

BARNYARDS & BACKYARDS

SPRING 2020



Lambing season tips

Edible flowers

Emerald ash borer

**Value-added food
ventures**

www.barnyardsandbackyards.com



Abby Perry
Magazine co-coordinator

To our readers

There is much uncertainty during this time of great stress in our country, but as Governor Mark Gordon has said in different words, if we all take sensible measures and help where we can, we'll get through it as best we can, in our Wyoming fashion (and across the nation). Our thoughts are with you, your families, and communities. Now, relax for a bit: we hope you enjoy some respite reading about some more everyday topics

— Your
Barnyards&Backyards
team

Time to spring ahead to growing season

Aww spring. It's one of my favorite times of year. Although usually short in wonderful Wyoming, I find so much joy in watching my little plant babies emerge from the soil – and sometimes even through snow, depending on how adventurous the plants are.

This year I'm feeling especially anxious to get out and see how everything has fared. I tried to remind myself frequently over the winter that snow is good. Snow cover keeps all my precious plant babies warm, insulated, and well-protected from vicious winter winds, and even gives them a nice, cool drink when they are waking up from the long winter. I also find spring to be so refreshing; nice, clean slates to start another season.

With fresh spring joy also comes fresh spring chores. In this issue, you will find information on getting the most out of your hand line irrigation system. The watering chore comes all too quickly as things green up. Sometimes the things that green up aren't the things we are most excited to see – darn weeds. Check out the article on temperature inversions to get a clearer picture of the best time to spray pesticides to reduce the chances of non-target species being affected. If all those spring chores are getting you down (so much to do, so little time), see the article on time management. It will help you plan and prioritize to get things done.

There are always a few tried-and-true plants that pop-out of the snow and are ready to "hit the ground running," but others are a little slow to emerge. If nervous your plants aren't as anxious for spring as you are and are late to bud out, look at this issue's Ask Sam for some tips on what to do or what your plants might be "thinking."

Living and growing in Wyoming is full of challenges, but I always find myself a little grateful for the few plants that did not survive the winter. The vacancies give me opportunity to experiment, add more varieties, and keep me puttering about.

We wish you all the spring joy and fresh starts this season, and just enough trial to keep you spry!

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Barnyards & Backyards is published quarterly by the Small Acreage Issue Team, a cooperative effort of the University of Wyoming Extension, Wyoming conservation districts, Natural Resources Conservation Service, Audubon Rockies, Wyoming State Forestry Division, Wyoming Weed and Pest Council and Wyoming Department of Agriculture.

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Yearly subscription price \$10

Single issue price \$3

Cover and Table of Contents: Shutterstock

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Wyoming

Considering a value-added food venture? There's a three-step approach

Starting a value-added food enterprise is like building a house: you need to lay the foundation before construction can begin.

Generally, there are three steps to identifying a new or alternative enterprise: determining personal and family goals; determining if those goals are feasible; and choosing an enterprise.

In my work with entrepreneurs, sometimes I'll see people go straight to choosing an enterprise. Unfortunately, the first two steps are the foundation-building process of trying to get a new venture off the ground.

What is value added?

Value added usually refers to products that experience some type of post-harvest processing. Common value-added foods include:

- Jams, jellies, and preserves,
- Salsas and sauces,
- Pickled vegetables, and
- Herbed oils and vinegars.

While unprocessed produce can usually be sold with very little planning, processed produce has a greater risk of foodborne illness. So the regulations, safety concerns, and processing requirements change, meaning the size of your aspirations will guide your planning and effort.

Starting at the beginning

Which connects back to Step 1: determine goals. Consider the case of a father and son who had been farming together for about eight

years. One day something prompted a discussion about the farm. One thing led to another, and it turned out the father was farming because he thought the son wanted to continue the farm to the next generation; however, the son was farming only because he thought Dad wanted to pass on the farm. In actuality, neither of them wanted to farm! They were both farming because they had assumed it was what the other wanted.

Or consider what we

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solitary job. So when someone who prefers tractors and lettuce goes to town and has to answer questions from customers and generally be gregarious (as good marketers often are), it tends to show.

So as you set your goals, consider what will actually be rewarding. Most importantly, ask yourself if it's something you actually want to work toward, or if it's something you're doing because it sounds easy or is something other people expect you to do. Goals often have a dollar value that can be identified – a living wage perhaps.

Whatever the goal, remember time is limited. The more selective and purposeful we can be about our goals, the more likely we'll contribute to our success and happiness.

Will it work?

How are we to know if a goal is feasible? The purpose of Step 2 is to answer that question as best we can.

If we've been clear about the goals from Step 1, then we may have specific endpoints such as dollars generated, amounts of time available, products created, and so on. (Note: it's helpful if the goals from Step 1 have target dates by which they'll be accomplished – a dream is transformed into a plan this way).

Determining profit potential for some food venture options narrows the choices. For one possible venture, take projected revenue (the level of sales you think you'll generate), subtract the cost of





goods sold and all your related direct production expenditures (the cost of fruit, sugar, jars, and labels, for instance, for jams and jellies), which will be a calculation of gross profit margin. From the gross profit margin, take out the indirect (fixed) costs (things that don't vary based on production, such as insurance and internet access – as well as your time spent managing) for your net profit. If that number isn't near your goal, then continue looking at options.

Exploring food ventures

Step 3 is choosing an enterprise. Most states have laws that allow home-produced foods to be sold in some form. Processing food in a home kitchen is less expensive than renting or building commercial kitchen space, but Cottage Food laws may limit where those products may be sold.

In Wyoming, home-processed food can only be sold to end consumers. So sales to restaurants or grocery stores or at the wholesale level (to a food distributor for instance) wouldn't be possible, nor sales to people or businesses in other states.

So if selling at a farmers market or in an on-farm shop sounds appealing, then home processing is an easy introduction to the business. Starting at a smaller scale gives cooks a chance to build processing and cooking skills, and all the other skills needed to build a business,

like advertising, creating recipes, conducting market research, building a brand, and managing the money side. And if you find that the work doesn't suit you, or it's not as rewarding as expected, then the amount lost is more manageable.

Consider the entrepreneur who wanted to start a bed and breakfast as a part-time job (to make money as well as spend time with family). But by the time he'd get done setting up a full house, getting a kitchen equipped, finding suppliers, and working through the time commitments for advertising and maintaining the B&B, it was almost a full-time job! He had to go back to the drawing board for feasible ideas (but at least the foundation for goals was now firm).



Starting a new venture often turns out to be more work (and is less profitable) than expected. Here are tips from those who have tried it:

- Do five times the research you think you should and have at least 25 percent more capital than you think you'll need.
- Make connections. The world truly does work on a "who-you-know" basis.
- Build a strong team. Know what you're good at and not good at to fill the gaps in the team. Have an excellent financial person beside you.

Final Comment

Whether you have an acreage you'd like to use more effectively, are looking for extra income, or seeking a different way to spend time, begin by being clear about what you are willing to put into it and what you'd like to get out of it. Setting objectives is one of the biggest aspects of planning. There are too many variables – too many activities to manage – to spend time doing things that don't get us what we want.

Read more in *Food Ventures in Wyoming: A Resource and Regulatory Guide*, and *A Guide to Specialty Crop Value Added Food Processing in Wyoming*. Both are available from the author.

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University of Wyoming Extension agriculture entrepreneurship specialist **Cole Ehmke** has been providing a helping hand to Wyoming residents for more than 15 years. He can be reached at (307) 766-3782 or at cehmke@uwyo.edu.

Landowners should be aware 2020 MAY BE A HIGH GRASSHOPPER

High populations of pest grasshoppers in some areas around towns, crop lands, and rangeland caused problems for Wyoming citizens in 2019.

Seven counties, based on reports of grasshopper damage and data from the 2018 summer grasshopper pest scouting surveys, expected large grasshopper infestations in 2019. These counties ended up protecting over 600,000 acres from high populations of grasshoppers in 2019. Based on grasshopper population surveys in the summer of 2019, different areas of the state may have grasshopper problems this year (Figure 1).

You need to be prepared for grasshoppers if you had them causing damage or were in very noticeable numbers by the end of last summer. These grasshoppers will have produced lots of eggs that overwinter in the soil and will hatch this spring (Figure 2). The females of the major pest species have the potential to produce over 300 offspring each! Even if we have bad weather for them this spring, such as prolonged cold and wet conditions after they have hatched from the ground, you may still end up with damaging populations of grasshoppers.

How many grasshoppers are too many?

