AGRICULTURE
Golden Plains Area Newsletter

http://goldenplains.colostate.edu
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JUNE 2019

GOLDEN PLAINS AREA AG NEWSLETTER

GOLDEN PLAINS AREA
COLORADO STATE UNIVERSITY EXTENSION

Colorado State University, U.S. Department of Agriculture and Kit Carson, Phillips, Sedgwick, Washington, and Yuma Counties cooperating.

Extension programs are available to all without discrimination.

Golden Plains Area Extension Agricultural Newsletter and Web Page Available

The Golden Plains Area Agricultural Extension team along with Colorado State University Extension is highlighting the availability of its Agricultural Newsletter. The newsletter is published multiple times per year and contains local agricultural information such as agronomic test plot results, weed science information, animal science information, Ag and Business Management information, and horticultural articles. This publication also lists area agricultural meeting schedules and locations. The newsletter is available without charge to anyone requesting it. To get on the mailing list, contact the Washington County Extension office at 970 345 2287 or send an email to: dennis.kaan@colostate.edu.

The Area web page also offers a wide variety of locally adapted information and can be found at: https://goldenplains.extension.colostate.edu/

CSU Researchers Seek Participants for Hail Study

If your livelihoods are impacted by hail storms, CSU researchers want to speak with you! Sam Childs, a PhD student in Atmospheric Science, along with State Climatologist Russ Schumacher are conducting interviews this summer with eastern Colorado agriculturalists who have lived and farmed in the area for *at least ten years*. The hour-long interviews will ask participants about their perceptions of hail storms past and present, how they receive warning messages, and their perceived level of risk and vulnerability. The hope is to better understand how the agricultural sector thinks about hail storms in order to improve risk communication and help mitigate the societal effects of hail. Interviews will be recorded by the researchers and transcribed by a third party, and no names or personal information will be shared in any resulting publication. Interviews will be done at the home of the participant or a nearby meeting place, so little to no travel is required. If you are interested, please follow the link below to fill out your contact information. The consent form gives more information and your rights as a participant. Please indicate your willingness to participate by June 14. Interviews will take place in mid-June through August, and the researchers will be in touch to coordinate a time after receiving your contact information. Thanks!

Consent/Informational Form:
https://docs.google.com/document/d/1ejKnY02ET00aNDa0BlzcEzPCT3E6n2Wt/edit

Sign-Up Form:
https://docs.google.com/forms/d/e/1FAIpQLSdr09vFRZhm46g4aH4VC56voP-dZnZzCVjBvTHEKk91oJb_Lg/viewform?usp=sf_link

International Tour of Agriculture

The Pueblo County Extension office is once again coordinating an International tour of agriculture, foods, and culture. This trip will travel to Chile with an optional post-tour to the Patagonia region. We will be traveling in February of 2020, with the group leaving from Denver on February 1st. Those not doing the post-tour will return to Denver on February 10, 2020; while those doing the post-tour will return to Denver on February 14th.

A flyer will be coming in the near future, but I wanted to share this information as soon as I could. A tentative itinerary is available at: https://docs.wixstatic.com/ugd/bce00d_db8f283d7eff4a0ea9bf7a2211372c95.pdf A link to the trip's registration website with the travel company that will be making the travel arrangements is available at https://www.explorationsbythor.com/colorado. The

online registration form is supposed to be active today. Explorations by Thor will be making the travel arrangements for this tour. Their contact information is on the tour registration website.

This trip is being put together in two parts.

Chile Tour, with airfare out of Denver, will be $4775.00 per person/based on double occupancy. A single supplement will be $825.00. (Land only prices for those making alternative flight arrangements is $3,150.00.) A $500 deposit is due to Explorations by Thor by August 16th with the remainder due November 1st. Persons attending just the Chile Tour would fly out of Denver on February 1, 2020 and return on February 10th.

A minimum of twenty people is required for the Chile tour to take place

A post-tour option is available for those wanting to also go to the Patagonia region. The post-tour is an additional $1395.00 per person/based on double occupancy. There would also be additional airfare, which is TBD and one would need to visit with Explorations by Thor about this. A single supplement on the post-tour would be $475.00. Persons attending both the Chile Tour and the Patagonia post-tour would fly out of Denver on February 1, 2020 and return on February 14th.

A minimum of twenty people is required for the post-tour of the Patagonia region to take place.

There will be more information advertising the tour in the next few weeks.

