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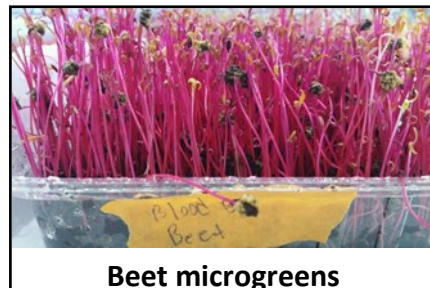
Microgreens Production

By Jennifer Cook, CSU Extension/NRCS

Microgreens are becoming popular in the US, perhaps because they offer a healthy punch of nutrients and a splash of color to meals. Microgreens are young vegetables, herbs, and grains (usually 1-3 inches tall); unlike sprouts, microgreens grow in soil or a substrate receiving a few days of sunlight before they are harvested. I interviewed up-and-coming microgreen entrepreneur, Travis Smith, to learn

more about growing microgreens in Colorado.

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Beet microgreens

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Travis Smith is an avid gardener and started growing microgreens after learning about all their health benefits and profitability. He turned a 10x16 foot portion of his garage into a temperature and humidity controlled growing space, with insulated mylar-coated walls and racks of shelves lined with waterproof LED strips for lighting. Travis says, "My set-up was a big investment, but now that I have the growing figured out, I can transfer everything to a bigger facility to scale-up with less risk."



Assortment of beet, radish, swiss chard, cabbage, and pea microgreens.

"Each species wants a little different amount of water and length of darkness," Travis mentions, so he's been experimenting and taking notes to determine the perfect growing needs for each. His microgreens grow in trays of coco coir, a byproduct of coconut fiber which has a neutral pH and natural antifungal properties. In general, microgreens take 10-24 days to harvest, the fastest growers are radish and peas while cilantro, bok choy, and Swiss chard take the longest.

Most of the seeds Travis uses come in bulk from Mountain Valley Seed Company in Longmont, CO. Seeded trays stay in the dark for 4-10 days, until plants are one inch tall. Then they are lighted to

green-up, and harvested just at true-leaf stage with a sharp knife. After harvest, microgreens are refrigerated and last 2-3 weeks. The roots and the coco coir can be composted for a more sustainable system.

"My favorite microgreen salad includes fava beans, sunflowers, peas, radish, kale and cabbage. My kids love any microgreens mixed with banana or apple in smoothies." Travis also mentions that corn has a unique flavor and is sweetest if grown exclusively in the dark.

As with other market greens sold unwashed and unprocessed, the spread of pathogens and microbial contamination is a concern. Travis always wears disposable plastic gloves when planting, harvesting and handling microgreen trays. Once a month, he sanitizes everything in the grow room, including the walls and equipment. Because he uses coco coir instead of soil or manure as a growing medium, there is less risk of pathogens in his system. Although no licensing is needed to sell microgreens, these [Good Agricultural Practices \(GAPS\) for greens](#) are important and recommended by Colorado Department of Agriculture.

Travis is an electrician so he designed the lighting system, with extreme electrical surge protection, which includes waterproof 6500K LED strips, a DC

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Microgreens can be produced vertically on shelves with lighting.

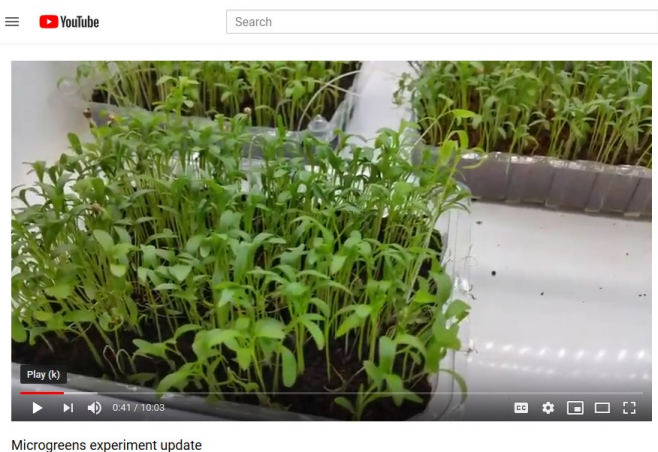
Microgreens from page 2

12 volt 500 watt rainproof transformer, and a home-made switchbox. The space is heated or cooled, depending on the time of year, to 74° F. A humidifier keeps the room at 40% humidity, “which is the sweet spot,” Travis says. “Too humid and plants get mildew, too dry and the plants dry-out.” His electric bill is about \$100 per month for the growing space, including heating, cooling, and lighting.

