



Master Your Garden

Thursday, April 15th, 1:00p.m.

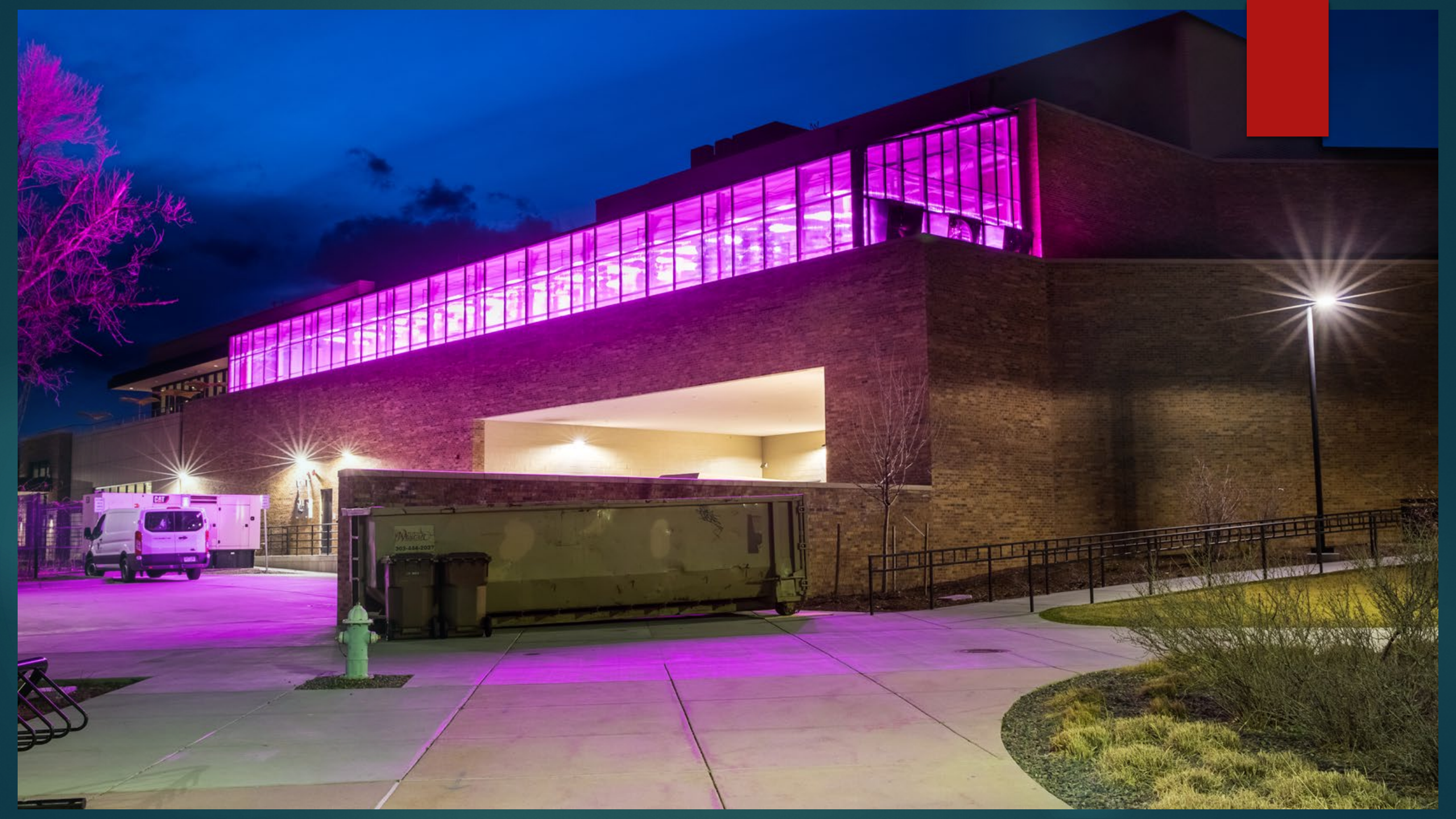
Introduction:



Alex Macmillan
Farm Manager, CU Boulder
Alex.Macmillan@Colorado.edu







Today's talk will cover:

- ▶ Watering
- ▶ Biological
Pest Control
- ▶ Q & A



Watering

- ▶ The technique in which we water a plant is often overlooked, but has a real impact in the output of a garden.
- ▶ While overhead irrigation is the natural way (rain) there are a few reasons why we should try to water our plants without getting them wet.



