



Volume 13, issue 1

Modoc

November 2020



Ranch Roundup

Greetings from the Farm Advisor,

Happy thanksgiving to you and your families. This edition of the Ranch Roundup is a collaboration between the Modoc, Lassen and Siskiyou County offices. Lots of great information about recent research in small grains, alfalfa, livestock and more. There are also additional articles and research briefs on our websites. Although we have not been able to get together as often as we usually do, cooperative extension has been hard at work throughout the intermountain region.

A huge thanks to our three seasonal employees, Mavrick Farnam, Lizzeth Mendoza, and Olivia Lappin who conducted research across the county looking at wild horses and elk, groundwater, vacant allotments, range monitoring, and sustainable beef production. Stories from their summer are posted on our blog at devilsgardenucce.org, a new website that Lizzeth created along with an office Facebook page.

As I write this, the rain is pounding down outside and I hope it keeps coming, filling up our ponds and streams for the next year. 2020 has brought many challenges but I am also extremely proud of our successes too. The 2020 Junior Livestock Show and Devil's Garden Colt Challenge were great projects that served youth and our community. A partnership between Modoc County, Modoc County Farm Bureau, UCCE Modoc, and the Modoc National Forest hired over 20 people that completed timber, recreation, archeology, range monitoring and other work to support the management of public lands and our local rural economy. As challenging as this year has been, watching our community continue to work together and support each other keeps me looking forward to the days ahead.

Sincerely,

Laura K. Snell

Find us on the web or on Facebook

Devilsgardenucce.org

Devil's Garden Research and Education—UCCE

UCCE RESEARCH UPDATE

Warner Mountain Meadow Monitoring and Vacant Allotment Study

We finished up our fifth year putting cages out in meadows throughout the Warner Mountains. Along with the annual production cages, we monitor stream bank alteration, stubble height, browse species use such as willow and shrubs, and conduct landscape appearance annual use. Look for a research update this spring.

We also completed our second year looking at the Emerson allotment in the south Warner wilderness which has been vacant for many years. We visited old key areas and established new key areas in all three pastures. We also took annual production, cover measurements, plant samples, and photo point monitoring. This analysis provides information to support future management of the allotment including possible use for emergency feed, reissue of the grazing permit, or restoration of riparian and forest ecosystems.

MODOC COUNTY CATTLEMEN'S ANNUAL DINNER



MODOC COUNTY CATTLEMEN'S DINNER

Announcing the Modoc Top Hand, Lifetime Achievement, and Cattlewomen of the Year Awards. Auction will be held to support scholarships.

Join Us
December 4, 2020

Brass Rail | 395 Lake View Dr Alturas, CA 96101
Happy Hour Sponsored by Modoc Auction Yard | 5:30 pm
Dinner | 6:30 pm

Suggested Couple \$100

\$60 Dinner - \$40 Raffle Tickets
** Fee can be paid upon arrival **

WE HOPE TO SEE YOU THERE

Big Valley Groundwater Research

In partnership with the North Cal-Neva RC&D and Modoc County, UCCE Modoc has contributed significantly to data collection supporting the **Big Valley Groundwater Sustainability Plan (GSP)** development.

Four groundwater clusters were established in Modoc County and one cluster in Lassen County, each one having one deep well and three shallow wells that can tell us about the elevation of groundwater and how groundwater is moving through the Big Valley basin. Each of these wells has a meter that records the groundwater elevation every 15 minutes. We download the information monthly.

We have also conducted surface water quality monitoring on the Pit River and Ash Creek looking at how the water changes throughout the summer. Along with monitoring we have also identified possible areas for recharge in the uplands surrounding the basin and areas of potential winter recharge within the basin.

Modoc County was successful in receiving a grant from the department of water resources last April to increase research and develop data in regards to surface water levels on the Pit River, recharge opportunities, and public outreach.

The joint Modoc and Lassen County GSP advisory committee has been meeting for nearly a year. The next meeting will be December 2, 2020 at 4pm at the Adin Community Center. The advisory committee has been successful in looking over the first six chapters of the GSP. All of these chapters are available at bigvalleygsp.org.

On **January 13 5:30-7:30** there will be a public outreach meeting at the Adin Community Center discussing the Big Valley GSP but more importantly starting the discussion about groundwater management in Big Valley. We have lots of information to share about the current condition of groundwater in Big Valley and we are interested in hearing how stakeholders would like to address the downdraft. What does sustainability mean to you as it relates to groundwater? What does the future of Big Valley look like? We will have experts from the University of California as well as engineers from GEI consulting and representatives from both Modoc and Lassen Counties. Dinner will be served.

What to do When an Animal Dies? Composting Could be the Answer!

Laura K. Snell , Modoc Livestock Advisor
Nicole Stevens, Siskiyou Research Assistant

When a large animal dies on your farm or ranch, what are your options for disposal? In California, there are limited legal options especially as rendering facilities have closed, regulatory burden has increased, and predators have grown in numbers. Livestock Mortality Composting could be a viable solution. Composting of mammalian tissue is legal in most states and recommended for on-farm disposal of livestock mortalities. California has allowed composting to occur on farms only during emergency situations such as high heat events, natural disasters, and disease outbreak. This research aims to make composting a legal disposal option for livestock mortalities and to provide input to streamline the regulatory agency process.



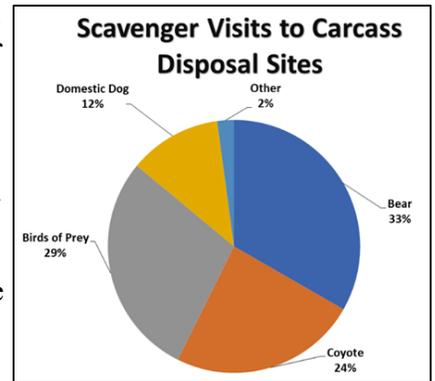
There are currently three rendering facilities statewide located in central California between Sacramento and

Fresno. In many cases these facilities are too far from livestock operations to take mortalities and the cost to transport and process carcasses is prohibitive to operations. Rendering provides a beneficial use to the carcass like composting and unlike other disposal options. Landfills can get permitted to accept livestock mortalities but there is no beneficial use to the carcass and not many landfills are properly suited.