Trays are watered from underneath and microgreens use very little water, about six gallons every two days. Compared to a toilet flush (2-5 gallons) or watering a small lawn (50 gallons per day), the water use is insignificant. But Travis invested in a high-quality water filtration system. “I could convert to drip irrigation at a larger scale, but there are many inconsistencies in water needs between species,” Travis cautions.

“Eating microgreens makes it easy for me and my family to consume lots of nutrition, we are much healthier now,” Travis remarks. In addition to the nutrition, microgreens can be grown vertically in the smallest of spaces and they don’t take much water or time to grow. Microgreens are my new favorite for a delicious and sustainable food option.

Follow Travis’s progress and how-to videos on his Youtube channel [The Garage Greenhouse](#).



A Little Bit of Snake Knowledge Goes a Long Way

By Karen Crumbaker, CSU Larimer County Extension

In October 2017, a hiker in Golden, Colorado died after being bitten by a rattlesnake. Most people are pretty squeamish when it comes to snakes, yet they play an important role in our ecosystem. Rattlesnakes prey on rodents and, in turn, are prey to hawks, eagles, coyotes and other snakes. Rattlesnakes are a part of Colorado’s outdoors. With our growing population, more and more people are hiking and running on trails where rattlesnakes may live.

Did you know Colorado has 25 species of snakes? Only the prairie rattlesnake (*Crotalus viridis*) and the massasauga (*Sistrurus catenatus*) are venomous. According to the [Colorado Herpetological Society](#), the prairie rattlesnake is found in all but 10 counties in Colorado up to an elevation of ~9,000’. The massasauga, on the other hand, is only found in the southeastern grasslands in Colorado.

The prairie rattlesnake and massasauga can be identified by a flat, broad triangular head and narrow neck, generally tan and brown patchwork, thick bodies, and can grow to 4 feet, with the average length of 2.5 feet. Most people identify a rattlesnake by the rattle at the end of its tail. The rattle is made of modified scales, which can be broken off, malformed or silent. Therefore, this should not be the only form of identification. If the rattle is missing, the snake will have a blunt stub. Rattlesnakes do not have sharply pointed tails.

Rattlesnakes may not always shake their rattle before striking. If you encounter a rattlesnake, remain calm and still at first, then slowly move away. Leave the snake alone! Many people who are bitten by rattlesnakes were bitten as a result of trying to handle or kill the snake. Rattlesnakes are typically not aggressive, but will defend themselves if startled, cornered, or stepped on. **Continued on page 4**

Rattlesnakes from page 3

Wear long, loose pants and tall leather boots when hiking and use a hiking stick to sweep tall grasses you may be hiking in. An added precaution is to wear snake guards in areas where rattlesnakes are known to live.

Rattlesnakes have heat-sensitive facial pits they use to find prey. A word of caution – a dead rattlesnake, even if it has been beheaded, can still bite and inject venom because its heat sensory pits are active until rigor mortis is complete.



Prairie Rattlesnake

Photo by Whitney Cranshaw, CSU, Bugwood.org

Rattlesnakes begin hibernation in October and November and resume activity in April or early May. During cool temperatures in the spring and fall, snakes can be found basking in the sun or on warm surfaces much of the day.

Rattlesnake deaths are very rare in Colorado. Prior to 2017, the last snake bite death was in 1999. When it comes to rattlesnakes, a little bit of knowledge goes a long way in identifying and understanding what to do to prepare yourself in the event you encounter a rattlesnake on the trail. To learn about discouraging snakes from moving into your yard or home, what to do in the event of a snake bite, and their legal status, see CSU Extension fact sheet, [Coping With Snakes](#).

Horse Pasture and Manure

Q & A

Q: When is the best time/month to pull horses off pasture completely to allow for spring growth?