Over 120 species of grasshoppers are in Wyoming, but only a dozen

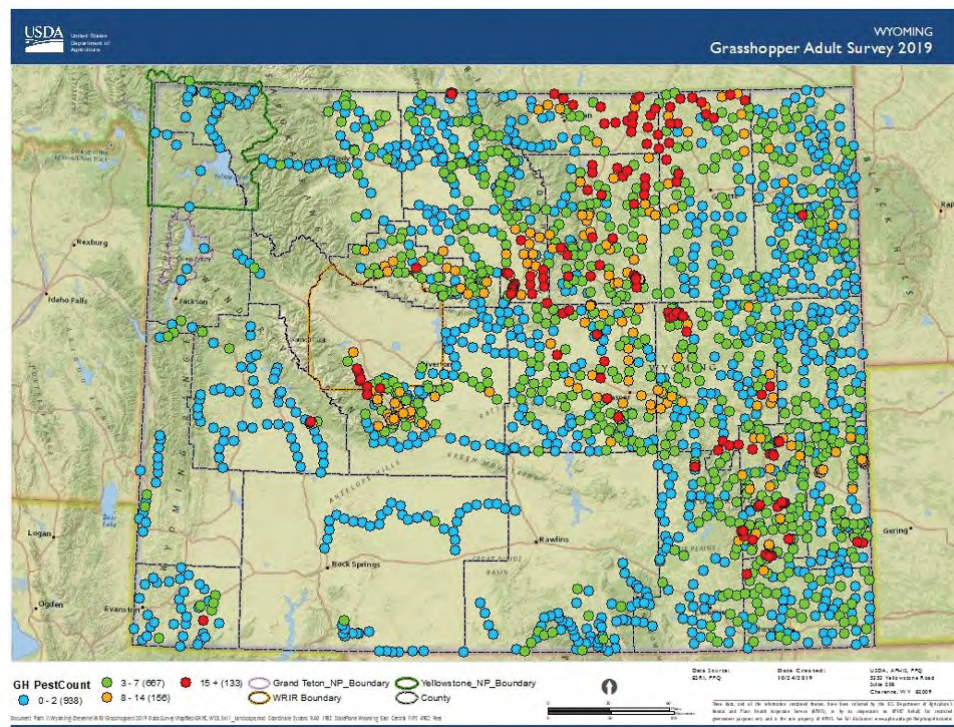


Figure 1. The 2019 adult grasshopper survey map for Wyoming. The red dots mark grasshopper survey points with densities at 15 grasshoppers per square yard or higher. The highest population density surveyed in 2019 was 41 grasshoppers per square yard. USDA APHIS PPQ used the Reduced Agent and Area Treatments method to reduce grasshoppers densities back down below 8 grasshoppers per square yard on over 600,000 acres in seven of the counties or many more red dots would have been marked on the map.

of them are considered important pests (Figure 5). Some species are not considered pests because they have low reproduction rates and never reach damaging population densities. Some grasshopper species eat only undesirable weedy plants and are beneficial (Figure 4).

In the years in between sudden increases, termed outbreaks, grasshopper population densities on rangeland are usually in the range of 1 to 7 per square yard. Research conducted on Montana rangeland

found that during an average grass growth year with a mixture of common species at the density of 14 grasshoppers per square yard, grasshoppers will consume (or make unavailable through clipping) 30 percent of the forage over the growing season. If your livestock need 50 percent of your rangeland's forage, then this grasshopper population is approaching the damaging level when too little forage is left behind for other more desirable wildlife to eat and ensure

YEAR

enough leaf area is left on the plants to support the root growth of the perennial range grasses.

Unlike the common rangeland species, the primary crop and suburban pest grasshopper species concentrate their egg deposition in weedy areas such as fencerows and borrow ditches. In early spring there can be few grasshoppers found in yards, garden, and crop fields. Meanwhile, the pest grasshoppers hatching in the preferred weedy areas can be at densities of over 1,000 per square yard. These pest grasshopper species, such as the large two-striped grasshopper, can spread from this habitat in early summer and cause severe damage to crops, gardens, and yards.

Research has shown a population density of just 10 adult two-striped grasshoppers per square yard can defoliate a field of knee-high corn plants. That population density equates to over 60 pounds of grasshoppers per acre, each capable of eating their body weight daily in green leaves and clipping more leaves than they can consume.

How to scout for hoppers and where to get help

Managing grasshoppers to reduce the damage they cause in the summer starts with scouting for them in the spring when the major pest species start hatching. The exact timing of the hatch varies with the warmth of the spring weather



Figure 2. The number of eggs inside a two-striped grasshopper's eggpod, like this one, ranges from 50 to a little over 100. Both the number and size of egg clutches produced by female grasshoppers, plus the survival of the hatchlings the next spring, determines if there will be an outbreak.



Figure 3. This hatchling migratory grasshopper is about the size of a grain of rice. These little insects are easily overlooked in the early spring vegetation. However, managing grasshoppers early in their life cycle is best as lower rates of insecticide can be used and they will have done little permanent plant damage at this stage.



Figure 4. This adult female *Hesperotettix viridis* is an example of a grasshopper species is considered beneficial because it eats plants with little forage value to livestock such as broom snakeweed. The Reduced Area and Agent Treatment grasshopper management strategy has less impact on species like this.

Figure 5. A display of adult specimens of Wyoming's common pest species of grasshoppers. Also included in the lower left corner are the five progressive developmental stages of a grasshopper, called the nymphal instars. In the lower right corner are two species of grasshoppers that spend the winter as 5th instar nymphs and become adults with colorful hindwings often seen flying in the early spring on rangeland.



and the green up of the vegetation they eat. The four major crop pest grasshopper species will start hatching in May and can continue to hatch all the way into early July. This means you can't look for grasshoppers hatching just once or even treat just once if you do find them hatching in damaging numbers.

When grasshoppers hatch from the eggs, they are about the size of a grain of rice and can be easily missed (Figure 3). University extension publications and MP 123

grasshopper management job aid at <http://bit.ly/hopperaid> can explain grasshopper management in more detail than space allows here.

Wyoming's county weed and pest districts can help with grasshopper management through coordinating cooperative treatment programs and through the sales of insecticide properly labeled for the areas infested with grasshoppers.

A branch of the USDA called the Animal and Plant Health Inspection Service (APHIS), Plant Protection

More information University of Wyoming grasshopper management information links

<http://www.uwyo.edu/entomology/grasshoppers/>

Grasshopper management and
identification poster

<http://bit.ly/hopperposter>

Contact information for your weed
and pest control district

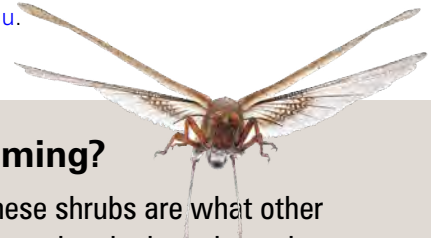
<http://bit.ly/weedandpestoffices>.

Wyoming's USDA-APHIS-PPQ
contact information

<http://bit.ly/wyoaphis>

and Quarantine (PPQ) can provide technical assistance on outbreak surveys and treatment advice. PPQ also completes annual grasshopper surveys on federal lands, state lands, tribal lands, and on private lands where the landowners have given permission. These surveys can provide data to help land managers prepare for large outbreaks. (Figure 1).

Grasshoppers aren't the only Wyoming insect pest **Scott Schell** has on his radar list. He is the University of Wyoming Extension entomologist and can be reached at (307) 766-2508 or sschell@uwyo.edu.



Why are pest grasshopper species outbreaks an issue in Wyoming?

Grasshoppers can easily outcompete livestock and other wildlife for forage. Being small is an advantage for the grasshoppers. They can clip down forage and then eat the grass as it grows from the crown. This prevents the forage from getting tall enough for larger grass-eating animals to grasp with their teeth.

Pest grasshoppers, when their preferred food plants are gone, will then start feeding on shrubs like sagebrush

and mountain mahogany. These shrubs are what other wildlife, such as sage grouse and mule deer, depend on for winter browse. In drought years, when there is little regrowth of grasses and forbs, pest grasshoppers will migrate to find food. When desperate for food, grasshoppers will damage evergreen and deciduous trees and shrubs in shelter belts and ornamental plantings around homes.



to be a shepherd – **now you get to lamb**

Starting a new small flock can be very fulfilling and profitable – if managed correctly.

The reality is lambing begins at the end of 140-155 days of gestation. Certain techniques can make it all easier – especially for those who work off-farm during the day.

Most flocks breed in the fall and lamb in the spring with shearing preceding lambing, but the timing in small flocks can vary according to resources. Often, lambing is completed just before the flock can move out to pasture and benefit from the nutrients in new green grass.

Before lambing

All flocks should have strong “preconditioning” health vaccination programs that include preventing introduction of diseases from outside sources. Practices like scrapie vaccinations and others can prevent low lambing percentages, abortions, low weaning weights, and other problems. It is best to have the flock in good health going into breeding, lambing, and weaning.

Rangeland sheep producers often lamb in a sheltered area that has cover and can deter predation. Predators are drawn to lambing because of the sounds and body fluids. Rangeland guardian dogs usually patrol the area and cleanup the afterbirth, reducing the predator attraction.

A week or so before lambing begins, a good practice is to gather the ewes and clip dirty wool away from their udders and birth canal to allow for good hygiene. This should be done gently since these are expectant mothers. In addition to trimming these dirty “tags” of wool, consider providing ewes some high-protein, high-passage rate feeds to provide energy and relax their digestive tracts, which aids lamb delivery. This is called “flushing.”

Provide shelter, if possible

Those with smaller flocks are often advised to use sheltered pens for lambing since they provide ready access to the sheep, protection from weather, and a central location to feed ewes as well as any lambs that may need a bottle.