Watering and Disease

- ▶ Overhead irrigation can cause plants that have some fungal/bacterial spores to spread to neighboring plants.
- ▶ The water droplets can actively spread the disease.
- ▶ Often this happens before we notice the severity of the outbreak
- ▶ Prevention is attained by moving the source of water close to the base of the plant (avoiding leaves when possible).



Overhead Watering

- ▶ If a leaf has some fungal/bacterial spores on it and we water like this, we are spreading those spores throughout our garden.
- ▶ This will spread the unwanted pathogen fast and can contribute to an explosion in growth.



How to avoid spreading pathogens:

- ▶ Watering with a wand and get as close to the base of the plant as possible.
- ▶ Water in the morning if possible. This allows time for the plant to dry.
- ▶ Keep your wand/nozzle off the ground when not in use.



Tool recommendation

- ▶ Dramm One Touch wand – been using at the CU greenhouse for a few years. Valve still works like new after several years of daily use.
- ▶ Cost about \$30-45 depending on length.



Using water to control other factors

Giving a plant the right amount of water can have a profound effect on the overall health and trajectory of growth that one can attain.

Too Much Water:

- Unable to maintain proper gas exchange
- Poor root development/rot
- Doesn't condition a plant for low water situations
- Can dilute soil/substrate and flush out the food that plants need
- Encourages some pests

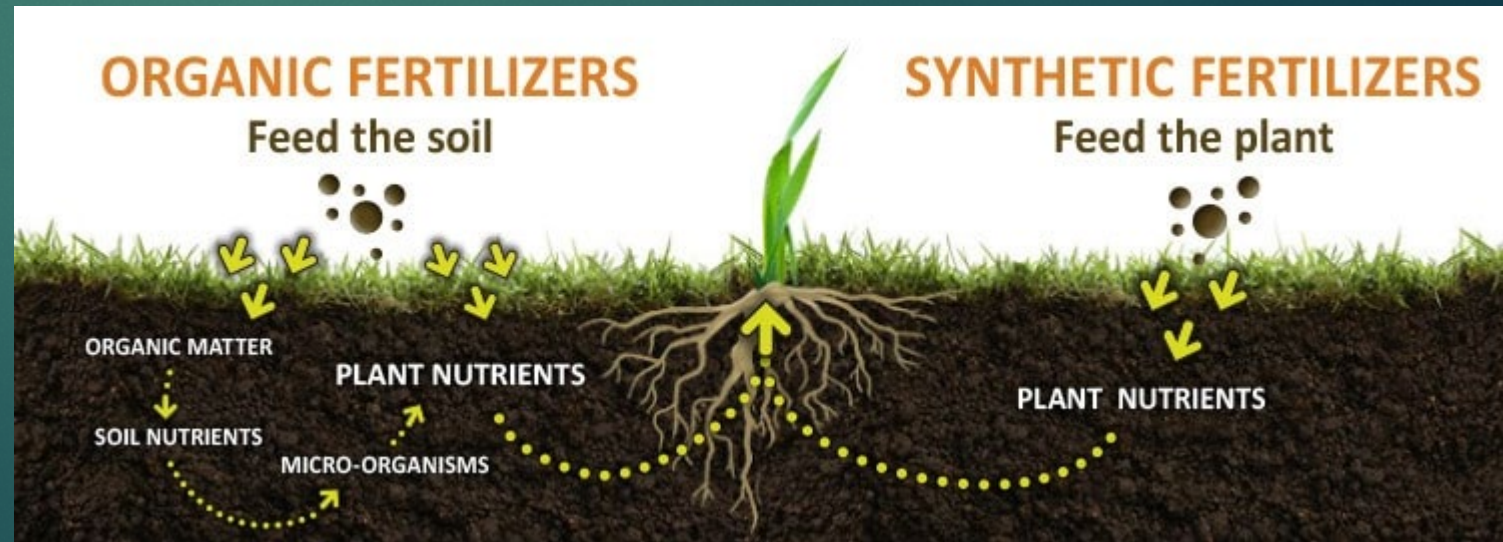
Too Little Water:

- Causes stressed plants. Can abort flowers/fruit
- More susceptible to external pests
- Slow/stunted growth
- Less likely to recover from an adverse event (stress/pest/disease)



Fertilizer

- ▶ Recommend feeding at least once a week using your fertilizer of choice. Rotate between fertilizer and clear water. Salt build up can happen if watering schedule not broken up with a clear watering.
- ▶ Nitrogen is a mobile element and can be moved throughout the plant
- ▶ If your plants larger, mature leaves are starting to yellow this is a sign of nitrogen deficiency. Your plant is hungry. Feed more.
- ▶ If organic, recommend some sort of bat guano or fish emulsion fertilizer.
- ▶ Wash off fertilizer on plants with clear water (careful not to flush out fertilizer)
- ▶ A slow release fertilizer, done as a top dressing early on in the season is an easy way to get food to your plants. These are urea-based fertilizers.



Fertilizer Tools

- ▶ Inline Fertilizer Injector, \$15-20
- ▶ Can mix up stock concentrate once, then just top off injector needed.
- ▶ Some math may be involved with this set up for mixing. Double check math before mixing.
- ▶ Use warm water to help dissolve fertilizer. Allow to cool to room temp before using.
- ▶ When mixing stock solution, fill half way with water, add fertilizer, fill remaining needed water.



When is the best time of day to water?

- ▶ Early Morning, before 10am
- ▶ Avoid watering between noon-7pm if possible. Water droplets can act like little magnifying glasses and burn the plants if watered too late in the day.
- ▶ Try to avoid giving plants “wet feet” at night. It’s generally not advisable to water plants right before it gets dark as this creates a damp microclimate within the plant that can exacerbate and worsen any fungal/microbial pathogens.
- ▶ By giving the plant what it needs early in the day we can prevent stresses that can occur from not enough water.

Container Watering Tips:

- ▶ Use the pots weight as a guide for watering. Pick up the pot just after watering – get a feel for what the pot feels like when fully watered.
- ▶ You can then use this knowledge in the future to gauge how dry your plant is.
- ▶ It might take you a little while to figure out the difference in weights, but it's worth the effort.
- ▶ Make sure you water the pot to saturation. When watered quickly not all the soil will reach it's water holding capacity. Best to go over a few times with a smaller amount of water verse one big drench.



Soaker Hose

- ▶ Setting up a soaker hose or drip irrigation can save lots of time with a little upfront effort.
- ▶ Doesn't need to be set up with anything fancy, just try to get the emitting part of irrigation close to the base of the plant.
- ▶ Quick connection parts make use of this a breeze.
- ▶ Use brass quick connects



Automated Irrigation

- ▶ Putting your irrigation on an automated timer can ensure your plants are getting enough water. This can help free up your time.
- ▶ Rainbird automated irrigation timers are the industry standard, but there are many other options available as well.
- ▶ Your local municipality may offer rebates or other incentives to purchase and/or install.
- ▶ [Louisville & Erie Smart Controller Rebate Program](#)
- ▶ [Rainbird Colorado Rebate List](#)



Pollinator Garden
















- ▶ Can be as simple as a hanging basket of sweet allysum, or can be a whole garden in itself.
- ▶ The key is to provide a habitat so when the prey population becomes low, your key predators don't migrate elsewhere.
- ▶ Native perennials make for the easiest care/ drought tolerant garden.



Good Bugs

- ▶ Will be cheaper to set up a pollinator/good bug garden then to import your predators.
- ▶ Bio programs are not cheap nor easy to run.
- ▶ Most effective when deployed proactively or when pest populations are first noticed. Knockdown applications of good bugs rarely work.
- ▶ If you crash your population of prey, your predator population will crash too or leave. Need secondary source of food – such as pollen.
- ▶ Need to be comfortable with the fact that with a bio program there most likely will always be some degree of pests in your garden.