-Michael "MJ" Fisher

AG BUSINESS

USDA Reopens Continuous CRP Signup

Extensions also available to Many Expiring Contracts

WASHINGTON, May 15, 2019 – USDA's Farm Service Agency (FSA) will accept applications beginning June 3, 2019, for certain practices under the Conservation Reserve Program (CRP) continuous signup and will offer extensions for expiring CRP contracts. The 2018 Farm Bill reauthorized CRP, one of the country's largest conservation programs.

"USDA offers a variety of conservation programs to farmers and ranchers, and the Conservation Reserve Program is an important tool for private lands management," said FSA Administrator Richard Fordyce. "CRP allows agricultural producers to set aside land to reduce soil erosion, improve water quality, provide habitat for wildlife and boost soil health."

FSA stopped accepting applications last fall for the CRP continuous signup when 2014 Farm Bill authority expired. Since passage of the 2018 Farm Bill last December, Fordyce said FSA has carefully analyzed the language and determined that a limited signup prioritizing water-quality practices furthers conservation goals and makes sense for producers as FSA works to fully implement the program.

Continuous CRP Signup

This year's signup will include such practices as grassed waterways, filter strips, riparian buffers, wetland restoration and others. View a full list of practices approved for this program.

Continuous signup enrollment contracts are 10 to 15 years in duration. Soil rental rates will be set at 90 percent of the existing rates. Incentive payments will not be offered for these contracts.

Conservation Reserve Enhancement Program Signup

FSA will also reopen signup for existing Conservation Reserve Enhancement Program (CREP) agreements. Fact sheets on current CREP agreements are available on this webpage.

Other CRP Signup Options

Fordyce said FSA plans to open a CRP general signup in December 2019 and a CRP Grasslands signup later.

CRP Contract Extensions

A one-year extension will be offered to existing CRP participants who have expiring CRP contracts of 14 years or less. Producers eligible for an

extension will receive a letter describing their options.

Alternatively, producers with expiring contracts may have the option to enroll in the Transition Incentives Program, which provides two additional annual rental payments on the condition the land is sold or rented to a beginning farmer or rancher or a member of a socially disadvantaged group.

More Information

On December 20, 2018, President Trump signed into law the 2018 Farm Bill, which provides support, certainty and stability to our nation's farmers, ranchers

AGRONOMY

Advances in Agricultural Technology

RF Meyer

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 for 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 better, 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 they 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 selected 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 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 species. This discovery was something 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 a herbicide tolerant soybean and the herbicide applied was glyphosate. The new discovery 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 did not require farmers to apply insecticides to corn plants to control insects.

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 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. In an effort 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 have now been found that allow a plant breeder to more efficiently select specific traits to advance to the next generation. While markers may or may not be the DNA that controls the desired trait, they act as a "flag" that point 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 and select 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 employ better varieties in a third of the time it used to take to develop.

It is no accident that record crop yields are happening yearly. The record corn yield harvested in 2018 was 477 bushels per acre. To be sure, agricultural scientists are currently employing the best technology available and the return on investment is showing up with quicker 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.

AgDrip Program Seeking Participants for 2019

RF Meyer

Groundwater use and availability remain key issues for the vitality of our region. In an effort to gather information about how groundwater is used over the course of the growing season and as a result of last year's successful project, researchers at Colorado State University are once again recruiting paid participants for the Agricultural Data Reporting and Incentives Program (AgDRIP).

The voluntary program asks agricultural producers to submit monthly meter readings from individual irrigation wells via the AgDRIP smartphone application or website. High capacity wells in the Plains and W-Y Groundwater Management Districts are eligible to enroll in the program, which will provide financial incentives to producers that choose to participate.

Producers in Colorado that participated in the program last year report that the smartphone application is easy to use and provides a useful record of water use over the course of the growing season. The water use and crop yield information that is collected will contribute to a better understanding of how differences in seasonal water use influence crop production. No well-specific groundwater information that is collected as part of the program will be shared with state or federal authorities.