Expecting ewes are often held in a barn that has small enclosures of 12-16 square feet. The ewe can be moved there when starting to lamb. These small enclosures, referred to as “jugs,” should have movement lanes between them. The jug will allow the ewe to claim and clean the lamb(s) without interference.

This set-up is crucial for first-time ewes, which may require some management before they demonstrate good maternal instincts. First-time ewes may need to be tied or coaxed to allow lambs to suckle. Once lambs nurse several times and pass feces, their smell will be recognized by the ewe and natural “claiming” usually occurs.

If the ewe has a hard udder or cannot support all her lambs, lambs may need bottle fed. These are often referred to as “bum” lambs. The lambs will need a stand-in “ewe” to feed them. The “ewe” can be a human or a ewe that recently lost her own lamb. Some small flock owners provide bottles to all lambs for the first two days to give them a jump-start.

Crucial components

Warm, dry, and suckling are the magic components to profitability.

For hygiene reasons, many producers dress the umbilical cord of the new lambs with iodine tincture so it dries up and does not get infected from surrounding sources. Regularly cleaning manure from the lambing area reduces disease risks. Clean bedding also assists comfort and warmth.

Keeping new lambs and ewes warm during this stressful period is crucial. Chilled lambs or ewes can be warmed by hanging a heat lamp over the jug. Try to keep wind currents

limited in lambing sheds and provide dry bedding as much as possible.

If a ewe does not clean a lamb in the first hour, consider toweling the lamb off but do not interfere with the ewe’s access. Some ewes take issue with humans near their lambs. Move quietly and calmly, keeping the lamb between you and the ewe so she can both see and smell it. Limit lambs and ewes interaction with others until the mother-lamb relationship is stable. A ewe must have three to six days to form a strong bond with her lamb(s).

During the delivery process, make sure the ewe expels the afterbirth and cleans it up if possible. Hormones within the material partially trigger lactation production and begin the new breeding cycle, which guarantees operation profitability. If it does not expel, contact your veterinarian or a knowledgeable sheep producer.

Ewes with lambs should be kept under shelter for at least two days. During severe or wet weather, consider two to four days. Once that period passes, move the ewes into pens with no more than 10-20 other ewes. Ewes and new lambs can get a little confused in large crowds and not find each other for feeding. They can be moved to a bigger group after 10 to 14 days.

A producer should study-up to recognize delivery processes, birthing challenges, and other problems with lambs and ewes.

Feed needs

A ewe’s dietary needs are heaviest in the last trimester of gestation and the first 60 days of lactation. The growth and strength of the lambs depend on her condition. Feed her well.

Clean water, minerals, quality hay, and protection from predators should be combined with some quality feed supplements. These all help prevent metabolic imbalances that can be a threat to the livestock. It is not unusual for experienced healthy ewes to support two to three young if fed sufficiently.

Some practices such as feeding in the evenings stimulate lambing in the mornings when light is better and temperatures may be higher (rather than middle of night). Some innovative small flock owners are artificially inseminating their ewes so most lamb on weekends. This takes some more effort. Usually, small flock owners will check their lambing sheds four to five times each day.

Goats and kidding

Goat flocks have many similar practices to sheep lambing except we refer to it as “kidding,” they seldom need to be tag sheared, and the vigor of their kids is usually more pronounced than sheep in the first two weeks. Goats also gestate from 148-152 days. Confinement for goats may require higher panels since they are very agile.

Please feel free to contact me if you have questions about livestock production techniques.

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No kidding (couldn’t help ourselves), ask **Scott Cotton** questions. He is a University of Wyoming Extension educator serving Natrona, Niobrara, and Converse counties. He can be contacted at (307) 235-9400 or scotton1@uwyo.edu.





Watch your ash because the **EMERALD ASH BORER** could sneak into Wyoming

Emerald ash borer infestation in Wyoming is not a matter of if, but when.

The pest has caused destruction of hundreds of millions of ash trees in at least 37 states and several Canadian provinces.

Emerald ash borer (EAB) has been found as close as Larimer, Boulder, and Adams counties, Colorado, and on the eastern sides of South Dakota, Nebraska, and Kansas. EAB was first identified in Boulder in 2012, but based on the level of infestation at that time, researchers there believe it could have been in Colorado as early as 2007. Colorado has since decided not to actively participate in control measures, which could contribute to future dispersal and infestation.

Cheyenne will most likely be the location for our first infestation because of its proximity to Colorado and the amount of traffic between our states; however, this does not exclude other Wyoming communities because firewood transportation is a real and effective method of dispersal. For more information on how transporting firewood

can easily disperse pests, check out this web site: <https://www.dontmovefirewood.org/>.

The emerald ash borer is a pretty little green buprestid (or jewel) beetle native to northeastern Asia that feeds on all ash species. Little was known about EAB when first discovered in Michigan in 2002, and it is believed to have arrived in the United States via wooden shipping crates.

EAB is not in Wyoming, so why worry about it?

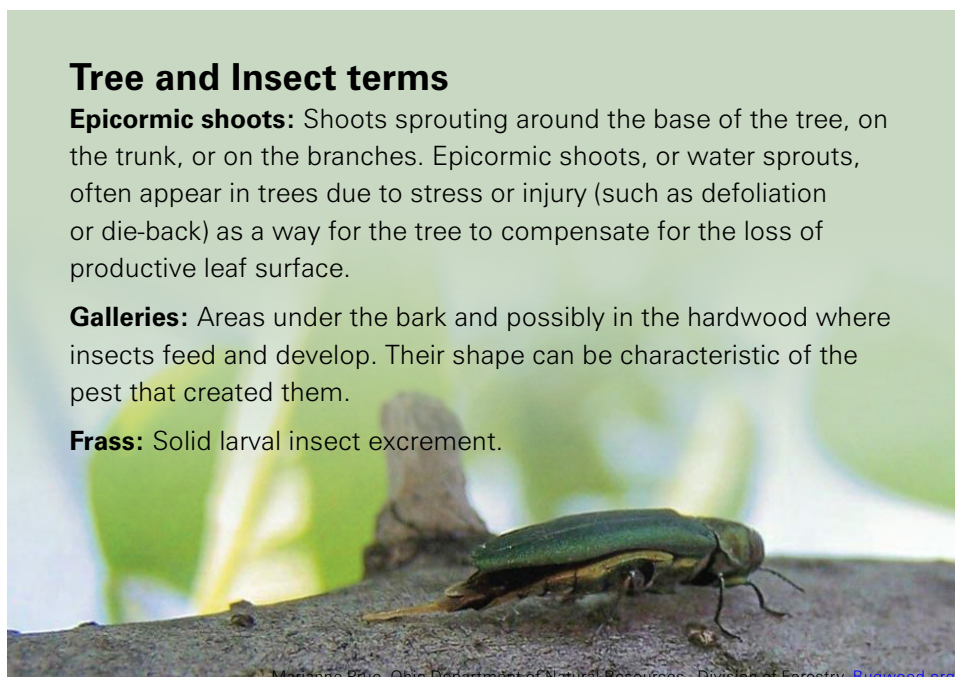
The USDA Forest Service characterizes Wyoming urban forests (street trees) as particularly important because they represent the only forests in some areas of our state. Each urban tree provides a variety of benefits, including moderating wind, heat, cold, and other weather effects.

Tree and Insect terms

Epicormic shoots: Shoots sprouting around the base of the tree, on the trunk, or on the branches. Epicormic shoots, or water sprouts, often appear in trees due to stress or injury (such as defoliation or die-back) as a way for the tree to compensate for the loss of productive leaf surface.

Galleries: Areas under the bark and possibly in the hardwood where insects feed and develop. Their shape can be characteristic of the pest that created them.

Frass: Solid larval insect excrement.



Marianne Price, Ohio Department of Natural Resources - Division of Forestry, Bugwood.org

These trees also beautify and add value to the areas we see every day. In a statewide survey conducted between 1991 and 1996, Wyoming's urban forests in 37 communities included 108,000 trees valued at over \$115 million (remember these data are from nearly 25 years ago). Due to the nature of Wyoming (high elevation, arid climate, and persistent wind), our urban forests lack the diversity to resist significant weather events and/or pest impacts.

Just three tree species – cottonwood, blue spruce, and green ash – comprise 44 percent of all street trees in Wyoming. Any natural disaster, insect, or disease problem affecting any of these three species would have a big impact on most Wyoming towns. For more information on this study, please visit bit.ly/wyoforesthealth.

Although the adult emerald ash borer beetle (*Agrilus planipennis*) causes slight damage by feeding on leaves, it is most destructive when the eggs hatch and larvae enter the tree through crevices in the bark and begin feeding under the bark. The larvae tunnel and feed on the hardwood and the inner living tissues (cambium) of the tree. Their feeding damage disrupts the tree's ability to transport water and nutrients, which, depending on the level of infestation, will kill the tree.

Signs of EAB

The only visual surface injury specifically characteristic of EAB is D-shaped emergence holes in the bark. The larvae will pupate under the bark and then molt to the adult stage. The adult will then chew an exit hole through the bark on branches or the trunk in late spring. Adults have wings and can fly up to 6 miles from host trees, but research



Crown symptoms in ash following attack



Epicormic shoots.



Emerald ash borer "galleries."

suggests they usually stay in an area where host trees are present.