Many livestock operations have a “bone pile” where they place livestock mortalities. This option can attract large predators such as wolves, mountain lions, bears and others making it a hazard for livestock operations with decreased predator control options. It also increases the time needed for the mortality to decompose with bones existing for years. Part of this study was to monitor predator and scavenger visits to current livestock mortality disposal sites in Modoc and Siskiyou Counties. Trail cameras have been located on current disposal sites for a little over a year.

The pie chart below shows the percentages of several different predator and scavenger species visits. The most common predators are bears, coyotes, and birds of prey including golden eagles, bald eagles, hawks, turkey vultures and crows. Other species include skunk, bobcat, mountain lion, and raccoon. One surprising finding during this component of the study was the frequency of domestic dogs visiting the disposal sites. Some of the dogs at the sites included livestock guard dogs while others seemed to be neighboring pets.

In 2019, a team of UCCE and CSU Chico researchers began a study looking at how livestock mortality composting would work in California. What are the current regulations preventing composting? Have studies taken place in the past? What would a composting site look like that follows current state regulations? Are all these regulations needed? All these questions led to a composting site being established at the Intermountain Research and Extension Center in Tulelake, CA. Letters and permits were submitted to agency staff from the county environmental health department, CalRecycle, CDFG, CA State Veterinarian, and the regional and state water board.

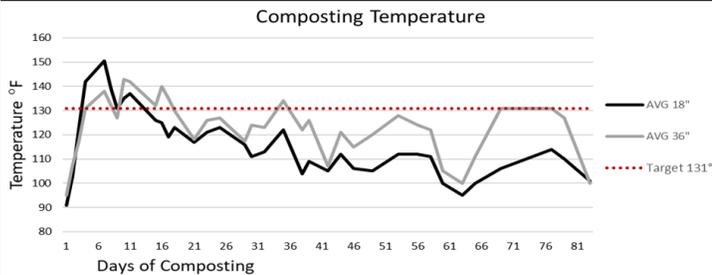


An existing 3-sided structure with cement at the base was retrofitted to accommodate the permitting regulations for the composting pile. A metal roofed carport structure was installed within the structure as a roof, required by the regional water quality board. Base rock material was placed on the floor and a pond liner was put on top of the rock to act as an impermeable layer. Then tube sand was used to secure the pond liner and created a basin to deter any runoff from the site. Continued page 4.



COMPOSTING CONT.

Livestock mortalities that have died only of natural causes are allowed to be composted. On August 10th we received a call that a cow was available for our project from a local producer. We were required to have a certified dead animal hauler move the animal. Once at the composting site, a layered base of fine and course wood chips and straw was laid out as an absorptive layer on top of the base rock. Materials were by-products from the Alturas Mill. The carcass was placed in the center of the structure and the carbon materials were layered on top. A sprinkler is available to add moisture as needed during the study.



Temperature readings are taken at 18 and 36 inches depth and moisture and pH are also taken. A temperature of 131 degrees Fahrenheit for 72 hours is required to kill potential pathogens in the compost pile. On day three, the pile achieved the target temperature and continued through day eight. Water is applied as needed and extra wood chips and straw are available as the pile shifts and needs extra material.

There is a good amount of research and educational material about livestock mortality composting from several university cooperative extension programs across the country. Navigating the regulatory process and coordinating with 8-10 government agencies with competing regulations makes this process currently unfeasible in California. By the end of this study, our objective will be to suggest best management practices from our research and other available science to create a streamlined approach to livestock mortality composting in California.

A big thank you to Carissa Koopman-Rivers who started this project in 2018, Dr. Kasey DeAtley at Chico State for her brilliance in study design and expertise, and the city of Alturas for carbon materials. We would also like to thank our local producer for the livestock mortality and the Intermountain Research and Extension center for their patience and monitoring help.

FROM THE MODOC COUNTY AG DEPARTMENT

2020 Restricted Materials expire 12/31/2020.

California Dept. of Pesticide regulation has made changes to the 2021 Restricted Materials Permits. Check your private applicators card to see if they have expired. Please call ahead for an appointment.

Reminders:

Pesticide Use Reports are due every month.

If you are organic, you need to be registered with CDFA and a certifier.

The department will try to have meetings in the spring for CE hours.

If you have a livestock scale, give the department a week to put you on the list for certification.

2021 DG COLT CHALLENGE

This year the Modoc National Forest was successful in gathering 506 horses from the Devil's Garden plateau. We are excited to announce our second year of the Colt Challenge pairing 4-H and FFA youth with weanlings from the Devil's Garden. Each wild horse placed from a Devil's Garden gather is one step closer to the appropriate management level of 204-402. This program placed 20 wild horses 4-6 months old with youth 9-18 years old in 2020 and we have 32 applicants this year for the challenge. For each horse entered in this project, an additional horse is placed with a friend or relative of a participant. This program aims to educate the public about wild horses while providing an educational project to youth to learn about training wild horses.

Devil's Garden Colt Challenge Youth Trainer Program

SAVE THE DATE

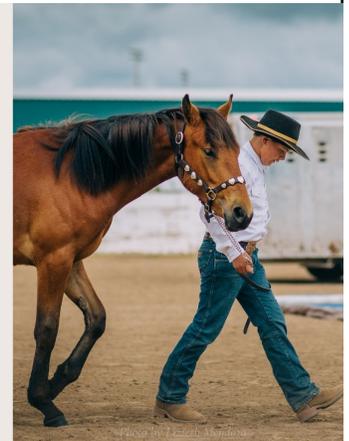
Saturday, June 19, 2021

Mark your calendars! The 2nd annual Devil's Garden Colt Challenge Youth Trainer Program will take place on June 19, 2021! We are ecstatic to see the program grow and look forward to seeing the youth expand their skills through this program.