Invitations with additional details about the program have been sent to eligible irrigated landowners. The program is supported by the United States Department of Agriculture in collaboration with Colorado State University. For more information about the program visit their website (www.AgDrip.org), contact CSU Extension Agronomist Ron Meyer (RF.Meyer@colostate.edu) at 719-346-5571 or Professor Jordan Suter in CSU's Department of Agricultural and Resource Economics (Jordan.Suter@colostate.edu) 970-491-2589

Corn Planting

RF Meyer

Since soil temperature, stand establishment and uniform emergence are all key considerations when attempting to determine an optimum corn planting window, early plantings generally coincide with cold soil temperatures and delayed emergence is the result. Agronomy professionals agree that the optimum corn planting window will be related directly to a consistent soil temperature of around 50 to 55° F at the two-inch soil depth. Traditionally, these consistent soil temperatures occur between late-April through early-May. Cool soils often result in a lengthy germination period, corn emergence can often times take over three weeks from the time of planting to full stand establishment when soils are not able to warm in the spring. Table 1 outlines the approximate days to seedling emergence based on various consistent, soil temperature ranges:

Table 1: Days to emergence based on soil temperature

Soil Temperature . . . . . Approximate Days to Corn Emergence
50° F …….25 – 20 Days
55 – 60° F ……..14 – 10 Days
65 – 70° F ……. 8-5 Days
75 – 80° F ……. 4 Days

Under cold weather conditions or fluctuating soil temperatures, the coleoptile (shoot) still emerges from the seed, but rather than growing upward towards the soil surface, it twists or curls around the seed. The unusual growth pattern of the coleoptile is in response to cold soil conditions; this type of growth alone is usually not cause for alarm. Once soil temperatures improve, the coleoptile will "right" itself and grow towards the surface, where it splits open when exposed to sunlight, allowing the first leaves to emerge.

Corn may leaf out underground for a number of reasons. A cloddy seedbed or improper closure of

the seed furrow may allow light to penetrate below the soil surface. If light reaches the emerging coleoptile (spike) underneath the soil surface, it may rupture, causing the leaves to unfurl. Cold soils and compacted and/or crusted soils can also lead to leafing out underground. Some herbicides can occasionally magnify the seedling corkscrew problem with the soil conditions mentioned above.

Once corn is emerged, other issues can express themselves due to cold weather. Purple Corn Syndrome shows up in a handful of cornfields nearly every year. This purple leaf color results from the expression of genes for anthocyanin pigment formation. Most corn hybrids contain 5 of the necessary 8 genes required to produce this purple color, while the other 3 genes are present in only certain hybrids suggesting this attribute is a "genetically inherited" trait more prominent in certain hybrids over others.

Since several of these genes are cold sensitive, overnight temperatures in the 40s with daytime highs in the 60s are often sufficient to trigger a purpling effect on corn leaves. These temperature sensitive genes are only expressed in seedlings prior to the six-leaf stage of growth, and the early corn developmental stage often coincides with the same period most likely to have lower temperatures. Corn usually outgrows the "purple" condition by the time it is 12 inches tall. Green color recovery occurs quickly if weather remains conducive for rapid growth or slows if conditions remain cool enough to retard root and shoot growth. Technically speaking, the cold soil condition ties up phosphorus and restricts the corn plant from this nutrient's uptake. Some corn hybrids do not respond well when this occurs.

So, will fertilizer correct this issue? Generally, the purple color is a direct result of cold soils and not an overall fertility deficiency. Even when planting into cold soils, the 10 pound rule is still in place. That is, with the seed, apply no more than 10 pounds per acre total of nitrogen and potassium. Both of these fertilizers are salts and applying more than 10 pounds per acre of these fertilizers with seed could reduce stands. Phosphorous, however, is not a salt and producers can apply as much as needed with the seed.

Realizing that cool temperatures, not the purple pigment itself, results in slow plant growth is important. Extensive research has been conducted on purple corn with no negative yield implications observed. When the weather warms, corn plants turn green and begin to outgrow this issue.

Source: Corteva

Reducing Soil Compaction While Spraying

John Spring, Area Extension Agent, Julesburg

With the wet, delayed year we've had so far, there have been quite a few fields sprayed under excessively wet conditions. While time pressures may make this unavoidable – the work does have to get done, and timing is often critical with applications of crop protection products – the sort of severe compaction that happens under these conditions can have long-lasting negative effects on yield. If equipment tracks are 3-6" deep on the surface, deep soil compaction has also happened. Experiments have consistently shown yield losses of 10 to 25% in wheel tracks, resulting from soil compaction when equipment is run on overly wet fields. Worse yet, the negative effect of deep compaction usually lasts 5 or more years, even after the visible surface compaction has disappeared. The area of a field covered by wheel tracks is seemingly minimal in any one pass, but over the course of even a single growing season a surprisingly large percentage of the field can be covered. In a complete controlled traffic or tramway system – where all equipment always drives in the same set of tracks – about 10% to 15% of field area is dedicated to wheel tracks, and the remaining area is untouched. In a more typical field where equipment traffic is not restricted to designated tracks, up to half (or more, for some crops) of the field area can be covered by at least one tire pass over the course of a growing season. Although extremely difficult to put a hard number on, this adds up quickly, and soil compaction can lower whole-field yields significantly over time. Compaction is important, and should be avoided if at all possible. A few considerations that may help reduce the risk:

Wait for better conditions. The worst compaction occurs when soils are just dry enough to operate on. As they dry, the risk falls relatively quickly. An additional day (or even a partial day) of drying can make a big difference. Of course, this is not always feasible, but when it is a bit of patience can pay off in spades.