EAB exit holes will be D-shaped and small (1/8 of an inch). Early infestation exit holes can be difficult to spot from the ground as emerald ash borer tends to infest the upper portions of the tree first.

Other symptoms of infestation (but not limited to EAB) may include:

- Thinning canopy
- Vertical splits in the ash tree bark
- Presence of woodpeckers
- Epicormic shoots – Shoots arising directly from the trunk or base or as a cluster of side shoots from a branch of the tree instead of normal growth from twigs on branches.

Removing the bark you may also see:

- EAB galleries will be frass-filled and s-shaped (serpentine) just beneath the bark or etched into the underside of the bark. This is a definite sign of EAB infestation. The larvae are white to cream-colored, legless, flattened, 10-segmented, 1 to 1 1/2 inches long, and found in the galleries beneath the bark of living ash trees.

Monitoring in Wyoming

USDA APHIS (United States Department of Agriculture Animal and Plant Health Inspection Service), in cooperation with state natural resources agencies and others, has instituted an EAB survey to identify the leading edge of known infestations and to find new or outlying populations. They use purple prism traps baited with a green leaf volatile lure.

Purple prism traps are not available to landowners, municipalities, or individuals.



Ash trees that like our weather

Worried you might have a tree at risk? Here's a list of common ash trees in Wyoming. Ash trees are in the *Fraxinus* genus within the olive (*Oleaceae*) family of woody plants (minimum of USDA Zone 5):

- Black ash (*Fraxinus nigra*)
- Green ash (*Fraxinus pennsylvanica*)
- White ash (*Fraxinus americana*)
- Blue ash (*Fraxinus quadrangulata*)
- Narrow leaf ash (*Fraxinus angustifolia*)
- Pumpkin ash (*Fraxinus profunda*)

Mountain ash is unrelated to true ashes of the genus *Fraxinus* and are not susceptible to emerald ash borer. Mountain ash (genus *Sorbus*), is included in the genus of several shrubs or trees in the rose family (*Rosaceae*).

Management strategies of EAB-infested states include the use of quarantines, tree removal, and pesticides. The long-term management option includes research and development of ash varieties that can resist emerald ash borer. Many of the ash species in Asia are resistant.

A great online resource packed with EAB facts and maps of the distribution and spread of this beetle is the Emerald Ash Borer Information Network (<http://www.emeraldashborer.info>). This website is a collaborative effort between multiple universities and the USDA/APHIS.

So what to do in the meantime? Continue to plant a variety of trees. Getting trees to establish and

grow in Wyoming is challenging between the wind, hail, drought, insect pests, rodents, deer, and human-induced issues. But there is hope. Suggestions for trees suited for Wyoming conditions are at <https://bit.ly/wyolandscaping> under Trees & Shrubs - Choosing Types. Get'em in the ground and get'em growing.

.....
We imagine **Jeff Edwards** with arms crossed standing watch for emerald ash borers on Wyoming's southern border. Edwards is the University of Wyoming Extension's pesticide training coordinator and can be reached at (307) 837-2000 or at jedward4@uwyo.edu.



BEST OF BOTH WORLDS!

Beauty for the eye, flavor for the table

Making time for the things we enjoy most is important in a world so jam-packed with activities and responsibilities. For some, that might be gardening.

Watering and weeding, watching the little babies blossom into mature plants can be so enjoyable. With limited time and resources, sometimes we feel like we have to choose between growing flowers for aesthetics or produce for eating. Edible flowers can give growers the best of both worlds.

Nasturtium

Nasturtiums are a delightful versatile annual (complete their growing cycle in one season) for any landscape setting. They can be planted in window boxes, planters, raised beds, or straight into the ground, and some varieties are even climbers. They are a wonderful cross-over plant for the grower purely interested in garden aesthetics and the grower interested only in growing plants for consumption.

Nasturtium flowers tend to be yellow, orange, or red, and have green, circular leaves. They enjoy full sun (at least 6-8 hours), yet can tolerate part shade, especially if the shade is giving them a reprieve from hot sun. Some varieties have flowers

that set above the circular foliage, but other varieties are more prone to bury their flowers under the foliage; however, the flowers and leaves respond well to deadheading and leaves can be trimmed to ensure the flowers are more visible.

These plants can handle lower quality soils; in fact, if the soil is too rich, the plants tend to produce more rich, green foliage and fewer blooms. Nasturtium seeds are big and easy to

handle, which makes direct seeding in the ground a breeze and actually what they prefer. The biggest concern is keeping the plants well-watered throughout the season due to their shallow root systems.

Nasturtiums can be used in salads, pastas, or stir-fries with vegetables. The flowers can even be stuffed with herb spread. Nasturtiums seeds can also be ground, dried, and used as a pepper substitute, to flavor cooking oil, or as an interesting addition to custom meat rubs.

Flowers, flower buds, leaves, and stems of nasturtiums should be harvested in the morning. Taste deteriorates as the day wears on. Like many edible plants, the same is true for young leaves opposed to old; the quality deteriorates as the plant ages. The harvested parts should be gently washed and dried and then consumed as soon as possible if eating fresh. The flower is stronger in flavor than the leaves, which tend to be milder.

Nasturtiums provide a beautiful burst of color to the garden and to the salad bowl as well as giving many recipes a delicious kick. Because they are easy to grow and care for, they present both gardener and chef with infinite possibilities.



Dandelions

Most people are familiar with dandelions as a pesky lawn and garden nuisance, but they are also edible flowers. Before harvesting flowers, know what has been applied to them, especially dandelions. Dandelions are more likely to have been treated with pesticides due to their status as common lawn weeds, or fertilizers because of their location within turf lawns.

Dandelions have three consumable parts: leaves, flowers, and roots. Leaves can be used in tossed salads. Although the leaves can make up the entire salad, its best to mix them with other greens. Dandelion leaves alone can be quite bitter, and like the nasturtiums, younger is better. The greens can be sautéed to help eliminate some of the bitter taste. Sautéed greens can be eaten alone or added to other dishes like pasta for a more complete entre.

Since dandelions tend to bloom all at once, the heads can be popped off, washed, and frozen to be used later. Heads can be dropped in a flour, egg, and milk batter and fried as dandelion fritters. Petals off the heads are more often used in baking recipes. Interested in giving dandelions a taste test? Give the dandelion cookie recipe at the right a try.

Marigold

Not all marigolds are edible, so it's important to know the difference. Generally, the taller species have large heads and are not edible. The smaller, signet marigold flowers are edible and have small heads and lacey foliage. Tags and labels at greenhouses should indicate the

species. If unsure, err on the side of caution and do not eat them. Like other marigold species, they are relatively disease resistant and don't seem to be sought after by deer or rabbits.

Signet marigolds make wonderful edge plants because of their stature and more delicate-looking foliage. There are many varieties with colors ranging from orange to yellow, to rust, or a combination of the three. Their pleasant light lemon-verbena scent is released when brushed-up against or disturbed by people walking along the garden edge.

Flower taste can vary from a light citrus to more spicy tarragon-like taste. The whole flowers or just the petals can be used. In addition to taste, sprinkling the petals on a dish can add a bit of a citrusy aroma.

The three flowers listed here are just a sampling of edible flowers available to grow and harvest in our Wyoming climate; there are many more to choose from. This list is from the University of Minnesota Extension <https://extension.umn.edu/flowers/edible-flowers>. Just keep in mind the importance of proper identification and that just because a flower doesn't make you sick (edible), doesn't mean it's delicious to eat. Also those with pollen allergies should be cautious.

.....
We're reminded of a popular movie "Please Don't Eat the Daisies." We'll ask **Abby Perry**, a University of Wyoming Extension educator and an editor of this magazine, if daisies are on her list of edibles. You can contact her at (307) 328-2642 or ajacks12@uwyo.edu.

Dandelion Flower Cookies

½ c. coconut oil

½ c. honey

2 eggs

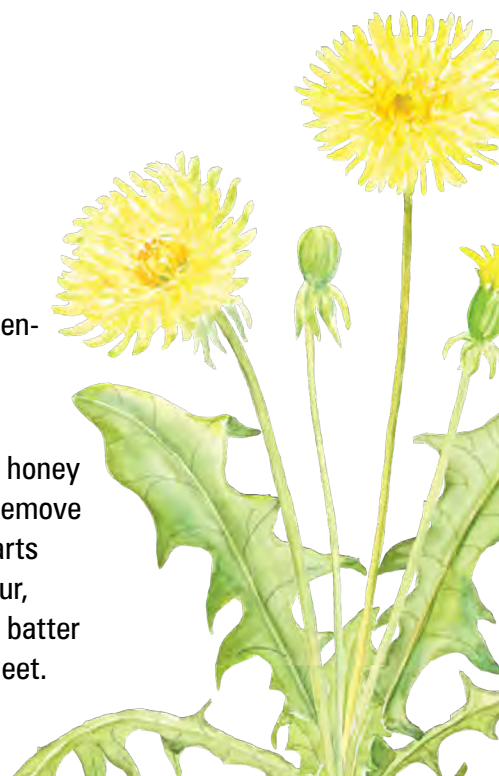
2 tsp. vanilla extract

½ c. dandelion flower petals

1 c. unbleached, unbromated flour or gluten-free flour mix

1 c. dry oatmeal

Preheat oven to 375. Mix coconut oil and honey and then beat in the 2 eggs and vanilla. Remove the yellow flower parts from the green parts (compost the green waste). Stir in the flour, oatmeal, and dandelion flowers. Drop the batter by tablespoonfuls onto an oiled cookie sheet. Bake for 10-15 minutes. Cool and enjoy!