**UC
CE**

Modoc National Forest

Contact Information
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WWW.DEVILSGARDENUCCE.ORG

Devil's Garden
Research & Education

IS IRRIGATING ALFALFA AFTER LAST CUTTING A GOOD IDEA?

By Rob Wilson, Tulelake Farm Advisor

Over the years, I have observed a large discrepancy in the way Northeast California alfalfa growers irrigate after their last hay cutting. Some growers like to irrigate after their last cutting, some irrigate twice, and some growers do not irrigate. When I ask farm managers why they irrigate after last cutting they often tell me they like to put the alfalfa to sleep in wet soils, or they like refilling the soil profile for next year when alfalfa breaks dormancy. When I ask farm managers why they do not irrigate, they say the crop does need water or they are busy deer and elk hunting. This discrepancy has perplexed me as sprinkler irrigation after last cutting has a significant energy and water cost and irrigating after last cutting often serves as a gateway for winter weeds such as cheatgrass, shepherdspurse, and prickly lettuce to become well established in the fall. This topic is not covered in most Western States university alfalfa guidelines unlike the countless publications and research detailing spring and summer alfalfa irrigation. Thus, I thought I spend a little time summarizing what I have learned from irrigating alfalfa at IREC and what experts from other States recommend. Keep in mind these thoughts are specific to established alfalfa and cold weather conditions in Northeast California.

Pros and Cons of Irrigating After Last Cutting

The cons outnumber the pros when choosing to irrigate after last cutting. Irrigating in October stimulates winter annual weeds to germinate, and early weed establishment makes it much more difficult to control weeds with dormant herbicide treatments applied in late winter. Fall irrigation can increase the potential for winter kill in years with wet, cold winters. A few experts say fall irrigation on sandy soils can help moderate alfalfa winterkill, but most experts say well drained dry soils help alfalfa plants go dormant and survive extreme winter temperatures. As there is some discrepancy in recommendations, I reviewed two peer-reviewed studies that directly measured soil moisture and winter kill. Both studies showed saturated soils resulted in more winterkill under extreme cold.



This is because high soil moisture does not allow for adequate air exchange and respiration in soils, saturated, flooded soils are more susceptible to ice sheeting, wet soils impede alfalfa plants from hardening off, and alfalfa roots need a period of dehydration to minimize cell freezing. I've visited several fields with significant winterkill

over the years, and almost all of them had standing water and oversaturated soils. Another con with irrigating after last cutting is it can stimulate fall regrowth which often leads to mice and vole damage.

The positive with irrigating after last cutting is it can refill the soil profile in years with low winter precipitation and uncertain spring water availability. This scenario has become a concern for many in the Klamath Basin due to water regulations put in place to preserve endangered fish. I cannot argue with growers that irrigate for this reason, but I feel the cons associated with fall irrigation outweigh the benefit. At IREC, we never irrigate after last cutting. Using this practice, I have not witnessed winterkill and our 1st cutting yields have been above average even in dry years. We also try to avoid over saturating soils with irrigation during the growing season as this often leads to root rot and soil compaction during harvest. I must point out the late, great Steve Orloff always preached never irrigate after last cutting; spring is the best time to irrigate to refill the soil profile after a dry winter! His advice always served me well, and I encourage you to consider these points when considering irrigating after last cutting next year.

ALFALFA SYMPOSIUM

This years UC Alfalfa Symposium will be held online, register today!

When: December 3-4, 2020, 8:30 AM-12:00 PM

Where: Virtual Webinar via Zoom (link and instructions to join will be emailed to registrants)

Registration fee: \$25.00

(will increase to \$30 at noon on Tues. Nov. 24)

Continuing Education: CEU's are being applied for from the California Department of Pesticide Regulation (DPR) and Certified Crop Advisers (CCA).

Hours will be posted as approved.

Visit: <https://ucanr.edu/survey/survey.cfm?surveynumber=32200>

BLUE ALFALFA APHID MANAGEMENT

By Giuliano Galdi, Rob Wilson, and Tom Getts

In early April, the UCCE office in Siskiyou County received calls regarding aphid infestations in alfalfa fields. Surprisingly, the infested crop was just breaking dormancy (below), which is uncommon since aphid populations tend to increase later in the season when above ground growth is more prominent.



The main two types of aphids that can be found in alfalfa fields are pea aphids (*Acyrtosiphon pisum*) and blue alfalfa aphids (*Acyrtosiphon kondoi*). While both of them are very similar in appearance, they can be distinguished by examining the antennae. The antennae of the pea aphids have narrow dark bands on each segment, whereas those of the blue alfalfa aphids gradually darken towards the tip. Despite their physical similarities, blue alfalfa aphid (left) cause much more damage than its relative pea aphid (right) by injecting a powerful toxin into the plant while feeding. This toxin retards plant growth, reduces yield, and may kill the plants.

In most years natural enemies such as parasitic wasps (right), lady beetle, lacewigs larvae, soldier beetles, and syrphid larvae are enough to keep aphids population in check.



However, insecticides may be necessary in case aphid populations are above the economic threshold as shown in the following table. Remember that these thresholds are guidelines and growers may need to treat earlier, especially if fields show significant stunting and chlorosis in the beginning of the season.