Air [down] for field conditions. It is a reasonable guess that most equipment tires are probably aired up for easy road travel most of the time. If you are in a wet field and concerned about compaction, air down as far as you can on that particular equipment/tire combination. This helps spread the weight, and can reduce tracking, slippage, and compaction meaningfully.

Control sprayer traffic. The benefits of controlled traffic or tramway systems are undeniable, but complete adoption with all equipment is not feasible. University studies have shown that approximately 90% of wheel sinkage, and up to 80% of soil compaction occurs on the first tire pass in wet conditions, with limited further effect from subsequent passes in the same track. Additionally, established tracks are often passable well before the rest of the field after a precipitation event. Since sprayers are the most likely piece of equipment to be operated on overly wet soils for most operations, controlling sprayer traffic alone can realize a great deal of benefit in terms of reduced compaction. Many guidance systems are capable of maintaining tramways for spraying. If your system is, the additional investment should be fairly minimal.

Correction: Ag Container Recycling

In the last newsletter, the website given for the Ag Container Recycling Council was incorrect. The correct website is: http://www.acrecycle.org

Dicamba-resistant kochia?

Last year, K-State scientists identified a kochia biotype with resistance to dicamba at a level allowing it to survive post-emerge applications of dicamba at rates as high as 32 oz/ac. While this was in the Garden City area, there is a very real risk of high-level dicamba resistance reaching our area in the near future. As such, dicamba should be used with extra care for proper stewardship practices, on kochia particularly. Tank mix with another effective mode-of-action, use the highest rate labeled, and apply to properly sized (small) kochia. Careful scouting for surviving plants 10 – 14 days after application of dicamba can be critical in early detection of resistance, and effective management response. If you have kochia survive a dicamba application and suspect resistance, I would be interested in talking to you about it, and possibly collecting some plants for further resistance screening at the CSU Weeds Lab. Please call or email me, John Spring, (970)474-3479, or john.spring@colostate.edu.

Wheat Production and Protein

RF Meyer

Can we influence protein contents with wheat production management strategies? Many of our wheat fields test low for protein and consequently, price discounts are assessed to wheat loads delivered to elevators. In the last few years, these discounts have been somewhat large, resulting in significant economic losses. Some seasons, fields that have acceptable protein levels are paid a premium and as a result, growers are interested in managing wheat fields for better protein levels.

First, research has found that there is an inverse relationship between yield and protein levels. As wheat yields increase, protein levels tend to decrease. Especially if fertilizer inputs are not increased with high yields. Scott Haley, Colorado State University wheat breeder explains that "high yields occur as a result of favorable precipitation early which increases wheat kernel numbers per plant." More wheat kernels translate into more weight produced (pound per acre) which means higher grain

yields. Wheat kernels contain approximately 65% starch and this starch content is extremely sensitive to the growing season's environment at the end of the season. This extra starch produced with high wheat yields essentially "dilutes" or reduces protein content.

Wheat kernels contain approximately 8-15% protein. Protein levels are a direct function of the amount of nitrogen within the plant during later stages of production. In fact, protein tests made on wheat kernels measure the nitrogen content to determine protein levels. Protein begins accumulating within kernels during grain fill. Research has found that 10 days after flowering protein begins to accumulate in kernels and by 20 days after flowering 50% of protein has been placed into developing kernels. During this time, starch is also being deposited into kernels. Therefore, growing conditions and adequate nitrogen amounts after wheat plants flower determine protein levels in grain. Excessive heat and drought during this grain filling time period lowers the amount of starch deposited into kernels which increases protein percentages. Better than average moisture conditions during grain fill will lower protein percentages.