Prevention is key to keeping mosquito-borne diseases at bay

West Nile virus is the main mosquito-borne disease of concern in Wyoming.

First detected in North America 20 years ago, Wyoming ranks 17th in the number of disease cases reported to the Centers for Disease Control and Prevention (CDC) between 1999 and 2018. It is estimated West Nile resulted in nearly \$800 million in human medical costs from 1999-2012 in the U.S. There is no vaccine or antiviral treatment for humans infected by West Nile virus. Only 20 percent of infected people will exhibit symptoms such as joint pain, vomiting, headache, body ache, weakness, fever, and stiffness.

The cost, prevalence, and asymptomatic features of West Nile

virus require us to rely on diligent prevention. Even though West Nile virus cases have decreased significantly in Wyoming since the peak number of cases in 2003 (Figure 1), personal protection and education are the best ways to prevent contracting West Nile virus.

Ways to reduce contracting diseases

Following the “D’s” of prevention is the best way to limit exposure to all mosquito diseases, including West Nile virus.

Drain

Three of a mosquito’s four life stages require water. Removing any egg-laying habitat will reduce the mosquito population significantly.

Special attention should be given to standing water in areas such as old tires, buckets, gutters, boat covers, and potted plant containers. These sources of water should be emptied at least once per week to prevent eggs from hatching.

For larger sources of water such as ponds, water tanks, and drainage areas, *Bacillus thuringiensis israelensis* (Bti), a bacterial protein, is often used. It is active only on mosquito larva and does not impact other aquatic organisms when applied as directed.

Dress

This prevention measure will likely not agree with those of us wanting a nice summer tan; however, most mosquito bites can be prevented by

wearing long-sleeved shirts, long pants, socks, and shoes. These items should be light-colored and loose-fitting but made of tightly woven material. Several clothing brands offer hats, shirts, and pants specifically for repelling insects. These clothes are typically treated with an insecticide called permethrin and should be worn and laundered as directed. You can also treat your own clothes with permethrin, but it should not be applied directly to skin.

Defend

Mosquito repellents should be registered by the Environmental Protection Agency (EPA) and include at least one of the following active ingredients: DEET, picaridin, IR3535, oil of lemon eucalyptus, para-menthane-diol, or 2-undecanone. To be most effective, repellents must be applied according to the label directions. The EPA provides a tool to help determine the best repellent for your needs: <http://bit.ly/rightrepellent4U>.

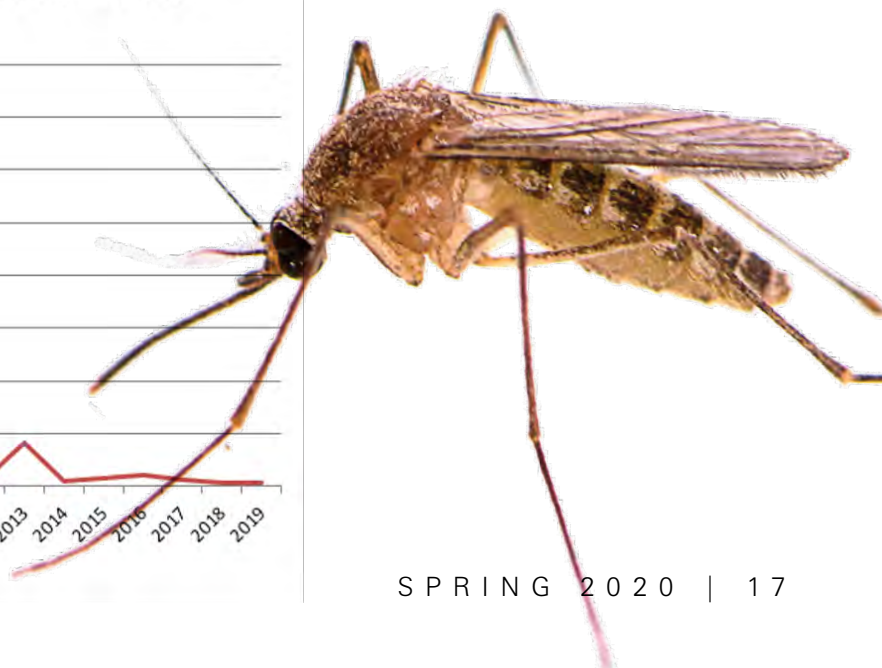
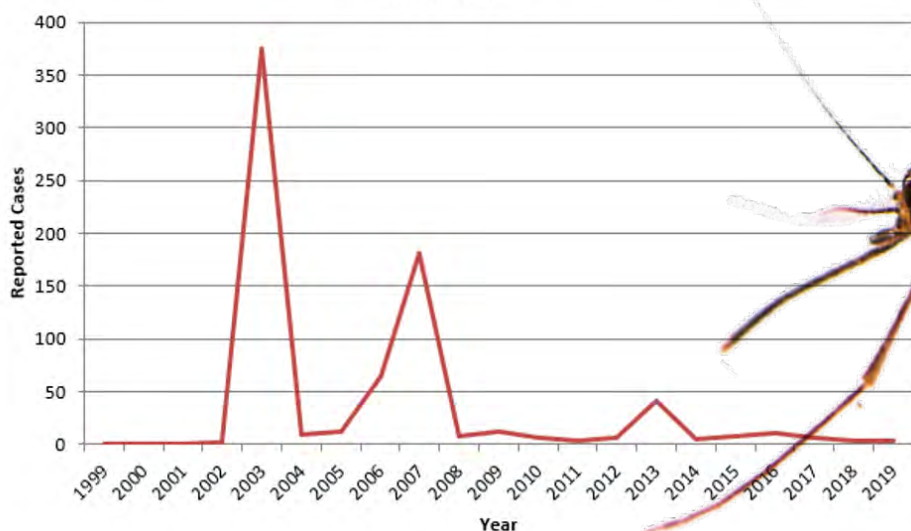


Humans aren't the only animals susceptible to mosquito-borne diseases

Mosquitoes are responsible for transmitting heartworm disease from one infected animal species to another. Heartworm disease impacts animals such as dogs, cats, foxes, ferrets, seals, and bears. Dogs are affected most severely by heartworm disease as they are the "definitive" host which means the adult parasitic worms complete their life cycle within the dog. While disease incidents are highest in the southeastern U.S., it can be found across the entire country. Incidents are relatively low in Wyoming, but be particularly cautious if you travel with pets and consult your veterinarian with any concerns.

Horses are another animal impacted by mosquito-borne diseases. Various types of encephalitis, such as western equine encephalitis, and West Nile virus can be fatal to infected horses. Vaccinations are available and recommended for equine in Wyoming.

**Reported Cases of West Nile virus in Wyoming
1999-2019**



Dawn/dusk

We know different species of mosquitoes transmit different diseases. They also prefer different habitats and feeding times. The *Culex* mosquito (which is the mosquito that transmits the West Nile virus) is most active at dawn and dusk. To reduce exposure to this particular disease, avoid the outdoors during these times or be sure to dress and defend appropriately.

Unfortunately, other mosquitoes in the area are daytime feeders and prefer to bite humans rather than other mammals such as birds and horses. While they may not

transmit disease, other mosquitoes in the area are active during the daytime and prefer to feed on humans rather than other animals. It is recommended to follow the other “D’s” to prevent bites from any mosquito.

Several municipalities and weed and pest districts monitor larval and adult populations of mosquitoes in their local areas. Adult mosquito collections are typically tested for the presence of West Nile virus. Those results are updated weekly during the summer on the Wyoming Department of Health website, badskeeter.com.

Additional information about testing, control measures, and prevention techniques against West Nile virus are available from your local public health department, municipality, or weed and pest district.

Always remember to **drain, dress, and defend – dawn/dusk**.

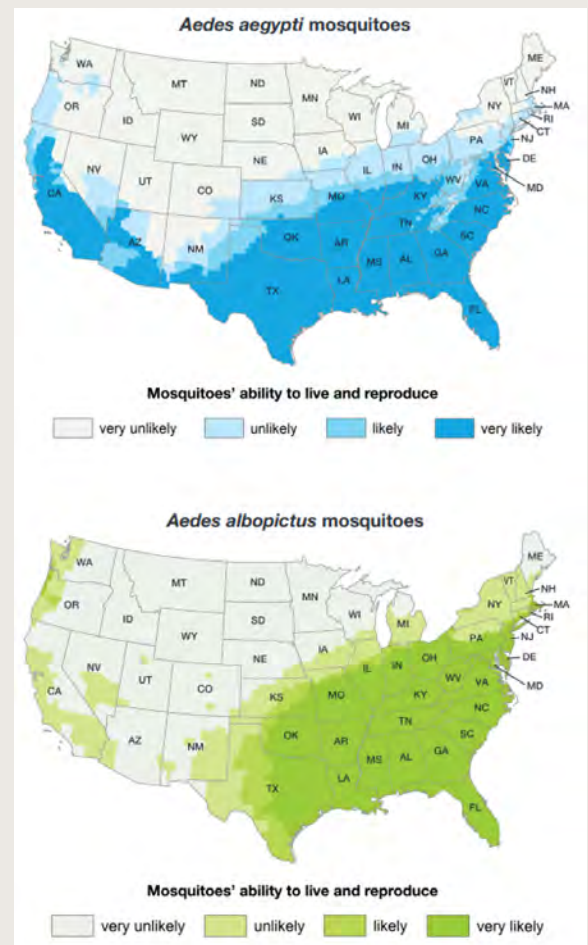
.....
We’re glad **Jenna Meeks** knows her bad skeeters (is there a good one?) and is on our side! She is the assistant supervisor with the Goshen County Weed and Pest Control District. She can be reached at (307) 532-3713 or at gocoweeds@gmail.com.