Plant height	Pea aphids	Blue alfalfa aphids
< 10 inches	40 to 50 per stem	10 to 12 per stem
10 to 20 inches	70 to 80 per stem	40 to 50 per stem
> 20 inches	100 + per stem	40 to 50 per stem

There are many insecticides labeled for aphid control. The widespread pyrethroid insecticides, such as Warrior (Lambda-Cyhalothrin), are efficient against aphids but their broad spectrum nature also kills many of the beneficial predators that can lead to increased aphid population after insecticide treatments. Pyrethroids can be applied in combination with organophosphates, which may improve control but this combination still has the same negative impact on aphid's natural enemies. Sivanto (Flupyradifurone), a more selective neonicotinoid insecticide, was the most effective insecticide for controlling blue alfalfa aphid in Intermountain UC trials. Sivanto was also effective in many grower fields in 2017 and 2020. The drawback is that Sivanto is more expensive when compared with most pyrethroids, but the added cost is usually justified as Sivanto is more effective at controlling blue aphid and preserving natural enemies

Due the 2020 aphid outbreak in Siskiyou County, the Agricultural Commissioner's department put in for a special local needs (SLN) label for Transform (Sulfoxaflor) as an alternative neonicotinoid insecticide that performs similarly to Sivanto for blue alfalfa aphid control. The Department of Pesticide Regulation made a notice of decision on July 24th, 2020 approving the SLN and allowing Transform application in Siskiyou, Shasta, Lassen, and Modoc Counties for the 2021 growing season. While Transform can be toxic to pollinators and must be applied before the crop blooms, its risks are reduced as blue alfalfa aphids are most problematic in early season when crops are not flowering.

Aphid infestations in alfalfa fields are not an every-year problem in many locations of the Intermountain Region of California. Scouting fields and identifying the type and quantity of aphids is key for properly timing insecticide applications to prevent reductions in yield and quality at first cutting. Alfalfa fields can normally withstand high numbers of pea aphids without significant damage, but blue alfalfa aphid outbreaks especially at alfalfa green-up can cause substantial lingering crop damage (right).



Tips for Maximizing Wheat and Barley Yields

By Rob Wilson, Tulelake Farm Advisor

Growers commonly experience fluctuations in wheat and barley yields from year to year. In some cases, the difference is related to weather and water availability, and in other cases differences can be traced back to management. 2020 is a year most of us would like to forget and wheat and barley yields were no exception for some producers. I heard a lot of reports of lower yields especially in drought areas. Below I tried to highlight some of the key management practices to maximize yields. Growers cannot control drought and lack of water, but many can alter their management to boost their chances of a profitable yield. I hope these tips help increase wheat and barley yields in 2021.

Planting Date: Five years ago, Steve Orloff completed several studies at multiple sites looking at how seeding rate and planting date influenced spring and winter wheat yields <http://cawheat.org/uploads/resources/645/orloff-wheatcommissionfinalrptseedrate.pdf> and <http://irec.ucanr.edu/files/229926.pdf>. The spring wheat study showed planting in early April was best for some varieties while planting in early May was better for others. The early April planting had the highest yield averaged across varieties; thus, I recommend trying to plant irrigated spring wheat and barley in early April with the goal of getting everything planted by early May. For dryland plantings, March to early April is the preferred seeding time. I talked to several growers that planted wheat and barley in late May and June this year. I will tell you from personal experience this is too late to plant spring wheat and barley especially if you want to maximize grain yield. Young plants growing in the middle of summer require a lot more irrigation to avoid drought stress and the plants are often stunted, have less reproductive heads, and kernels per head. June plantings are often attacked by aphids and other insects more so than early plantings. Forage producers that plant wheat and barley in late May and June should expect low forage yields and a greater need for irrigation.

Planting winter wheat and barley from mid-October to mid-November gave the best grain yield over multiple years compared to planting early in September or late in early February. Winter wheat planted in September looks great in the fall and early spring, but the plants reach reproductive stages

Variety	Seeding rate				
	Seeds/acre (x 1,000,000)				
Planting date	0.8	1.1	1.4	1.7	2
Yecoro Rojo	-----tons/A-----				
Early	3.13	3.06	3.22	3.06	3.14
Late	3.29	3.29	3.35	3.31	3.38
Fuzion					
Early	3.71	3.95	3.87	3.85	3.82
Late	3.24	3.62	3.42	3.71	3.59
Alpowa					
Early	4.87	4.51	4.37	4.12	4.32
Late	3.88	3.66	4.00	3.56	3.95
Nick					
Early	4.00	3.76	3.70	3.57	3.43
Late	3.94	3.98	3.78	3.81	3.78

Table: The effect of seeding date and rate on the yield of four spring wheat cultivars in Tulelake, CA. Early seeding was in early April and late seeding was in early May. Seeding rates ranged from 80 to 211 lbs per acre.

too early the next season (May) making the crop susceptible to frost damage. September plantings are acceptable for forage producers not worried about grain yield, but grain growers should avoid early plantings especially in cold areas. Planting in February resulted in high grain yields the first year and the lowest grain yield the second year of the study. The reason for this fluctuation between years was related to the weather after planting. Winter wheat and barley require a vernalization period to transition to reproductive growth. Many people think the vernalization period is a set amount of time but it is actually quite variable from year to year depending on winter temperatures. One study showed vernalization can range from 40 days to 70 days for the same variety because of differences in winter temperatures. This variability in vernalization makes late winter planting very risky. You may get lucky and have great yields with a mid-February planting one year, but as Steve's study showed if wheat and barley do not get enough cool weather after emergence the plants will be short and have erratic seed production.

Seeding Rate: Most growers have a favorite seeding rate for wheat and barley, but Steve's studies showed little difference in yield when wheat was seeded at rates between 100 to 200 lbs per acre in Tulelake. Wheat and barley have a remarkable ability to compensate for seeding rate by altering the number of tillers, spikes, and seeds produced per acre. Continued page 8.

WHEAT AND BARLEY CONT.