Can protein levels coming off a wheat field tell us if nitrogen was yield limiting? Colorado State University researchers found a direct correlation that suggest protein levels in wheat are tied to nitrogen management. As a result, the rule of thumb for nitrogen management is as follows: wheat fields routinely testing less than 11.5% protein have yield-limiting low levels of nitrogen fertilization. Wheat fields that have grain protein levels of 12% or more had enough available nitrogen to reach full yield potential.

Table1: Guidelines for interpreting winter wheat grain protein-nitrogen nutrition levels in Colorado.

Protein Level	Interpretation
< 11.1 percent	Yields may be significantly limited by nitrogen deficiency. More nitrogen fertilizer Would probably increase yields and protein content.
11.1% - 12.0%	Yields may have been limited by nitrogen deficiency. Apply more nitrogen fertilizer may or may not increase yield appreciably but will increase protein content.
> 12.0%	Yields were probably not limited by nitrogen deficiency. Application of more nitrogen will not increase yield but may increase protein content.

Source: RJ Goos, et.al., Colorado State University

Can we fertilize or make a variety selection to influence protein in wheat? 80% of a wheat plant's nitrogen accumulation is taken up prior to flowering. However, that leaves 20% of a plant's nitrogen needs taken up after flowering and during grain fill. But, keep in mind that new research is finding varietal differences in nitrogen uptake, which can also affect final protein content. A term called grain protein deviation describes higher nitrogen uptake from some wheat varieties versus others. As a result, wheat variety selection can influence protein content when growing conditions cooperate, BUT NITROGEN MANAGEMENT REMAINS BY FAR THE MOST EFFECTIVE WAY TO INFLUECE PROTEIN.

Further, researchers at Oklahoma State University have found that late applications of nitrogen can also increase protein levels in wheat. These researchers applied nitrogen to wheat test plots as late as the flag leaf stage (right before heading) and found that later nitrogen applications increase protein contents. These later applications increased wheat yields only slightly, but increased protein contents more. The application method was liquid nitrogen streamed onto fields. Higher protein boosts were noted with rainfall received right after nitrogen applications. Protein levels were increased by 0.05% protein content per pound of nitrogen applied. Therefore, it took 20 pounds per acre

actual nitrogen to raise protein levels 1% (plus rainfall after application).

Keep in mind, however, that when applying late season nitrogen, plants have a limit to how much nitrogen can be taken up. It is expected that nitrogen applied at this point may be able to raise protein levels 1 to 2%. Also, as a result of later applications, slow release, low salt, or organic nitrogen forms may not be the best fit.

Similar (and usually better) protein results can be achieved with adequate nitrogen fertilization earlier in the growing season. Many wheat fields are fertilized early in the spring with herbicide applications or with separate streaming operations. Adequate nitrogen applications at this time of the growing season will increase both yield and protein levels. Normally, adequate fertilization early in the season is the most cost-effective nutrient management strategy.

Soil and plant tissue tests will determine nitrogen amounts needed. Setting realistic yield goals and knowing current nutrient test levels will keep applications near economic levels.

Keep in mind that yield and economics should drive crop input decisions for each field. Planting varieties that are proved to be adapted to our area and managing other inputs such as weed and disease issues need to have production priorities first. Protein premiums are not consistent but there are nitrogen management decisions that can affect protein contents when protein production is profitable.

Source: adapted from Brian Arnall, Oklahoma State University

HORTICULTURE

Fall Beekeeping Mentorship Program

By Linda Langelo, CSU Horticulture Agent

The Golden Plains Area Extension has a new area program called the Colorado Beekeeper Mentorship Program. The Colorado Beekeeper Mentorship Program is for beekeepers and aspiring beekeepers from beginning to advanced. Coming this fall, we are hosting the program for the second time this year. The program starts September 9 and runs through October 9, 2019. Most of the dates fall on Mondays and Wednesdays in the evenings starting at 5:30pm to 8:30pm with one Saturday morning from 9am to 12:30pm.

The program is seven weeks of training covering bee management from winter, spring, summer and fall, beekeeping equipment, hive preparation, feeding bees, pathogens and parasites of honey bees, and other related topics. After the training, participants give back in volunteer time on mentoring other beekeepers and answering beekeeping questions and giving advice on beekeeping issues. There is a minimum of 30 hours volunteer time given to the area for the first year which helps to keep the cost of the program affordable.

Not everyone needs to become a Colorado Beekeeper Mentor. You can take the course and not serve any volunteer time, but the cost will be higher. Those who do volunteer are also required to do some continuing education to retain their status in the Beekeeping Mentorship Program. There are many educational opportunities throughout the year to gain continuing education.