A: Over-grazing is over-grazing if its done in the winter or not. Even in the winter, keep to the [estimated numbers of hours \(days\) per year of grazing based on grass production](#). When the soil is wet, do not graze because it will cause soil compaction. February is a good rule of thumb to pull horses off for spring growth, keep them off until grasses have grown 5 inches. Use the grass height to signal when it's time to start grazing again.

Q: How often in spring/summer/fall is dragging ok to break up pasture manure?

A: Dragging works best in the Fall or Spring when the animals have been pulled off the ground. Shorter grass is easier to drag and helps the piles break up better. If the estimated grazing days are followed, there won't be too much manure on the soil to cause the need to drag more than once or twice per year when the ground is not wet.

Q: How often can manure be spread with a spreader if not composted?

A: In general, it is recommended to compost manure first in order to kill some weed seeds and reduce the volume of material. The [Manure Management on Small Acreages brochure](#) suggests spreading no more than 1 ton of compost or manure per year on dryland pastures. If there is a significant amount of manure, you may want to do some nutrient management calculations and consider manure nutrients, if not used by the growing plants, are pollutants that will run off-site and leach into groundwater. If this is the case, talk to your local NRCS office for help with a nutrient management plan.

Pasture Seeding Q & A

Q: If we decide to seed our pasture, what ground preparation should we do and when is the best time to prep and seed?

A: The best time to seed is between November 15 and April 15, although it really depends on where you live in the state. Elevation and local temperatures may impact the best dates to seed, so check with your local Extension or NRCS office.

Prepare the field by tilling or spraying existing vegetation to kill it before seeding. You may want to plant a cover crop such as oats (planted in spring) or sorghum (planted in summer) to suppress weeds and build soil health prior to grass seeding. Read [Guidelines for Seeding on Colorado Small Acreages](#) for more information on site preparation and management.

Weeds with Taproots: Organic control on small plots

Kara Harders, CSU Extension/USDA-NRCS

Weed control is a constant battle, but some are harder to control (in theory) than others. Some of the more difficult weeds to control are those which have a taproot. These weeds readily come back after being mowed, pulled, or grazed because they have enough nutrients stored in their roots to regenerate!

There are several tools to consider for controlling weeds organically. No matter what tools are used, it is important to recognize weeds as a symptom of land management. You may control the weeds one season, but if the ground is left uncovered or overgrazed, your weed problems will likely return quickly.

Obviously, life would be much easier if the weeds weren't there to start with. **Continued on page 6**



This dandelion plant is an example of a taproot.

Taprooted Weeds continued from page 5

When it comes to organic control of weeds, proactive strategies will save you far more time and labor than reacting to the weeds once they are present and established. Proactive approaches to weed management include mulching, crop rotations, and cover cropping. These methods all make it difficult for weeds to get enough sunlight to grow or become comfortable in their surroundings. These strategies also increase soil health, decrease erosion, and even help with pest problems. Consider adding these methods to your land to help prevent the problem!

If you only have a few of the pesky tap-rooted plants, using a spade to dig out the whole root can be a reasonable approach, especially if the ground is relatively soft. Getting the plants out before they go to seed helps prevent new ones from establishing. Hand pulling is generally not effective on plants with taproots since they tend to break off leaving the roots safely underground ready to re-grow. This is why goats are less effective at controlling tap-rooted weeds by grazing. If you want to use animals to control weeds, pigs are a more effective choice for taproots. Pigs plow and root up the soil, doing a better job killing tap-rooted weeds.



Flame weeding is a common organic practice. This is the Red Dragon Backpack Flame Weeder from Johnny's Selected Seeds.

Occultation is a less known method which helps germinate and kill weeds early in the season. By anchoring heavy tarps (UV-stabilized silage tarps work well), or dark landscape fabric, over weedy areas, you can increase the temperature of the soil earlier in the spring and cause seeds to germinate earlier. When the plants under the tarp sprout, they have no sunlight and die off. After three to four weeks the weeds should have grown and died, leaving behind a bed of soil ready for planting desirable species. If well cared for, the tarps or fabric can be reused many times! A barrier to this method is the tarps can be too heavy, difficult to move, or hard to store depending on your situation.