Cooler climate buffers Wyoming from many disease-carrying mosquito species

Malaria, chikungunya, yellow fever, dengue fever, Zika virus, and West Nile virus are all potentially fatal diseases transmitted by mosquitoes. Fortunately, due to our relatively unfriendly habitat, only 50 of the world’s 3,000 mosquito species call Wyoming home, where West Nile virus is the disease of concern.

The Asian tiger mosquito (*Aedes albopictus*) and the yellow fever mosquito (*Aedes aegypti*) are responsible for carrying dengue, yellow fever, chikungunya, and Zika viruses. Malaria is spread by certain species of the *Anopheles* mosquito, which are widespread throughout the world.

Substantial attention was given to the Zika virus outbreak in 2016. Zika was first found in monkeys in 1947 and mutated to affect humans with the first case documented in 1952. Even though the mosquito species known to transmit Zika virus are not found in Wyoming at this time, travelers should be cautious. Travel to areas where the vector species are present, such as the southeast U.S. seen in maps to the right, is a concern. Since humans can also transmit the Zika virus, the range of infection is much larger than West Nile virus.



A photograph of a wheel line irrigation system in a green field. A long, dark metal pipe runs from the foreground into the distance. In the foreground, a vertical riser pipe with a valve handle is visible. Several nozzles along the line are spraying water into the air. In the background, there are rolling hills or mountains under a clear sky, and a small building is visible on the right.

Getting the most from your wheel line or hand line irrigation system

Many wheel lines and hand lines still exist across Wyoming despite introduction of other less labor-intensive irrigation methods. These methods can still be an effective way to irrigate when used properly and maintained regularly.

First things first

Let's compare soil to a sponge to better understand the soil-water relationship. Water runs out when you lift a sponge out of a sink. The sponge has reached its water-holding capacity once it stops dripping. This is known as "Field Capacity" (FC). The water-holding capacity of soil is most greatly influenced by soil texture, or the size of the soil pores (the airspace in the soil). A sandy soil, for example, holds less water than a clay soil.

Now let's think about a sponge when you are done washing. There is some water left within the sponge no matter how much you wring. In soil terms, this is referred to as the "Permanent Wilting Point" (PWP). The PWP is the point where water is left in the soil but plants are unable to extract water from the soils and eventually die. The water that remains in the sponge for this example is known as "unavailable water."

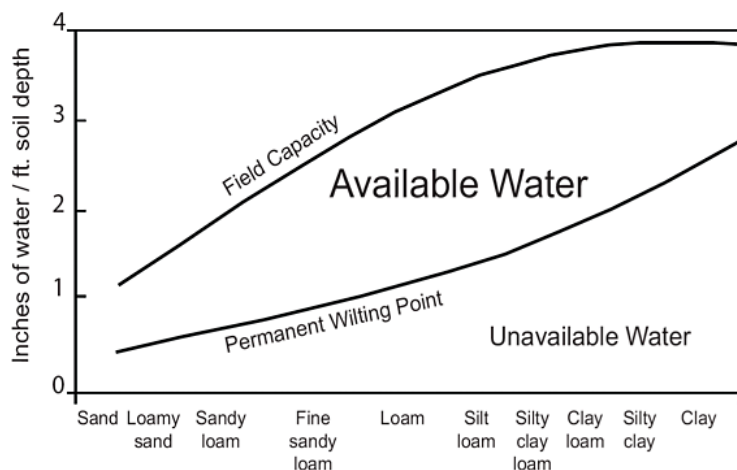


Figure 1. Relationship between available water and soil texture. (Ohio Agronomy Guide, 14th Ed. Bull. 472-05)

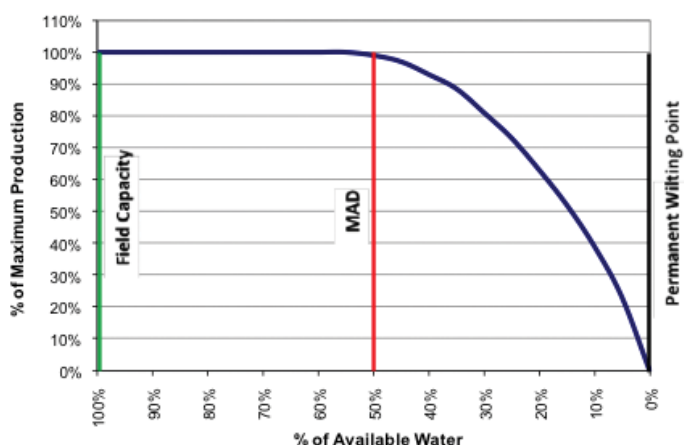


Figure 2. A generalized curve showing how plant production (growth) is affected by soil water stress. (Peters, 2011)

The water in the soil between Field Capacity and Permanent Wilting Point is the “Available Water.” Figure 1.

One has to squeeze harder and harder to keep removing water from the sponge. Plants also face this same challenge, and there comes a point where plant production begins to drop off due to this stress. This is referred to as the “Management Allowable Depletion” (MAD). Figure 2.

While MAD is typically figured at 50 percent of the Available Water, the shape of the curve and the MAD

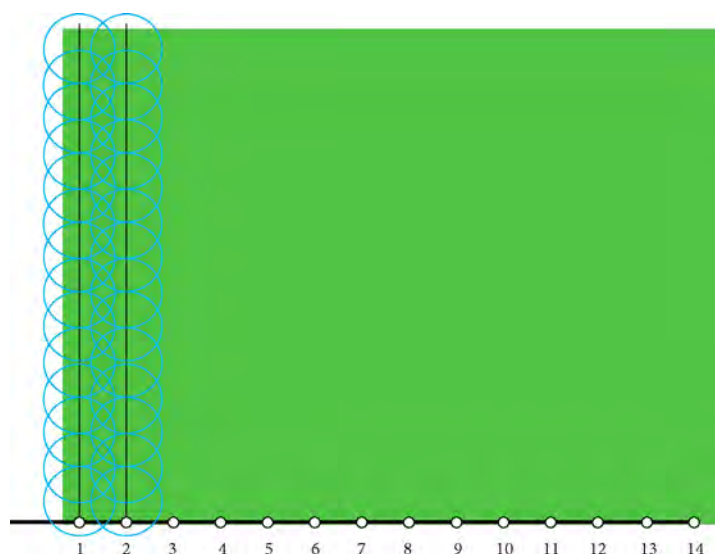


Figure 3. Typical overlap of each set on a TAXI pattern. (Peters, 2011)

does vary by crop, soil type, and the capacity of the irrigation system to replace soil moisture.

So what does this mean for irrigation?

The goal is to apply enough water to keep the soil above MAD while avoiding run off or deep percolation before the irrigation system is moved to the next location. For moving wheel lines and hand lines, the three commonly used methods include TAXI, WIPE and SKIP, in Intervals of 12 or 24 hours.

TAXI: A field is irrigated using every riser (the point where the hand line or wheel line connects to the main water line), and once the system reaches the end of the field is “taxied” back to the first riser and the process begins again. This is very labor-intensive. Hand lines are typically loaded onto a trailer and hauled back to the first riser. Figure 3.

WIPE: Begins the same as TAXI, but upon reaching the end of the field, the irrigator waits 12-24 hours and the process begins again in reverse. This avoids having to move the whole system back to the beginning, but it



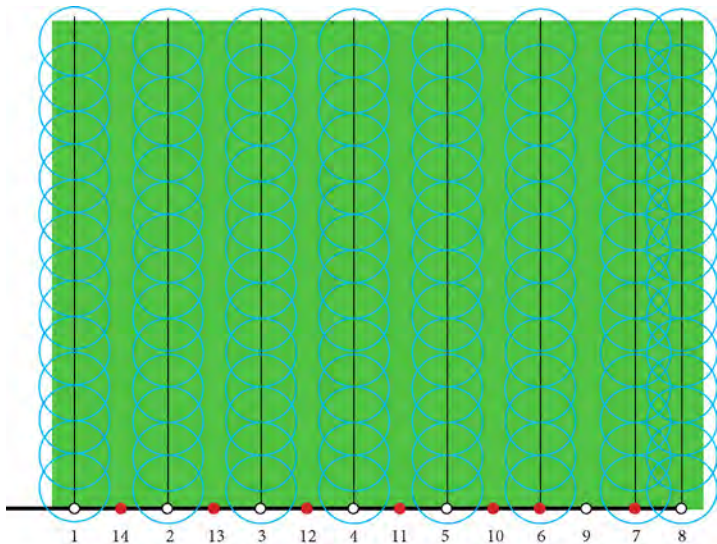


Figure 4. The SKIP pattern showing the process of skipping risers and using them on the way back. (Peters, 2011)

results in excess water application followed by long periods of water stress at the ends of the field.