For further details, please contact Linda Langelo at the Sedgwick County Extension Office at (970)474-3479 or by email at linda.langelo@colostate.edu. I will be happy to answer any questions you may have in regards to this program.

Beneficial Pollinators: Leafcutter Bees

By Linda Langelo, CSU Horticulture Agent

This cannot be understated according to CSU Leafcutter Bee Fact Sheet by Whitney Cranshaw, CSU Entomologist, "Leafcutter bees are native bees, important as pollinators." You probably know them by the fragments of leaves they take to build their nests from the following preferred plants such as roses, lilacs, green ash and Virginia creeper. However, they can use the leaves of many broadleaf deciduous plants.

Can they do serious damage? The serious damage usually occurs in isolated rural plantings. What do the leafcutter bees do with the pieces of leaves taken from the margins of leaves. The pieces of leaves look like circular pieces. These pieces they cut, are taken to the nest to make a nest cell which might resemble a cigar butt. Each leaf lining the nest cell has nectar and pollen on it. When the female leafcutter bee is ready, she lays an egg inside the nest cell and seals it. They are solitary bees. They are not aggressive. However, if you go to handle one, you may be stung. Think of them as loners who do not appreciate unannounced company. They are mild mannered. They like their neighbors from a distance.

Most of the time the injury is minor. They are known to nest in the largest diameter of rose canes. They do not get to the cambium of the rose, just the pith. Their tunneling is very restricted and does very little damage. So what can you do to control them on your favorite roses or lilacs? There are no effective insecticides. There are many parasites that act as their natural enemies such as wasps, blister beetles and velvet ants.

To prevent them from tunneling into the larger rose canes, seal the canes that are pruned and exposing the pith. Take wax or white glue or even a thumb tack on the opening of the cane. Mostly, leafcutter bees nest in soft, rotted wood. Remove any rotted wood from your landscape. You can place loose netting over your roses and/or cheesecloth during late summer when they are most active.

Despite their leaf thievery, they often cause grave concern and lots of attention that is misunderstood. Their lifespan lasts five to six weeks. They do not produce honey. They do pollinate alfalfa, various fruits and vegetables such as onions and carrots.

PEST MANAGEMENT

2019 Grasshopper Populations and Risk of Infestation and Damage in Colorado

Assefa Gebre-Amlak and Frank Peairs
Colorado State University Extension

According to the 2018 USDA APHIS adult grasshopper counts, (*https://www.aphis.usda.gov/plant_health/plant_pest_info/grasshopper/.../hazard.pdf*) there were low populations of grasshoppers in Colorado last year with the exception of some areas of a low to moderate risk of rangeland infestations in south eastern counties this year. The rest of Colorado had much lower counts of the insect and no risk of grasshopper infestations and damage expected in 2019.

We encourage ranchers and producers to monitor grasshopper situations in your area in those counties with moderate risk of the hazard. Generally, grasshoppers have one generation per year. Eggs are deposited in the ground in the fall. The eggs hatch in the spring and summer (late May through early June) and hatch is dependent on soil temperature, which differs for different species.

Weather conditions will determine how much of the damage potential will be realized in those areas with light to moderate populations of grasshoppers. Most grasshopper outbreaks are associated with several years of dry conditions.

The simple economic threshold for grasshoppers in rangeland is 15-20 grasshopper nymphs per

square yard. This number is equivalent eight to ten adult grasshoppers per square yard. However, the economic importance of an infestation is affected by such factors as grasshopper species, range condition, cattle prices, and treatment costs. CARMA is a computer program that allows the landowners to include these factors in their treatment decisions. CARMA is available at the same website as the hazard map mentioned earlier.

Treatment options for grasshopper management are based on the Reduced Agent and Area Treatment (RAAT) strategy, which results in untreated swaths and swaths treated with reduced chemical rates. Using lower rates and leaving untreated areas reduces treatment costs by as much as 50% and preserves biological control. Grasshoppers move constantly, insuring that they will enter a treated swath and that levels of control will be similar to complete coverage applications. Large infestations can be treated aerially with malathion, carbaryl or diflubenzuron (Dimilin). Smaller infestations can be controlled with RAAT treatments applied aerially or with all-terrain vehicles (https://wiki.bugwood.org/HPIPM:Main_Page) appropriately equipped to apply carbaryl or diflubenzuron. See labels for grazing restrictions.