Flame weeding is another method that can kill weeds from a seed bed after they have germinated. Flame weeding works by burning young plants when their root systems may not be established enough to allow them to recover. It can also knock back a weed population allowing desirable plants to better compete for sunlight, moisture, and nutrients.

Herbicides can also be a choice in organic agriculture (although often less effective on established weeds with taproots). Organic herbicides are non-synthetic and the active ingredients must be approved for use by the [Organic Materials Research Institute](#) (OMRI) and [National Organic Program](#) (NOP).

Organic herbicides usually have broad spectrum or non-selective effects, essentially, they kill everything they touch. Remember, always read and follow directions on herbicide labels! The timing of the application is important and multiple applications are often required.

Common active ingredients in organic herbicides:

- Corn gluten meal – pre-emergent herbicide that inhibits growth and root development. It is non-selective and must be applied just prior to weed seed germination to be effective.
 - Vinegar (Acetic Acid) – 5%-30% acetic acid as post-emergent herbicide used to burn off top growth. Acetic acid is most effective on small annual weeds
- Continued on page 7**

Taprooted Weeds from page 6

and less effective on grasses than it is on broad-leaf weeds. The more potent horticultural vinegars (above 11%) can cause burns on human skin when exposed to it.

- Herbicidal soaps – fast-acting, broad spectrum herbicides made from fatty acids. They are used post-emergent and most effective on annual broadleaf weeds and grasses.
- Clove oil – an active ingredient in post-emergent, non-selective organic herbicides. Research has shown that it can be as effective as acetic acid in controlling broadleaf weeds but at a lower application rate.
- Chelated Iron – These iron products are similar to the iron you would use to fertilize a lawn. However, the iron is bound to a chelating agent making it more available for plant uptake. Broad-leaf plants absorb the iron more easily and when the high levels are oxidized it causes the broad-leaf weeds to dry up and die quickly. Multiple applications are needed throughout the year and [chelated iron](#) is most effective in lawns.

If you are looking for more weed management strategies, check out ATTRA's [Sustainable Weed Management for Small and Medium Scale](#).

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**Upcoming Focus -
Identifying Young Weed Seedlings**



Feeding Wildlife During Winter Does Harm

By Colorado Parks & Wildlife

Even though temperatures are warming, for wildlife, Colorado remains in the depths of winter. Despite the recent snow storms Colorado Parks and Wildlife (CPW) reminds citizens that big-game wildlife do not need our help. Feeding big game in Colorado is not only illegal but also does more harm than good.

Also, people should not approach big-game because it will force the animals to move unnecessarily and burn calories they can't afford to lose.

"Native species are well adapted to survive the winter months on natural food sources," said Renzo Del-Piccolo, area wildlife manager for CPW in Montrose. "Feeding big game, especially deer, whether it's hay, corn, dog food or other livestock-type food, can kill them. Their digestive systems aren't designed to handle these types of rich foods."

Unfortunately, every year, some people decide to feed big game and every year big-game die as a consequence. CPW wildlife managers recently have received reports of dead deer in the San Luis Valley and Gunnison Basin. Wildlife officers examined the stomach contents of some of the carcasses and they found them to be full of corn, grain, bird seed and other food that the deer couldn't digest. The deer died with stomachs full of food that people had provided.

"People want to help. But the reality of it is that feeding doesn't help wildlife, it harms them," Del-Piccolo said. "Winter is a tough time of year, and it has always been how nature eliminates the sick, the weak and less-fit animals from the population. It's ironic, but the toughest time of the year is what makes wildlife populations healthy."

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This deer, found in the San Luis Valley recently, died because of human-provided food. An examination of the stomach contents showed it to be full of corn and grain -- foods that deer can't digest.

deer, animals can bunch up, draw in predators and create unnecessary conflicts.

Wild animals are unpredictable and can be dangerous to people who decide to get close to them. They can be particularly aggressive or defensive around food sources, during breeding seasons and when they have dependent young nearby.

“Winter in Colorado is often a great time to watch big game animals. They are more visible when they congregate on low-elevation, more open winter ranges,” explained DelPiccolo. “Please, observe them from a distance, keep your dog on a leash and don’t be tempted to offer any food.”

For more information about wildlife in Colorado, see cpw.state.co.us.