Planting wheat at 100 lbs per acre will result in fewer plants per acre, but those wheat plants will produce more tillers, spikes, and seeds per plant compared to higher seeding rates. For this reason, I suggest planting wheat and barley at 100 to 130 lbs per acre when using a drill. One thing to note is there can be a 30% variability between kernel weights of different varieties and seed lots, so it is worth checking the kernel weight on the seed tag. The target plant population for irrigated wheat is 1.35 million plants per acre. For those that don't like math, Mark Lundy created a handy seeding rate calculator for determining wheat seeding rates (lbs/acre) with adjustments for kernel weight, germination rate, and desired plant population http://smallgrains.ucanr.edu/General_Production/Seeding_Rate/. Higher seeding rates may be justified if you are planting into a poor seedbed or broadcasting seeds, but 200 lbs per acre is too much seed in most situations.



Irrigation: Wheat and barley irrigation needs are deceiving. Small grains are efficient water users, thus in wet years with timely spring rains growers have quite a bit of flexibility in irrigation especially on heavier soil types (loams, silt loams, and clay loams) with high water holding capacity. In drought years, this is not the case on all soil types. I heard many producers say they irrigated their wheat and barley crop once or twice this year. In a dry year, one or two irrigations is not enough irrigation frequency to meet crop water needs to maximize grain yield. Water use for wheat ranges from 19 to 23 inches for a grain crop, and it is around 16 to 18 inches for a forage crop cut at soft dough. Just as important as total applied water, irrigation frequency must keep the soil wet during critical growth stages with 70% of wheat water use occurring from late tillering to flowering.

My best recommendation for grain growers is to monitor crop water use and dig in the field at least weekly to check soil moisture in the top 1 ft. Soil moisture monitors are also very helpful in monitoring soil moisture in grain fields. Darrin Culp, IREC Superintendent at IREC, has developed a great knack for irrigating small grains over the years. This is evidence by the fact that IREC yields often exceed 3.5 tons/acre for spring wheat and 5 tons/acre for winter wheat. When I asked him about his irrigation tips for small grains, he stressed wheat and barley's tremendous appetite for using water from tillering to flowering and how it is important to keep the soil moist during this time frame. It is extremely easy to get behind irrigating small grains and never catch up which will always reduce yields. This point is crucial because many growers apply a big irrigation at tillering and then get busy irrigating other crops such as alfalfa and vegetables. Small grains appetite for water from stem elongation to flowering is extremely high and often requires multiple irrigations. Grain is also most susceptible to yield loss during these growth stages. At IREC, Darrin often applies 2 or 3 wheel-line irrigations during this time frame to keep up with water use (on a heavy silty clay loam soil).

The last irrigation on heavy soils should correspond with flowering on heavy soil types, milk on medium soil types, and possibly early soft dough on sandy soil. Never water after soft dough! A good way to know if you timed your last irrigation correctly is to look at the kernels and test weights. If you have pinched grain and low test weights you likely need to irrigate a little later into the season. If the kernels are plump with good test weight but you have a problem with late emerging green tillers and slow dry down, you are watering too late. In dry years, 3 to 5 irrigation events with wheel-lines and possibly 6 to 15 passes with a Center Pivot depending on irrigation amount is needed throughout the season to meet the water demand for small grains. This assumes that sprinkler irrigation is not heavily influenced by wind. If irrigating on windy days make sure to have irrigators offset the wheel-line on the next irrigation to avoid wind strips.

WHEAT AND BARLEY CONT.

Fertilizer: Nitrogen is often the key to maximizing grain yields. Steve Orloff and Mark Lundy carried out several studies in the Intermountain Region evaluating nitrogen fertilizer effects on grain yield over the last 10 years <http://irec.ucanr.edu/files/213662.pdf>. Darrin Culp and I use their recommendations in our management, and we have continued to try to fine tune their recommendations in recent years. What we can tell you is the lack of nitrogen at critical growth stages will dramatically decrease forage and grain yields. Yes, fertilizer costs money, but nitrogen will almost always pay for itself when used correctly even at today's mediocre grain prices. The key to nitrogen fertilizer is applying it at the correct time and making sure you water the crop enough to get the benefits of the fertilizer. Mark and Steve's studies showed the most efficient time to apply most of the nitrogen for wheat is at tillering as 70% of wheat's total nitrogen demand occurs from tillering to heading. If you apply all the nitrogen at planting, it is not available from stem elongation to flowering when wheat needs it most. If you are growing hard red wheat, it is extremely important to also apply nitrogen at flowering to boost protein. If you don't, you will likely not reach 13% grain protein. The total amount of nitrogen to apply throughout the season depends on your yield potential and preplant soil nitrogen test result. A good rule of thumb for irrigated wheat is 50 lbs of nitrogen per ton of grain. Thus, a 3-ton grain crop needs 150 lbs of nitrogen per acre. Twenty-five to 50 lbs of nitrogen per acre is also needed at flowering to boost protein in hard red wheat fields with 40 to 50 lbs needed for grain yields over 3 tons per acre.

The other side of equation when talking about nitrogen fertilization is the amount of nitrogen in the soil. Always soil test fields for fertility shortly before planting and again in early spring in the case of fall planted grain. Don't rely on a fall soil test for spring planted grain or a soil test from a couple years ago! If your nitrate soil test (NO₃-N) is below 10 ppm, your soil is on empty and you have little available nitrogen in the soil. If your nitrate soil test is between 10-20 ppm, you have some nitrogen in reserve and you can reduce your fertilizer amount. If your soil nitrate test is over 30 ppm, you may not need to apply any nitrogen fertilizer. I'm guessing most fields are below 10 ppm unless they are following alfalfa or vegetables, but you should



always test the soil to make sure. Another approach for testing soil nitrate is using a nitrate quick test; the process for this method is detailed in the following link put together by Mark Lundy's Lab http://smallgrains.ucanr.edu/Nutrient_Management/snqt/

In the case of brew barley, the opposite fertilizer program is needed to meet quality standards. In many cases, growers have a problem with grain protein being too high to meet brew barley quality standards. This means you need to test your soil for nitrogen at planting and the tillering stage for brew barley. If the soil has more than 15 to 20 ppm nitrate, don't apply nitrogen fertilizer when growing brew barley. If the soil has less than 10 ppm nitrate, you should consider applying 50 to 75 lbs nitrogen per acre pre-plant or early in the season to boost yield but always be conservative especially if you have limited water.

