to advance to the next generation. While genetic markers may or may not be the DNA that controls the desired trait, they act as a "flag" that points to the specific gene that plant breeders want transferred. This technology has been used since the early 2000's.

One particularly powerful form of DNA marker technology is Single Nucleotide Polymorphism or SNP (pronounced snip). This plant breeding technology allows less expensive and high-throughput DNA sequencing methods to identify and locate genes controlling important traits. SNPs located close to a particular gene act as a marker for that gene. Once the marker is identified, plant breeders know which genes to focus on, where they are located, and will select it for transfer.
Two other plant breeding methods that are currently garnering increased attention are Genomic Selection and High Throughput Phenotyping. Genomic Selection allows the breeder to use SNPs to increase the accuracy and efficiency of trait selection, with the key goal of shortening the breeding cycle time and more quickly increase the rate of genetic gain. High throughput phenotyping uses remote sensing and other technologies to rapidly and inexpensively evaluate breeding germplasm for drought tolerance, heat tolerance, plant biomass, pest tolerance, and other important production characteristics.

Further, another new plant genetic transfer technique is called Clustered Regularly Interspaced Short Palindromic Repeats or CRISPR. The CRISPR breeding method involves more nature than science and uses proteins to change the sequence and potentially "deactivate" certain undesirable genes. For instance, CRISPR technology could disable a plant's gene that allows disease or insect susceptibility, thus making the plant resistant to specific pests, without using transgenic methods. Meaning this technology could make plants more insect or disease resistant by turning off the bad genes and enabling the good genes to thrive, without inserting foreign genes into the plant. This could also eliminate or reduce pesticide applications to control pests.

As a result of improved crop production techniques, agronomists are now able to reduce the time required to release a new and improved variety equipped with targeted pest tolerant traits from 10 years to approximately 3 years, in some cases. As a result, farmers can now plant better crop varieties in a third of the time it used to take to develop them. This decreases the development time from a crop pest outbreak to existence of a pest resistant plant. A system that will decrease pesticide use.
It is no accident that record crop yields are happening yearly. The record U.S. corn yield harvested in 2019 was 616 bushels per acre, while a field in Cheyenne County, Colorado yielded near 320 bushels per acre in past years. To be sure, agricultural scientists are currently employing the best technology available and the return on investment is showing up with quicker new-variety release times, enhanced

pest resistance, and higher yields using similar inputs.

Sources: Colorado Wheat Farmer, Glenda Mostek.
Maine Organic Farmer & Gardener » Spring 2011, John Koster.
Scott Haley, Colorado State University Wheat Breeder.

Hay Fire Prevention
Catie Green, Area Agronomy Specialist

Something to keep in mind as we go into another hay storage season is keeping an eye on the temperature of your haystack. With a particularly wet 2023 hay season it is possible that hay didn't get baled at optimal moisture to prevent microbial activity and respiration leading to the warming of bales and potentially a hay fire.

Hay that is baled above 20% moisture without using a preservative is at greater risk for fire and the critical moisture content for large bales is even lower. As hay is cut, dried, and baled it continues to respire – meaning the forage is still releasing carbon dioxide into the atmosphere or air. Microorganisms present in baled hay have an ideal environment for multiplying. These processes generate heat, and given the right conditions, reach a temperature high enough for combustion.

Temperatures in stored hay can begin to rise 3 to 4 weeks after hay has been baled and stacked. This is when temperature monitoring should begin. Several methods are available for checking the temperature of stored hay. Commercial thermal cameras or guns may be available through your local fire department. Temperature and moisture can also be purchased for this purpose and will need to be left in the bale for 10-15 minutes to get an accurate reading. Because these probes are usually only 20" long and the highest temperatures may be deep within a haystack, the thermometer can be lowered on a string into a pipe that has small holes drilled in it and has been inserted into the middle of the stack. An accurate reading can be obtained after 15 minutes using this method. If no thermometers are available, a 3/8" iron pipe can be driven into the haystack. The pipe should be left in the haystack for 20 minutes and then removed. If the pipe is hot to the touch after removal, this means there is a problem.

Recommended temperatures and corresponding actions:

- 125°F - No action needed.
- 150°F - Temperatures are rising and should be checked twice daily. If possible stacked hay should be taken apart to allow more air flow.
- 160°F - Temperatures are continuing to rise and should be checked every two hours. Stacked hay should be taken apart.
- 175°F - Hot spots or fire pockets are likely. If possible, stop all air movement around the hay and alert the fire service of a possible hay fire incident.
- 190°F - Remove hot hay with the assistance of the fire service. Be prepared for hay to burst into flames as it encounters fresh air.
- 200°F - Fire will most likely occur. Remove hot hay only with assistance of the fire service.