GOOD BUGS vs BAD BUGS

Ladybugs & Green Lacewing	VS	Aphids & soft bodied pests
		
Trichogramma	VS	Caterpillars & Moths
		
Fly Predators	VS	Fly Control
		
Nematodes & Hypoaspis miles	VS	Fungus Gnats
		
Cryptolaemus	VS	Mealybug
		
A. melinus	VS	Scale
		
Nematodes	VS	Soil Pests <small>Fleas, Ticks, Grubs, Chiggers & over 200 kinds of soil dwelling insects.</small>
		
Predatory Mites	VS	Spider Mites
		
Orius & A. cucumeris	VS	Thrips
		
Encarsia formosa & Delphastus	VS	Whiteflies
		

Scouting

- ▶ Scouting: Going through your crops and checking for pests.
- ▶ Scout for pests weekly. Take notes including date and numbers. Can be useful info to have for use next season.
- ▶ The hotter the temperature is outside, the quicker bugs repopulate
- ▶ A hand lens can aid in identification (\$5-10)
- ▶ Knowing what pest you are up against can increase your chances of getting rid of it.



Ladybugs

- ▶ About 70 native species to Colorado, with an additional 10-12 species having made Colorado their home in the past century.
- ▶ Most ladybugs sold are the convergent lady beetle (*Hippodamia convergens*)
- ▶ Predatorial as an adult and larva. Wide range of prey
- ▶ These insects have a wide habitat range.
- ▶ Releases generally lead to poor/inadequate control due to the dispersive nature of the ladybug.
- ▶ Because they often fly away upon or shortly after being released in an effected area a more economical approach would be to use the money to create an area around your garden that encourages and enhances natural populations.
- ▶ Ladybugs most often use shallow flowers for a source of pollen. Sweet alyssum would be a good pick to encourage a natural population of predators.



Native Ladybug

- ▶ Found eating aphids in a thyme plant



Ladybug Larva

- ▶ Found roaming around the greenhouse



Lacewing

- ▶ Lacewing larvae are what I use in the greenhouse for aphid control. Weekly releases.
- ▶ Eats basically anything it can fit in its mouth. Including other lacewing.
- ▶ Larva don't fly away upon release. Will stick around.
- ▶ Even distribution throughout crop during release is critical for proper control.
- ▶ Cost: About \$15-20/bottle of 1,000 larva
 - ▶ Overnight shipping required for most bugs
 - ▶ Supplied from TipTopBio, via Acme Hydroponics



Lacewing Larva

- ▶ Found roaming around on a strawberry plant.
- ▶ About 5x bigger in size compared to when first released. They are hungry and eating.



Lacewing Larva

- ▶ Found in greenhouse on basil



Parasitic Wasps

- ▶ *Aphidius ervi*, a parasitic wasp.
- ▶ Adult females lay eggs inside an adult aphid. The eggs then hatch inside the aphid and consume the aphid before emerging.
- ▶ We lose a pest and gain a predator.
- ▶ Some natural levels of these types of predators in Colorado. Also there are parasitic wasps that prey on other parasitic wasps.



Cultural Controls

- ▶ Cultural Control: Controlling pests through means of the specific culture being grown.
- ▶ Growing a powdery mildew resistant crop is an example of a cultural control.
- ▶ Often the simplest changes can have the greatest effect.



Prospera® Italian Large Leaf DMR (ILL2)
Johnny's seed. Resistant to Downy
Mildew and Fusarium

Links:

- ▶ [Front Range Native Low Water Plants - CO Native Plant Society\(PDF\)](#)
- ▶ [Colorado Native Plants Retail Vendor List - CO Native Plant Society \(PDF\)](#)
- ▶ [Front Range Suggested Native Plants - CO Native Plant Society \(PDF\)](#)
- ▶ [Gardening With Boulder's Native Plants - City of Boulder](#)
- ▶ [Tip Top Bio Control](#)



Thanks for going me today

Questions and Answers