All-terrain vehicles also can be used for spot treatments of egg-laying sites such as pastures, ditches, and untilled field margins. Grasshopper nymphs tend to remain concentrated in their hatching areas for some time after they emerge, where the application of an approved insecticide can provide effective and economical control of localized infestations.

Dimilin (diflubenzuron) treatment for grasshoppers should be applied in 2nd to 3rd instar stages because this growth regulator insecticide will not control adults. Strategies for managing grasshoppers in cropland are somewhat different. Recommendations for specific crops can be found in the High Plains Integrated Pest Management Guide, (https://wiki.bugwood.org/HPIPM:Main_Page).

. Are You Scouting for Alfalfa Weevil in Your Fields?

Assefa Gebre-Amlak,
Extension Specialist, Colorado State University Extension

It is time to scout alfalfa fields for alfalfa weevil infestations in Colorado. Weevil larvae are currently seen in most fields. These insect larvae are about 1¦20 inch long when they first hatch. They range in color from cream, to pale green, and are curved with shiny black heads. A white stripe running down the middle of the back may be visible and becomes more distinctive as the larva matures. At this stage a 10X hand lens is necessary to identify the weevil larvae. The coloration and shape is characteristic throughout the four larval stages, referred to as "instars." Fully-grown larvae are up to 3¦8 inch long and are wider in the midsection than at either end of the body.

Alfalfa weevil larvae feeding in the folded leaves can heavily damage stem terminals, but initial damage is not always clearly visible. The closed, overlapping foliage of the stem terminals should be unfolded to detect feeding damage. Third and fourth larval instars cause most of the economic damage, so initiating sampling at the peak occurrence of second instars should provide adequate sampling prior to economic weevil populations.

Field damage can be recognized on heavily infested stands as a grayish or frostlike appearance due to the dried defoliated leaves. At high weevil densities, foliage can be stripped; leaving only skeletonized and ragged leaf fragments and stems. Yield losses of 30 to 40 percent of the standing hay crop are possible under extreme population levels. Damage also may reduce hay quality due to loss of leaf tissue, leaving only the lower quality stems.

Damage to regrowth buds may occur when the plants break dormancy and after first cutting. Larval

feeding on the regrowth after first cutting may be concentrated in strips coinciding with windrow locations, especially if the first cutting was taken early due to heavy weevil infestation and larvae survived under the windrows. Damage to regrowth may retard plant growth and result in yield reduction and encourage weed establishment.

Estimation of the weevil instars present in the field can be calculated using degree-days. Alfalfa weevil development increases at a nearly constant rate as the temperature rises above 48°F (9°C.). The amount of warm weather required for weevil larvae to complete development is measured in units of degree-days. For the alfalfa weevil, degree-days are accumulated after 1 March for each 24-hour period in which temperatures exceed 48°F (10°C).

Monitoring techniques: Sweep sampling using a standard sized 38 cm diameter net is the most efficient method for estimating larval populations. Sampling should begin when 148 degree days have been accumulated, when the larvae are expected to be primarily second instars and when alfalfa hay has reached at least 10 inches in height.

Ten, 180 degree sweeps are taken while the sampler is walking through the field. Count the number of larvae per sweep and repeat this sampling procedure, taking a minimum of three samples for fields up to 20 acre, four samples for fields up to 30 acre and five samples for larger fields. Survey for alfalfa weevil larvae in a predefined pattern based on field acreage. Weevil infestation may be patchy or uniform depending on terrain, weather and soil. Inspection for weevils in every distinctive section of the field will aid in determining the pattern of the infestation.

Bucket method or stem count method may also be used to determine the number of weevil larvae per stem. Take three six-stem samples in fields one to 19 acres, four samples in fields 20 to 29 acres, and five samples in fields 30 acres and bigger. The tools and supplies needed for this method includes a three or five gallon light-colored bucket, a white cloth, a hand lens, paper and pencil. Use the following steps to survey and estimate alfalfa weevil densities (larvae per stem).

The simple ***economic threshold*** for a sweep sample is 20 larvae per sweep. The simple economic threshold for the stem sampling method is 1.5 - 2 larvae per stem. For calculating detailed economic threshold, check the High Plains IPM guide at (https://wiki.bugwood.org/HPIPM:Main_Page).

Management of the weevil: Early harvesting and insecticide applications are the most common management strategies.