As always, when accessing a haystack from the top, follow general safety precautions and use planks across the top of the bales so that the weight of the person is distributed. Cavities can occur in burnt out hay and cause a greater risk of falling.

Resources: Penn State Extension

LIVESTOCK

PASTURE TO PROFIT

Body Condition Scoring at Weaning Time
Travis Taylor, Area Livestock Specialist

Weaning time in Colorado's Golden Plains Extension Area is an exciting time for cow-calf producers. It is the time when all the benefits of nutrition, breeding and genetics programs can be seen and an important time to do evaluations on the beef herd. There are several factors, such as weaning weight, which need to be evaluated and goals for the coming year need to be re-evaluated. It also provides an opportunity to evaluate cow Body Condition Score (BCS) and make necessary adjustments to give cows the best advantages going into winter and gestations final trimester. Cows in good condition (BCS 5.5 to 6) are more tolerant to the stresses of winter and require less maintenance energy than cows in poorer condition (BCS 4 to 4.5). A dry cow during her second trimester can gain body condition more efficiently and economical than during her third trimester. This can be done on native range or stalk fields with more reasonable levels of protein and energy supplementation. Separation of thin cows that require additional supplementation from cows with BCS of six or higher at weaning can allow for better utilization of available forages.

On the production side, weaning time cow body condition score can be helpful culling cows that may not fit into your ranches production model. Each operation truly is a unique model with vastly different resources available. One operation may have availability to abundant crop aftermath fields, while the next operation is trying to operate solely on native range with limited supplementation. The two operations most likely join fences, but just as likely in both operations management could identify cows that are considered excessively thin or overly fat. At weaning it is important to identify cows that are non-productive, such as a late calving cow with a lightweight calf having a BCS 6 or more. Such a cow is likely poor milking, using up more energy into maintaining herself than producing a calf, and is a culling candidate. In contrast, a cow could be considered always a BCS 4 and weaning the heaviest calf in the herd. She may be out milking her nutritional environment and most likely will breed later and later till she comes in open at a young age. Not only is this cow a possible candidate for culling, but likely the big shinny heifer calf at her side should be eliminated in the replacement pen.

No question that a productive cow will see fluctuations in weight and body condition due to different factors like stage of production or level of forage quality and availability. She needs these body energy stores to respond to her necessary requirements efficiently. It is how she responds when those situations regarding her nutritional demands are improved or changed that is important. Likewise, as producers, being able to utilize a simple and effective tool like Body Condition Score, which can be applied from the pickup window, to make nutritional and culling decisions that can benefit the bottom line is important. For questions involving Body Condition Scoring link to https://extensionpublications.unl.edu/assets/pdf/ec281.pdf on the web or contact your local county CSU Extension Office.

Are You Wildfire Ready?
Scott Stinnett, Livestock, and 4-H Youth Development

With the great precipitation much of the eastern plains of Colorado experienced during the early and mid-summer, an abundance of plant growth can be seen in rural areas. But sit down at your local coffee spot, and the volunteer firefighters will tell you that it also means a significant amount of fuel for possible wildfire as we move into the drier winter and early spring months. Now is the time to make sure your family, home and facilities are wildfire ready.

Start by making an emergency plan. There are many resources to help you develop an emergency plan, but here are some basic things to think about. If a wildfire was approaching your home or facilities, what would you do? First priority is always people. If you must evacuate with little time to spare, have a pre-selected meeting site and a backup site for your family and employees. It may be a local landmark, a school, church, or community building. It could even be at a neighbor's or extended family's home. Second priority is animals including pets and livestock. Can you take pets to your meeting site? How will you transport them? What about livestock? Do they need to be loaded and transported or just open gates and relocate them to a different pasture? Last priority is personal belongings. Things can be replaced, but you may have some important documents and personal care items you need to take with you when you evacuate. Are documents easily accessible and can be gathered quickly? Are personal care items like medications easy to find and gather or are prescriptions? available to refill any medications left behind. If fires are a threat or in the area, putting together a disaster bag or box with the most essential items may also be advisable. This would be your "grab and go" or "bug out" bag to grab as you evacuate.

To defend your home, facilities, and assets from wildfire damage, start with wildfire defense zones. These are areas around your property that, when properly maintained, can help lessen wildfire damage and make it easier for firefighters to protect your property. Start with Zone 1. This zone includes the home or other structures and extends out to at least 5 feet. In this zone, non-flammable materials including deck materials, patio furniture and fences should be used to prevent the spread of fire to the building. Landscaping should also be low growing and well-spaced to prevent the spread of a fire from plants to the building.