When fertilizing with other nutrients, I'd recommend focusing on phosphorus and potassium. I often hear growers say they fertilize grain crops with sulfur and micronutrients every year. My response is you likely do not need these nutrients especially for grain and applying too much sulfur is great way of lowering your pH requiring you to buy lime fertilizer to boost pH next time you plant alfalfa. Lime is expensive! Most crops do not need more than 30 lbs of sulfur per year and if you apply sulfur repeatedly you probably have an excess in the soil. Soil test and tissue test for sulfur. If you have more than 5 to 10 ppm sulfur in the soil you don't need sulfur for grain. In the case of phosphorus and potassium, test the soil shortly before planting. If phosphorus in the top foot is over 15 to 20 ppm using the Olsen P soil test you likely have -

Continued Page 10

WHEAT AND BARLEY CONT.

enough phosphorus in the soil. If potassium in the soil is over 75 ppm you likely have enough potassium. Apply phosphorus and potassium before your last tillage pass at planting or in the drill at planting for best results.

Choose a good variety: For those that have planted the same variety the last 10 years it may be time to change things up. Growing the same variety multiple years has the benefit of learning the ins and outs of the variety, but the genetics of new varieties keep improving and the best new varieties produce higher yields and have better pest resistance and quality compared to the best variety 10 years ago. On the following pages are the results for the winter and spring variety trials conducted at IREC in 2020. If you have questions or need more information, contact your local UC farm advisor or us at IREC 530-667-5117.

2020 IREC Irrigated Winter Wheat Grain Yield Summary, Tulelake, CA.

Entry #	Entry Name	Grain Yield (tons/acre)
18	LWW16-71088	6.17 A
17	LCS Blackjack (LWW15-71945)	6.02 A B
4	Bobtail	5.69 A B C
15	LCS Ghost (LWW14-74143)	5.64 A B C
11	WB 1783	5.63 A B C
2	Mary	5.62 A B C
3	Rosalyn	5.50 A B C D
14	LCS Hulk	5.50 A B C D
6	Nixon (OR2121086)	5.35 A B C D E
23	OR2150346	5.34 A B C D E F
5	Norwest Duet	5.32 B C D E F
24	OR2150141	5.32 B C D E F
20	Stingray CL+	5.30 B C D E F G
9	SY Ovation	5.23 B C D E F G
13	WB 1532	5.17 C D E F G
22	OR2140401	5.16 C D E F G
1	Stephens	5.13 C D E F G
16	LCS Shine (LWW14-72916)	5.12 C D E F G
21	Magic CL+	5.07 C D E F G
7	VIBulldog (IDN 07-28017B)	5.03 C D E F G
19	M-Press	4.75 D E F G H
10	SY Dayton	4.65 E F G H
12	WB 1604	4.50 F G H
25	OR5170022	4.47 G H
8	Pritchett	4.02 H
Average		5.23

2020 IREC Irrigated Winter Barley Yield and Agronomic Characteristics

Entry #	Entry Name	Barley Type	Grain Yield tons/A	Heading Date	Maturity Date	Plant Height (cm)	% Lodged Plants	% Stripe Rust	Bushel wt.
1	Alba	Feed	3.56	5-Jun	22-Jul	120	10	5	47.6
2	Strider	Feed	3.94	2-Jun	20-Jul	120	0	0	47.5
3	Wintmalt	Malt	2.91	6-Jun	24-Jul	105	55	55	46.8
4	Thunder	Malt	3.29	5-Jun	23-Jul	109	14	23	49.4
5	DH130910	Malt	3.02	5-Jun	18-Jul	112	5	8	48.6
Average			3.34	4-Jun	21-Jul	113	17	18	48

More variety information at http://irec.ucanr.edu/Research/Past_Research/Cereal_Projects_829/

ALFALFA WEED CONTROL

By Tom Getts, Cropping Advisor Modoc, Lassen, Sierra and Plumas Counties

Weeds are perennially persistent and problematic in cropping systems year after year. While a healthy stand of alfalfa can out compete most weeds, winter annual weeds are often problematic in first cutting. Species like tumble mustard, tansy mustard, prickly lettuce and shepherd's purse are common contaminants of hay fields. While these plants are not toxic, they detract from the quality of the hay, and are visual deterrents for consumers. Winter annual grasses, such as cheatgrass and foxtails, are a different story with seed heads that can get lodged in the mucus membranes of livestock causing infections. Hay contaminated with these grasses is much less marketable. Furthermore, there are toxic weeds, such as fiddleneck, which can lead to death of livestock if too much is consumed. But the real cost of weeds comes at the market, where weedy hay can be worth anywhere from \$30-100 less per ton depending on the contaminant. This makes weed control an aspect that growers cannot afford to ignore.

Many growers of conventional alfalfa in the Inter-mountain Region often make applications of a residual herbicide combined with a burndown herbicide before the crop breaks dormancy in late winter. These applications can be an excellent way to control emerged weeds while creating a residual barrier for weeds yet to germinate. If made after dormancy is broken, unacceptable crop injury can occur. For the residual herbicides to be effective, they need to be incorporated into the soil profile by precipitation. Typically, in February and early March there is adequate precipitation to activate these soil residual herbicides. Some years are too wet, with muddy fields preventing applications by ground rigs from occurring at all.