Feeding Wildlife from page 7

Big-game often lose 30-40 percent of their body weight during the winter. Most are able to live off the fat they’ve stored from the summer and from some available forage they find during the winter. Big game are now running on empty, so don’t do anything that would make them move unnecessarily. “Leaving them alone is the best way to help big game during the winter,” DelPiccolo said.

Feeding animals can cause other problems. When deer crowd around a food source they can transfer diseases or parasites from animal to animal. When animals bunch up they also become easy targets for predators, including mountain lions. Feeding big game can draw them away from their natural habitats and disturb migration patterns. In some areas, deer that have been fed during the winter haven’t moved on as they should when spring arrives.

Feeding is not just a concern with big game. CPW also advises people to refrain from feeding small animals such as coyotes, foxes, squirrels, bobcats, rabbits, chipmunks or turkeys. These animals also aren’t equipped to eat human-provided food. And just like

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More info and register here—

www.online.colostate.edu/badges/land-stewardship/

Bark Beetle Outbreak Expanding in Colorado

By Colorado State Forest Service

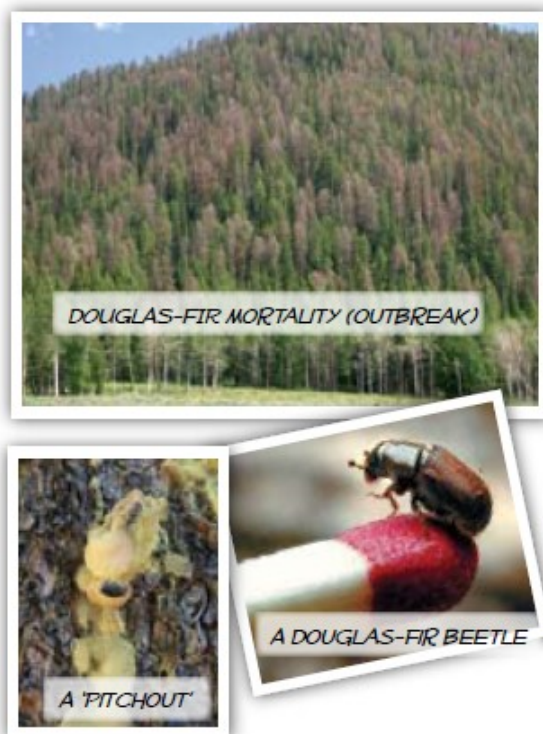
Every year, the Colorado State Forest Service and U.S. Forest Service, Rocky Mountain Region, work together to aerially monitor forest health conditions on millions of forested acres across the state.

The 2018 survey indicates that bark beetle outbreaks have continued to expand in parts of Colorado. Notable impacts include:

- ⇒ Approximately 178,000 acres of high-elevation Engelmann spruce were affected by spruce beetles in 2018. Primary areas impacted include forestlands in and around Rocky Mountain National Park, and portions of the San Juan Mountains, West Elk Mountains and Sawatch Range.
- ⇒ Since the year 2000, spruce beetle outbreaks have caused tree mortality on more than 1.8 million acres in Colorado, and approximately 40 percent of the spruce-fir forests in the state have now been affected.

- ⇒ Roundheaded pine beetle, along with associated native bark beetles, has continued to increasingly affect ponderosa pine forests in southwest Colorado. Over the past several years, populations of this insect have risen exponentially, with 27,000 acres impacted in 2018, compared to 11,000 acres in 2017. Record-warm temperatures and record-low precipitation have provided an environmental window that may continue to favor increasing beetle populations.

For more information on bark beetle, read [Bark Beetles, Are Your Trees at Risk](#), by Colorado State Forest Service.



Colorado Small Acreage Services Database

The source for landowners to find contractors, equipment, and services.

<http://sam.ext.colostate.edu/>

Need help with weed control options?
Have a small pasture seeding project coming up?
Search the site today to find a local contractor!


This is a free service brought to you by NRCS/CSU Ext. and your local Conservation District



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Upcoming Focus -
Identifying Young Weed Seedlings



For a list of upcoming events in your
area visit CSU Extension Small
Acreage
Management website
sam.extension.colostate.edu/

Do you have a question about managing your small acreage?

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