Zone 2 extends 5 feet from buildings to 30 feet away. In this zone trees need to be trimmed 6 to 10 feet up from the ground. Individual trees or small groups of trees should be 30 feet apart to prevent fire spreading from tree to tree. Grass should also be mowed down to 4 inches.

Zone 3 begins 30 feet from buildings and continues to 100 feet from all structures. The main goal in this zone is to keep any fires low. Again, trim trees up and keep brush, weeds and grass trimmed to prevent what are considered ladder fires where flames can leave the ground and move up into trees. Also remove piles of limbs or flammable materials like trash lumber piles, or any other flammable materials.

Wildfires are unpredictable, fast moving and sometimes uncontrollable. Being prepared for a wildfire is the best prevention. Get with your family and employees to make an emergency plan for wildfires. Protect your property and structures with wildfire defense zones. For additional information on wildfire preparedness go to www.csfs.colostate.edu/wildfire-mitigation/, www.ready.gov and

www.redcross.org.

HORTICULTURE

Common Tree Planting Mistakes
Linda Langelo, Area Horticulture Specialist

As I travel the Golden Plains Area, I see mistakes that potentially end up contributing to the death of the new tree that was purchased. These are only some of the biggest mistakes.

1. Before even purchasing a tree do some homework and learn what type of soil is on the property and particularly the location of the tree. Every tree has either a range of soils or a soil type that the tree prefers. Elm trees are tolerant of clay, loam or sand that is both acid and alkaline soil.

2. When shopping at the nursery, check to see the overall health of the plant. No diseased leaves or insects on the tree. It is best to research these issues for the tree you want to purchase. Make sure the tree trunk is not damaged and there are no co-dominant leaders at the top of the trunk.

3. Make sure to check how deep the trunk is buried in the soil container. The soil can be higher up on the trunk. When planting the tree, then the tree can be planted too deep. All the excess soil must be knocked away from the trunk until the trunk meets the soil. Planting the roots too deep mitigates the amount of oxygen and water to the roots. Proper planting depth is located at the base of the trunk where the root flare meets the soil in the container. Then do not place much soil on the shoulders of the root ball or containerized plant. Do not place mulch or soil up against the trunk after planting. That creates moisture and can begin to damage the bark by decay. The bark is the skin of the tree and protects all the vascular structure within it.

4. When digging the hole for the tree, the hole must be shaped like a saucer that fits on the bottom of a teacup. The hole must be the proper depth for the root ball or container. The proper width of the hole is equally important. This must be two to three times the width of the root ball.

5. Watering is the most challenging thing to do. There is a recommended formula of ten gallons of water per every inch of the tree's caliber at breast height. This is helpful to know when watering each time the tree needs watering. Factor in other environmental issues such as temperature, heat index, wind, and soil structure such as clay, sand, or loam.

If these steps are followed, the tree has the greatest chance of success!

Fall Lawn Fertilization and Weed Control
Linda Langelo, Area Horticulture Specialist

There is an advantage to fertilizing a lawn in the fall versus the spring. Do you know what it might be? And did you know there is a broad spectrum weed control that a homeowner can do for themselves? These items in this article are very handy for keeping a healthy lawn and weeds in check.

Here is one thing to consider before you fertilize your lawn this fall. What type of water restriction do you have for watering from the town? If there are none, then proceed with a normal fertilization of nitrogen because the regular watering will help with developing a better root-system and allow the lawn to green up sooner. Plus, a ½ inch of water at the time of application will provide the greatest benefit along with consistent watering after in the fall according to CSU Turf Specialist Tony Koski.

If you are living in a town that has watering restrictions, then still apply the fertilizer, but know that the best results may not show until spring. If the water restrictions are 2-3 times a week, then a fall fertilization still has benefits according to CSU Turf Specialist Tony Koski.

When is the best time to apply winter fertilization? If you apply late September to early November with a high nitrogen fertilizer, the lawn will be healthier in the spring.

As for weed control, there are products such as Prodiamine or Barricade that control many weed seeds. This is a pre-emergent weed control that stops seeds that have not germinated from germinating. Barricade can be applied in the fall and the spring while the air temperature is in the 50's. For our lower elevation, the temperature would be in the 50's in March. This pre-emergent will control crabgrass, summer annual grasses, annual blue grass, goosegrass, spurge, duckweed, and several annual broadleaf weeds. Here are some other weeds Barricade controls: puncturevine or goathead, purslane, spotted spurge, henbit, prickly lettuce, foxtail, and barnyard grass.