Table (right): Approximate cost of the chemicals (based on quotes and online retailers, prices may vary).

Cost of Herbicides Alone	
Tricor 75 df 2/3 lb	\$13.59
Gramoxone 1 qt.	\$8.10
Sharpen 2 oz	\$13.00
Shark 2 oz	\$18.00
Select 16 oz	\$19.25
Pursuit 3oz	\$8.65
Pursuit 6oz	\$17.29
Raptor 6oz	\$24.28
Prowl 2 qt.	\$33

ALFALFA WEED CONTROL CONT.

This past spring, we had a couple of field trials which I wanted to share some data from. The first was investigating an experimental herbicide (CNV2243) for dormant season applications. This experimental herbicide is thought to be similar (yet different) than metribuzin giving some control of small emerged weeds, but mainly having pre-emergent activity. We were looking at crop safety and weed control compared to metribuzin with and without the burndown herbicides Shark, Sharpen, and Gramoxone. Applications were made in late winter (early February) just as green buds were seen down in the crowns of the alfalfa. No precipitation fell until early March to incorporate the residual herbicides. It is not uncommon for growers to miss the late winter application window, so we also tested applications after the crop had broken dormancy on April 2nd.

In conversations with some pest control advisors, there were other valleys in the region that never received any late winter precipitation to incorporate residual herbicides like metribuzin. Alfalfa had broken dormancy and they needed to apply a herbicide with more crop safety than a burn down product. While there are selective products like Pursuit and Raptor available to growers, they are not used as commonly outside of new seedings. Part of the reason for this is because of price, weed control spectrum, and potential for some injury. Some of the questions I was getting about Pursuit and Raptor I didn't have the answers to: Could you get adequate control with 3 oz. of Pursuit? Did adding AMS help with weed control but cause unacceptable crop injury? Did you need to add a grass killer like Select for adequate grass control? To help answer some of these questions, we put out an adjacent trial in the same field with a whole slew of post emergence treatments on April 2nd.



Both trials consisted of 10*20 ft. plots, replicated four times. Crop injury and weed control was evaluated at one-week increments following treatments and before harvest. Before harvest weed control data is shared in tables page 12. All treatments in both trials applied on April 2nd showed some crop injury, where any application of Shark or Gramoxone caused significant burn back of the crop. First cutting yields have been shown to be reduced by application of these contact burn down herbicides in previous research. All Pursuit and Raptor treatments also initially caused crop injury. While I cannot speak to the effect of the initial crop injury on yields in these two trials, all treatments outgrew any "visual" injury by the time of harvest (and could not be differentiated from the untreated check).

There were three weeds present at this field location: tumble mustard (*Sisymbrium altissimum*), prickly lettuce (*Lactuca serriola*) and cheatgrass (*Bromus tectorum*).

Generally, dormant season treatments provided the best broadleaf weed control. Tumble mustard was controlled with most treatments in both studies. Prickly lettuce was more difficult to control. In the dormant trials, satisfactory control of prickly lettuce was only achieved when Gramoxone or Sharpen was included in the tank at the February application. Only the tank mix with Gramoxone controlled prickly lettuce at the April application, with no control in any of the Pursuit or Raptor treatments. Cheatgrass was more difficult to target, and the best control was achieved in February applications that contained Select or Gramoxone in the tank. Cheatgrass was also controlled with 6oz Raptor + AMS, or a combination of Raptor + Select in April. **Continued page 12.**

Picture (left): Notice the tumble mustard is controlled, the cheatgrass is suppressed, and the prickly lettuce appears unaffected by the treatment of Raptor at 6oz/acre. The Alfalfa is also healthy.

ALFALFA WEED CONTROL CONT.

Dormant Trial: Percent Weed Control before Harvest

	Tumble Mustard		Prickly Lettuce		Cheatgrass	
metribuzin (tricolor 75df) .67 lb	91	a	83	ab	75	a
CNV2243 16 floz	35	bc	30	abc	14	bc
metribuzin (tricolor 75df) .67 lb + gramoxone 1 qt	94	a	95	a	95	a
metribuzin (tricolor 75df) .67lb + sharpen 2 oz	95	a	95	a	48	abc
metribuzin (tricolor 75df) .67 lb + shark 2 oz	95	a	95	a	46	abc
CNV2243 16 floz + gramoxone 1 qt.	88	ab	91	a	88	a
CNV2243 16 fl oz + sharpen 2 oz	93	a	94	a	41	abc
CNV2243 16 fl oz + sharpen 2 oz + select 22 oz	93	a	95	a	94	a
CNV2243 16 oz + shark 2oz	89	ab	64	abc	3	c
2 in metribuzin (tricolor 75df) .67 lb + gramoxone 2 qt	90	a	89	ab	43	abc
2 in metribuzin (tricolor 75df) .67 lb + shark 2 oz	94	a	46	abc	5	c
2 in CNV2243 4L 16 fl oz + gramoxone 2 qt.	71	ab	90	a	63	ab
2 in CNV2243 4L 16 fl oz + Shark 2oz	71	ab	68	abc	10	bc
2 in CNV2243 16 fl oz + Shark 2 oz + Select 22 oz	68	ab	70	abc	64	ab
untreated	0	c	0	c	0	c

April Second Trial: Percent Weed Control before Harvest

Treatment	Tumble Mustard		Prickly Lettuce		Cheatgrass	
Pursuit 3oz	78	a	20	a	17	c
Pursuit 6oz	70	a	23	a	35	bc
Raptor 6oz	95	a	10	a	69	abc
Pursuit 3oz + Select 16oz	94	a	5	a	66	abc
Pursuit 6oz + Select 16oz	71	a	15	a	51	abc
Raptor 6 oz + Select 16oz	95	a	20	a	85	ab
Pursuit 3oz + AMS	95	a	20	a	18	c
Raptor 6 oz + AMS	95	a	33	a	93	a
Pursuit 3oz + Select 16 oz + Prowl 2qt	76	a	28	a	65	abc
Pursuit 6oz + Prowl 2 qt. + AMS	95	a	35	a	64	abc
Raptor 6oz + Prowl 2 qt. + AMS	95	a	38	a	90	ab
untreated **	0		0		0	

There are a lot of alternatives but Metribuzin + Gramoxone still offers some of the best broad spectrum weed control out of options tested.