SKIP: Every other riser is used going down the field, and then the alternate risers are used on the way back. Benefits to this pattern include:

1. Eliminates excess watering and long dry spells on field ends as found with the WIPE method.
2. Labor is more spread out than in the TAXI method.
3. The likelihood of overwatering is reduced as the overlap between irrigation sets is eliminated. The result is more frequent, but smaller, irrigations and water stress and water loss due to deep percolation or runoff.

Using an offset of 20-30 feet off the riser is another strategy to increase uniformity (Figure 5). This offset would then be continued through one whole cycle. The next cycle could be offset to the other side, or back to the riser. The more uniform application of water over time created by the shift in position ensures equal water for all plants. A hand line can also be offset using a short pipe and an elbow.

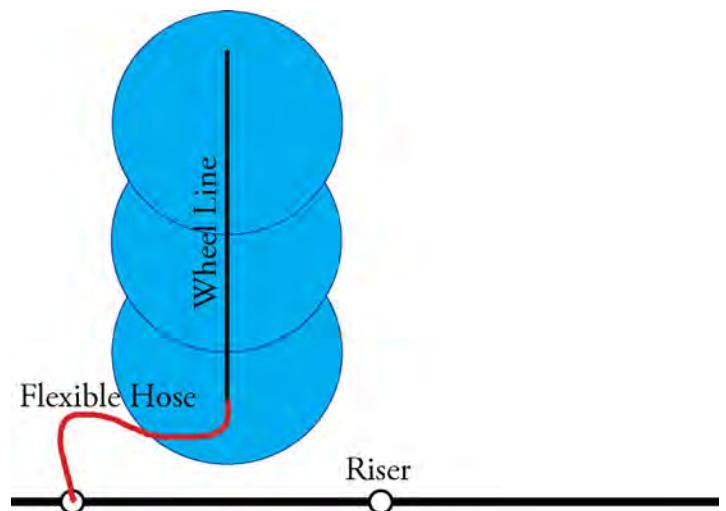


Figure 5. Using an offset to increase uniformity. (Peters, 2011)

Maintenance

The most important maintenance happens immediately after a hand line or wheel line is turned on. Watch the system pressurize and ensure each sprinkler is spraying and spinning properly. A short piece of stiff wire is a great tool for clearing any clogged sprinklers.

Check for leaks that might indicate a worn or broken gasket, clamp, hose, sprinkler, etc. Leaks can be significant and will affect the performance of the system. Be sure to follow manufacturer guidelines on proper maintenance for the drive system.

Lastly, properly securing the wheel line during winter is important. This is usually done by tying it securely to several posts along a fence line. Hand lines can be stacked together off the field and out of the way.

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We're wondering if **Caleb Carter** ran through lawn sprinklers as a child? He is a University of Wyoming Extension educator serving southeast Wyoming and can be reached at (307) 532-2436 or at ccart13@uwyo.edu.

For more information

Managing Wheel-Lines and Hand-Lines for High Profitability. Washington State University Extension, <http://bit.ly/wheelmovemanage>

Wheelmove Sprinkler Irrigation Operation and Management. Utah State University, <http://bit.ly/wheelmoveoperate>

Maintenance of Wheelmove Irrigation Systems, Utah State University Extension, <http://bit.ly/wheelmovemaintain>

Understanding temperature inversions, mitigating pesticide drift – and maintaining friendly neighbors

True or false: ***Applying pesticides is always safer when there is a 2-mile per hour wind than when the wind is blowing 20 mph?***

Read on to find the answer.

Landowners take pride in their windbreaks and flower and vegetable gardens; they strive to ensure peak performance each year. One step a landowner might take to maximize growth is applying an appropriate pesticide to help battle pesky weeds or insects. This use is meant to provide benefits to plants we want to grow, but sometimes the weather can increase the chance of unintended damage to plants.

In our example, the landowner reads the label (which includes laws related to the appropriate application) and sees it says “potential pesticide drift is lowest between wind speeds of 2 to 10 mph” – depending on any number of variables such as droplet size and application equipment. Drift is when a pesticide moves through the air after you spray it and lands somewhere you didn’t intend it to. It’s easy to see how drift would happen when windy.

However, less easy to understand is when the landowner

goes on to read that the pesticide should not be applied during a temperature inversion (TI), because “drift potential is high” during these conditions.

What is this about?

A temperature inversion is when stable layers of air, with different temperatures, are created close to the earth (like a sandwich). With a temperature inversion, pesticide droplets might not be able to penetrate the cooler, denser air, which is closest to the ground. The slightest air movement can cause pesticides to move sideways through the air rather than down onto the weed or insect we are interested in controlling.

Let’s take a closer look at each ingredient in a temperature inversion to better understand when one could develop – and help landowners protect windbreaks and other adjacent vegetation from pesticide drift.

Radiation from Earth

In general, we think about the Earth’s surface and objects that cover it (buildings, plants) as being

warmer than the air or atmosphere high above us; however, when objects on the Earth’s surface lose heat, they emit long-wave radiation, which warms the air, and as the warm air rises, the air closer to the ground cools – resulting in one of the key ingredients to creating a temperature inversion.

Take a moment to think about a 24-hour day – when might the Earth’s surface begin to cool? Depending on the day, this varies; however, the lower the sun is in the sky, the less direct short-wave radiation we receive to continue to heat or maintain the warmth of the Earth – especially at Wyoming latitudes.

Cloudless to near-cloudless skies

Cloudless or near-cloudless skies is the second key ingredient. Ever notice when there is cloud cover at night, the outside temperature remains warmer than nights when there are little to no clouds?

Why?

Cloud cover serves a similar role to a bed comforter – the comforter holds the warm air, coming from your body, next to you – resulting in more

The recipe for a temperature inversion is:

Radiation from either the Earth or objects on the Earth’s surface into the sky + Cloudless to near cloudless skies + Light to no wind = Temperature Inversion



warmth than when the comforter is off. Similarly, clouds block the escape of the long-wave radiation resulting in warm air staying closer to the Earth's surface. However, when there are few (for example, 25 percent or less) or no clouds, the radiation continues to travel farther into the atmosphere resulting in a cooling of the air closer to the Earth's surface.

Light to no wind

To recap: the first two key ingredients of a temperature inversion are the Earth's surface and objects covering it cooling down as long-wave radiation is emitted from them into the sky, and 25 percent or less cloud cover; however, sufficient wind can prevent a temperature inversion or weaken one already formed by mixing the air.

You might ask, what is considered sufficient wind to prevent or disrupt a TI? As with many things, it depends – and will vary based on different variables. The short answer is temperature inversions can form and persist when there is 0 to 3-mph winds – and typically, a TI is stable enough to withstand 4 to 5 mph winds.

A good rule of thumb is if it seems like a stellar time to spray pesticides, take a moment to think about whether the Earth's surface is cooling – or will start to cool soon – and how much cloud cover exists, then evaluate wind speed. If planning to spray for quite a while, remember to monitor the conditions as they evolve throughout the day. It may be safe to spray now, but as the sun moves lower in the sky later in the day (which results in less direct short-wave radiation from the sun to warm the Earth's surface and objects

that cover it), conditions may cause a temperature inversion to develop.

Throw it all in the mix – and what happens ...

Wyoming's climate affords a very short growing season and in many places the wind frequently blows above 10 mph. We tend to want to get outside as soon as conditions appear favorable to apply pesticides; however, we must be able to identify when a temperature inversion has developed or has the potential to develop – because a TI can be a more dangerous pesticide drift culprit than high winds.

And to answer the question at the beginning of this article, applying pesticides with a 2-mph wind during a temperature inversion can be less safe than applying them when there is a 20-mph wind.

But why is spraying pesticides when a temperature inversion is forming or has formed more dangerous? Cooler air closer to the Earth's surface is denser than the warmer air it replaced – and with little to no wind this layer of air remains stable from vertical flow; however, horizontal or laminar flow usually still occurs.

The dense air is able to suspend spray droplets, such as pesticides, while the horizontal airflow moves the droplets away from the intended target – sometimes many miles away. Many variables influence how long a spray droplet will be suspended, including droplet size and rate of evaporation.

The key takeaway is never apply a pesticide when there is a temperature inversion or risk of an inversion forming.

Consider when the worst time of day to spray a pesticide might be.

The answer might not be as obvious as some people think – so let's cut to the chase.

Temperature inversions tend to develop later in the day (a few hours before sunset) and continue through the night – peaking at or a few hours before sunrise. The worst time of day to spray a pesticide (as it relates to a temperature inversion) is the few hours before sunset when the Earth's surface and the air in the lower atmosphere begins to cool. If the other two inversion ingredients are present and a TI forms – the risk of your pesticide landing off target increases, as does the potential distance for travel.