Cultural control: A non-insecticide control measure for alfalfa weevils is an early first harvest if an economic infestation is not detected until late in the growth of the first cutting. Harvesting alfalfa in an immature stage provides good control of larvae for the first crop. Rapid removal of hay will accelerate larval mortality due to desiccation by direct sunlight. An early first cutting tends to cure more rapidly because lighter windrows dry quickly, and forage quality is enhanced by higher crude protein and lower fiber content. Additional steps should be taken to ensure that surviving larvae do not cause economic damage to the regrowth. If larval survival under the windrows is high and baling is delayed (e.g., due to rainfall), damage to regrowth may be exacerbated. Regrowth should be inspected at a height of one to two inches to determine larval density.

Chemical control: If damage becomes unacceptable as harvest approaches, an early harvest or "rescue" insecticide treatment may be necessary. Use care in applying insecticide when alfalfa is approaching bloom: refer to the Pollinator Protection section for guidelines on minimizing insecticide contact of pollinators. Also, consider the waiting period before harvest for different insecticides. Generally, harvest or insecticide applications should happen before bloom if weevils are a problem. For effective products check the High Plains IPM Guide at: (https://wiki.bugwood.org/HPIPM:Main_Page).

2019 COLORADO WHEAT FIELD DAYS

Speakers

Scott Haley, CSU Wheat Breeder: Walk-through of variety trial
Jerry Johnson, CSU Crops Testing: Wheat Report
Rick Novak, CSU Director of Seed Programs: Seed certification & plant variety protection
Brad Erker, Executive Director: CWRF and CWAC updates

Schedule and Directions

Thursday, June 13

Walsh 8:30 a.m. — **Plainsman Research Center, Baca County -** From west side of Walsh, north 4 mi on Rd 43, west 1.5 mi on Rd HH. Research station on south side of Rd HH. GPS: 37.4346, -102.3193

Lamar 1:00 p.m. — **Stulp Farms, Prowers County -** From Hwy 385/287 in Lamar, go about 5 mi south on Hwy 287/385 about 1/2 mile past CR CC, pull-in to field right off highway on east side. GPS: 38.0026, -102.6135

Brandon 5:00 p.m. — **Burl Scherler Farms, Kiowa County -** From Hwy 96 west of Brandon, north 4.5 mi on CR 58, turn west 1 mi and back north on CR 57 for 2 mi. GPS: 38.5345, -102.4712

Friday, June 14

Burlington 8:00 a.m. — **Michael Hinkhouse Farms, Kit Carson County -** From Hwy 385 and I-70 interchange in Burlington, go south on Hwy 385 for 0.6 mi, then west on CR U. GPS: 39.2852, -102.2795

Genoa 12:00 p.m. — **Steve Beedy Farms, Lincoln County -** From Genoa/I-70: north 3 mi on CR 31, west 1 mi on CR 3K, north 2.5 mi on CR 30. GPS: 39.3516, -103.5093

Monday, June 17

Orchard 12:00 p.m. — **Wickstrom Farms, Morgan County -** From Briggsdale, 7.5 mi east on Hwy 14, 8 mi south on WCR 93 east 4 mi on CR 74/CR KK, south on CR 2 for 3 mi. Trial is NW of intersection of CR 2 and HH. GPS: 40.4817, -104.1099

Roggen 4:00 p.m. — **Cooksey Farms, Weld County -** From Prospect Valley, go east 6 mi on Hwy 52 to CR 81. Trial is on SW corner of intersection of Hwy 52 and CR 81. GPS: 40.0727, -104.302

Tuesday, June 18

Julesburg 8:30 a.m. — **Carlson Farms, Sedgwick County -** From Ovid/I-76 (exit 172), south 8.2 mi on CR 22/Ovid Rd, east on CR 14 for 2.5 mi. Field day will begin at farm on south side of road. GPS: 40.8352, -102.336

Haxtun (Irr.) 1:00 p.m. — **Steve Boerner Farms, Phillips County -** From Haxtun, south on Hwy 59 for 15 miles, east on CR 59 for 1 mi., south on CR M 1.3 mi. Trial on east side of road. GPS: 40.40476, -102.6063

Yuma 4:00 p.m. — **Andrews Brothers Farms, Yuma County -** From Yuma, north 5 mi on Hwy 59, east 3 mi on CR43 to CR J. GPS: 40.19, -102.661

Wednesday, June 19

Akron 8:45 a.m. — **USDA-ARS Central Great Plains Research Station -** From Akron, 4 mi E on Hwy 34 to USDA-ARS research center on GR GG. GPS: 40.149, -103.1373

cwrf

COLORADO STATE UNIVERSITY EXTENSION

Colorado Wheat Administrative Committee

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