While often not emphasized in research reports, cost often drives what treatment a grower selects. Expensive treatments eat into the bottom line. However, an ineffective treatment will end up costing much more if the hay ends up weedy. It is a balance between treatment effectiveness and price. Some of the tank mix combinations cost significantly more than treatments which offered similar or even better weed control. One of the most cost-

In terms of the questions we were trying to answer, the experimental herbicide seemed to have good crop safety in this trial, and offered good weed control as a tank mix partner but not as a stand-alone product. Pursuit at the 3 oz. rate was not very effective. Raptor had broader weed control activity and picked up cheatgrass when AMS was included. Shark and Sharpen looked pretty good on the broad-leaf weeds, but did not control the cheatgrass like Gramoxone. Generally, only a few dormant season treatments tested controlled all three weed species effectively. Adding Prowl to the tank did not increase control of any species for the April applications, as most of the weeds had already germinated.

effective treatments was Metribuzin + Gramoxone in the dormant season trial. Raptor 6oz + AMS was one of the most cost effective treatments tested in April, with the caveat of limited prickly lettuce control. Knowing your weed spectrum by field can help guide what combinations should be chosen.

To read about round-up injury to round-up ready alfalfa and other weed control studies in the intermountain region, check out http://celassen.ucanr.edu/Weed_Advisor/

SHOULD I STILL VACCINATE FOR BRUCELLOSIS?

Gabriele Maier, CE Specialist for Beef Cattle Herd Health and Production

Every state decides on the requirement for brucellosis vaccination in cattle. In California, assembly bill 1801 repealed the mandatory calfhooed vaccination for intact female beef breeds 12 months of age or older and sold within the state as of January 1, 2020. In other words, it is not a requirement anymore that beef breed heifers or cows show evidence of Bangs vaccination before they can be sold within this state. To be clear, there was no requirement to vaccinate beef breed heifers before this law was passed in California if they didn't change ownership.

The new freedom raises the question: should I continue vaccinating my heifers for brucellosis? Let's first take a step back and talk about what brucellosis is: brucellosis is a serious and contagious livestock disease that causes late-term abortions in cattle. The causative agent in cattle is *Brucella abortus*. The disease poses a significant public health risk because it can be transmitted to people. Drinking raw milk or eating soft cheese made from raw milk from infected animals is a common risk factor to contract the disease. Exposure to tissues and fluids from cattle aborting due to brucellosis is another way that farm workers can catch brucellosis. In humans, the disease is also known as undulant fever because of its ability to cause intermittent bouts of fever. Other symptoms include joint and muscle pain, gastrointestinal symptoms, and orchitis (inflammation of the testes) in men. Brucellosis in people often results in chronic disease lasting months or years. No wonder there was a huge effort in eradicating this disease from cattle in the United States. Through a combination of vaccination, testing and quarantine, removal of positive animals and continued surveillance, we have reached a state where the entire United States has been officially declared brucellosis free. The last infected herd in California was found in 1997 and there hasn't been a case here in cattle since. The only pocket where brucellosis is still around in the US is the Greater Yellowstone Area in the Montana/Wyoming/Idaho region, where brucellosis still lingers in wildlife such as elk and bison and occasionally spills over into a cattle herd. Regulations around vaccination and testing of cattle in the Designated Surveillance Area of that region are strict, e.g. a negative blood test is required for movement or change of ownership for all breeding cattle with few exceptions.

Benefits of Continued Vaccination:

- The vaccine RB51 we use for brucellosis must be administered by an accredited veterinarian. This annual vet visit could serve to document a valid veterinary client patient relationship to be able to write prescriptions and being familiar with the operation and the animals as part of the California vet requirements.
- Brucellosis vaccination comes with automatic official ID, the orange Bangs tag that is applied at vaccination. Official ID is required for interstate movement under certain conditions. Having official ID also helps animal health officials trace animals back to their origin that may be found at slaughter to have a foreign animal disease or a disease that is regulated by USDA or state agencies.
- If you plan on selling cattle to a state that still requires Bangs vaccination for entry of breeding female cattle, you need to accomplish vaccination before the heifers are 12 months old. At the moment, California does not allow mature vaccination, which is routine vaccination of females over 12 months of age.
- If everyone stopped vaccinating, we would end up with a naïve population of cattle and a new introduction of the disease could cause critical damage. However, the risk of introduction of brucellosis through an animal from the Greater Yellowstone Area into California is very small according to a risk analysis model.
- The California Cattlemen's Association strongly encourages all California ranchers to vaccinate beef heifers that will be added to the breeding herd to keep them protected from the disease.

On the other hand, you could consider the drawbacks:

- There is some cost and stress to the animals involved in having your vet vaccinate heifers.
- If a heifer is pregnant at the time of vaccination, she may abort and potentially spread the disease to herdmates or people getting in contact with the aborted fetus and placenta. Although this is very rare, because RB51 is a live vaccine, it is a concern.

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FUTURE EVENTS OF INTEREST

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- Modoc County Cattlemen's Dinner
December 4th 5:30 pm Brass Rail
- Modoc Ag Expo
March TBA
- Junior Livestock Show
June 14-18 Alturas Junior Livestock Showgrounds
- Devil's Garden Colt Challenge
June 19 Alturas Junior Livestock Showgrounds