So, remember to assess and monitor conditions throughout the day to ensure you don't accidentally damage non-target species such as your wind break, someone else's flower or vegetable garden, or a neighbor's cash crop (their livelihood!).

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We're assuming **Windy Kelley** NEVER gets comments about her name and her career area. Kelley is with the University of Wyoming Extension and is the Regional Extension Program coordinator for the USDA Northern Plains Climate Hub. She can be reached at wkelly1@uwyo.edu

Additional Resources:

Enz, JW; Hofman, V; Thostenson, A. Revised 2019. *Air Temperature Inversions: Causes, Characteristics and Potential Effects on Pesticide Spray Drift*, Bulletin AE1705. North Dakota State University Extension.

Nowatzki, J., 2018. *Understanding Air Temperature Inversions Relating to Pesticide Drift*, Bulletin AE1876. North Dakota State University Extension.

Feel there is too much to do and too little time? Try some **TIME MANAGEMENT TECHNIQUES**

How we manage time and other resources has a large impact on how easily we conquer our to-do list and complete projects.

Luckily, there are some great practices that can help improve time management. These include developing a **project plan, setting priorities, thinking before acting, and planning for down time.**

Time is just one of many resources property owners and managers must allocate. Here are some strategies and ideas to help make the most of your precious time.

Time management worksheets

In his book *The Seven Habits of Highly Effective People* (1989), Stephen Covey outlines a time

management worksheet. This can help individuals, a family, or a manager and employees assess where they spend most of their time (Figure 1).

Covey encourages individuals to shift their emphasis away from activities that are not-important-but-urgent (quadrant III) or not-urgent-and-not-important (quadrant IV) to activities that are important-but-not-urgent (quadrant II).

The time management worksheet offers a good way to assess how you and others spend most of your time. Working through the worksheet helps develop a list of tasks and jobs on which time is spent and what important tasks have been completed in the past month, season, or year. Finally, spend time

discussing where each person placed the majority of his or her activities.

Resource coordination

Resource coordination involves breaking plans into specific action steps, scheduling the order of those steps, and developing contingency plans. End-point scheduling, optimist/pessimist scheduling, calendars, and Gantt and PERT charts are some of the tools for scheduling action steps.

Time management is critical for effective resource coordination. The time management matrix provides a method for thinking about how time is used and which activities might be prioritized.

Resource coordination tools

End-point (backward) scheduling

Estimating the amount of time it will take to complete a project or task and work backward to the present time is a good way to develop a schedule for activities. The use of end-point scheduling requires developing the schedule to start with the time they wish to finish a project or task rather than the time the project can start. The finish time and date is most important with this tool.

Optimist/pessimist scheduling

Under this approach, first determine the optimistic parameter. How much time would it take to accomplish the project or task if

	Urgent	Not Urgent
Important	Quadrant I Crises Pressing problems Deadline-driven projects	Quadrant II Prevention, Relationship building, Recognizing new opportunities, Planning, Recreation
Not Important	Quadrant III Interruptions, Some calls, Some mail, Some reports, Some meetings, Pressing matters, Popular activities	Quadrant IV Trivia, Busy work, Some mail, Some phone calls, Time wasters, Pleasant activities, No-brainers

Adapted from Covey (1989)

Figure 1. *Time Management Worksheet* | *Applied Risk Management in Agriculture*

Project Plan for _____

Project Steps	Date
Project completion	9/xx/XX
Step 5	7/xx/XX
task 5.2	7/xx/XX
task 5.1	6/xx/XX
Step 4	5/xx/XX
Step 2-3	4/xx/XX
Step 1	3/xx/XX
task 1.3	3/xx/XX
task 1.2	2/15/XX
task 1.1	1/10/XX
Today	xx/xx/XX

Figure 2. Example End-point Schedule

everything went well? Then determine the pessimistic boundary by asking how much time would it take to accomplish the project or task if everything went poorly. Next, an upper and lower boundary of time estimates can be set with the assumption not everything that could go wrong will go wrong and that all that could go right will not go right.

A time frame can be set and then focus attention on the time within the boundary.

Calendars

Electronic and hard copies are useful for planning out time. A desk-top calendar that depicts the entire week allows writing in when various action steps must be accomplished. A pocket calendar is not as detailed but is easily carried. A wall calendar that offers a month-by-month view provides at a glance when action

Estimated completion of early and late completion of tasks

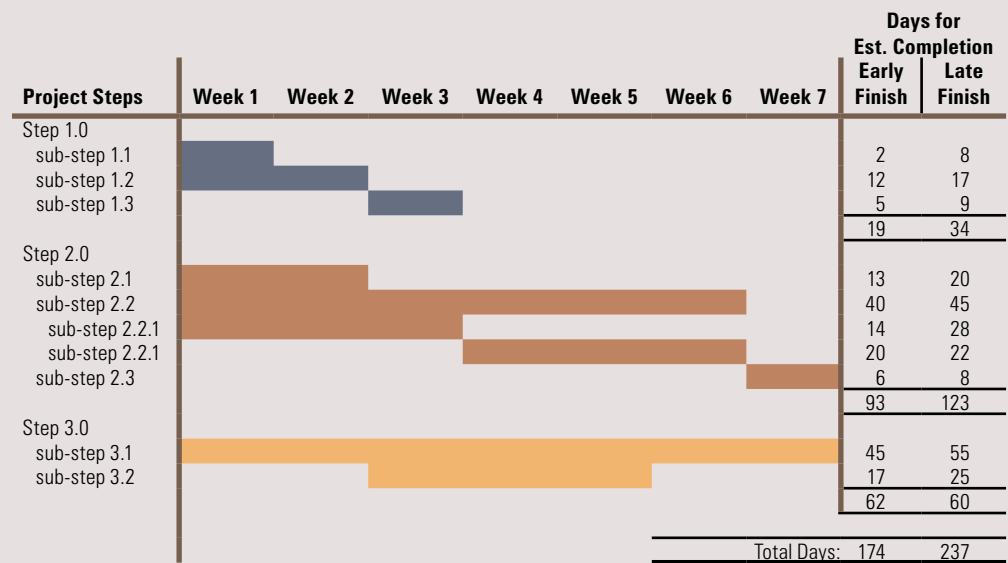


Figure 3. Example Optimist/pessimist Schedule. Bars indicate the estimated period for a particular task. Bars lie between early and late estimated finish.

Example Gantt Chart



Figure 4. Example Gantt Chart

steps should be accomplished. Day planners are more complex but allow a planner to review several projects and plan at the same time. Many calendar apps are now available for smartphones or tablets; planning tools are no more than a couple of clicks away and remain available even when in the field. However, hard copy calendars can still be

useful as a backup to technology or for those who find visualizing the flow of work easier in this format.

Gantt charts

A Gantt chart depicts the beginning and ending dates for an event, the sequencing of events, and the extent to which an event is completed. As action steps are



Time as a Resource

Fact: To control your work and your life, you must control your time.

Fact: We have all the time there is.

Fact: You cannot save time – you can only spend it or invest it.

Fact: Putting in more hours is not the answer.

accomplished, they are noted on the chart, and barriers are identified. The timing of action steps is most important in Gantt charts. The technique involves graphically laying out the sequence of steps or events that must be accomplished to complete a project or task. The time to complete each event is clearly specified, and a critical path is determined. The critical path is the longest sequence between the series of events. It is called the critical path because any delay in this path will delay the entire project.

PERT chart

The Project Evaluation and Review Technique, or PERT, presents the plan for accomplishing a particular project by outlining the steps required, the time estimated for each task, and the minimum time needed to complete the entire project. PERT was developed to simplify the planning and scheduling of large and complex projects and is more of an event-oriented technique rather than a start/completion date approach.

Action planning

The Action Planning Worksheet helps translate complex projects into

the specific action steps needed for operational planning. Operational plans can help resource coordination and tracking progress.

The Action Planning Worksheet provides blanks for specific action steps, dates for completion of each step, the person or persons responsible, and the tracking or measuring system that will be used to determine if the actions have occurred as planned.

Once filled out, the Action Planning Worksheet can be very helpful in assigning specific task responsibilities by individual and by set of activities across individuals for a week, a month, or a season of operation. In addition, the worksheet can be used to describe operational plans in the detail needed to allow active tracking of progress toward the listed objectives.

Other management resources

As noted earlier, resource acquisition and application are extremely important to the success of any enterprise; however, in some ways these represent easy aspects of management. Coordinating

resources as plans unfold takes more talent and is, perhaps, more difficult to balance.

Effective and timely communication is another important dimension to this component, as are adequate planning and consideration of possible contingencies.

Additional resources for planning and management are listed below. One that includes an outline of a strategic planning framework and how this can be tied to day-to-day management decisions and time management is *Applied Risk Management in Agriculture*, as well as the companion Risk Navigator website (RightRisk.org).

Look under resources in this story and you'll see **John Hewlett's** name. He is a University of Wyoming Extension farm and ranch management specialist in the Department of Agricultural and Applied Economics and can be reached at hewlett@uwyo.edu or (307) 766-2166.

Resources

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