



AMTOPP News



Summer 202

By: Lydia Hesper
Director

Our AMTOPP Field Day took place May 7th, at the Miles City Veterans Cemetery. However, the lawn fertilizer application was completed on Friday, May 6.

On Saturday we had tree climbers Cooper Elwood, Owen Nickol, Clint Hesper, Dawson Hesper, and Carlo Hesper clean out dead branches in older cottonwoods, along the road. While climbers were busy in the trees, ground crews pruned smaller trees.

With a donation of seven Elm trees, some missing trees along the drive now had a new tree to fill the spot, along with a few other empty spots from previous tree removal. Tree ring installation and watering finished the tree planing and Curt, the Cemetery Director, was pleased and thankful with all the work that was accomplished.

Many hands made for lots of work to be accomplished, along with all the donations of equipment and material and labor, the day proved to be another successful AMTOPP Field Day.

Photos curtesy of Laurie Marburger and Trudie Southwick





Association of Montana Turf, Ornamental, and Pest Professionals

**18th Annual Field Day
Renewal & Remembrance**

Miles City - Saturday, May 7

Eastern Montana State Veterans Cemetery



THANK YOU SPONSORS

Bobcat - Miles City	Mountain Tree Company - Missoula
Dudley's Trees - Kalispell	NotMont Equipment Co - Great Falls
Good Earth Works Co & Nursery - Billings	Oxen Tree Service - Ronan
Galanti Lawn & Landscape - Missoula	Stockman Bank - Miles City
Hesper Tree Service - Forsyth	Tree Amigos Tree Service - Great Falls
Jonas Sprinklers & Fertilizer - Great Falls	TruGreen - Billings
Midland Implement - Missoula	Wilbur-Ellis - Great Falls
Mid Rivers Communications - Glendive	Yellowstone Environmental - Miles City

President's Message

The Future of Our Industry or The Futures Market



My degree is in Agriculture Economics. This means I studied Economics in the Agriculture College at UA in Tucson. One of the jobs I had while going through college was trimming trees and landscaping. I would ride a bicycle to do my bids. Hire a buddy with a pickup truck. Used rock climbing equipment and rented a chain saw. Let us just call it "rustic". In Agriculture there is this institution called the Futures Market, located in Chi-

cago. It is a commodities market which is used by farmers to hedge their crops and cover their base expenses. In a simplistic sense it works like this. Say a farmer plants a thousand acres of a crop and wants to make sure their investment is covered for the season. They would lock in a sale price on the market to insure this happens, say five hundred acres is locked into a set price. Then they let market forces do their thing with the second five hundred acres. Sometimes at a loss and sometimes at a profit. Either way they are still in business another year.

I have recently been thinking about how to convert this same concept into our industry. After all we are farmers in a sense. Little quarter to one acre plots located in the typically urban environment. We have caretakers to manage our

plots of land called clients. And we occasionally visit these farms to harvest said crops. That would be called trimming trees or landscaping or the Green Industry as we like to call it.

How does this relate to the Futures Market? This is a stretch and just a basic concept, but it could be fun to tinker with. Let's use the landscape portion of this Green Industry. I have a client that wants landscaping done. They might be building a new house and the project will take place next year as the work is backlogged. We agree to work together, and a contract is signed. I take a substantial deposit to "hold their place in line". I go the nursery with my plant order in August. They order my plants for delivery in the spring when I will be ready to start this project. They get a deposit out of my deposit. Say one half with the rest on delivery. They make the order at the growers with confidence because of the deposit. The grower has a confirmed sale for the following season. They can schedule a trucker six months in advance. The nursery does not need to guess which plants might sell the following season. I get my material delivered in a timely fashion. The client gets first pick on quality with the previous seasons price tag. This is a win for the grower, trucker, nursery, landscaper and ultimately the client.

So, what happens if the client pulls out of the contract for whatever reason? Then the nursery gets compensated their costs out of the deposit and so do I. The client has meat in the game and will pay to leave the contract. We still get paid for our time and commitments as contractors. And we move on to our next project. It takes the guessing out of the spring season, provides a consistent and high quality service, and the inventory is stored in transit, not in my yard.

This can be done with irrigation, chemical applications, landscape installation, equipment purchasing. You know you will use it next year, you know you will have the money next year, and it gives you a year to prepare. You can even anticipate the experience level of your crew. The best part is you are using the clients' money to make these commitments. I would strongly suggest opening up a separate bank account to keep these deposits in. The temptation to spend them prematurely is high. It is

imperative to keep these funds separate and not available until the contract is in place and started. There will still be the open market to play in but if we could "Future" out a portion of our next year's earnings it would take the guess work out of our operating costs. Give us as owners stability and confidence that our product will be supplied and of high quality. Creating a sense of stability in the industry as a whole. I know, a crazy idea right?

Dudley Marburger
2022 President



WEBSITE



STORE



SOIL & PLANT HEALTH CARE PRODUCTS WITH TREE, LAWN, & PEST CONTROL SPRAYING EQUIPMENT



Diverse selection of lawn, tree, pest control and industrial vegetation sprayers, pumps, tanks, hose, handguns, camlocks, valves, engines, and parts...thousands of parts.

CUSTOM BUILT SPRAYERS TO FIT YOUR NEEDS & BUDGET

Call Today for a FREE Catalog or Visit Us Online at:
<http://www.warnechemical.com> shop.warnechemical.com

2680 Commerce Rd, Rapid City SD 57702

800-658-5457

605-342-7644

Micro-injection delivering fertilizer, fungicide, insecticide, antibiotics, and nutritional micro/macro arbor solutions.

Recap Of Board Meetings

May 6

The board met in Miles City, Montana on May 6th for our meeting. Those present were: Past President - Cooper Elwood, President - Dudley Marburger, Secretary Treasurer - Lydia Hesel, Chris Galanti, Steve Jonas, Matt Means, Owen Nickol, James Roberts, Jason Stringer, and Executive Director Trudie Southwick.

The main topics of discussion were getting the details nailed down for the upcoming Field Day at the Miles City Veterans Cemetery, and the upcoming conference in January. We are getting very close to having the conference put together soon so that we can let everyone know what to expect this January.

There were some legislative items that needed discussion including the EPA requiring the state legislatures make more regulations on training for restricted use pesticides for workers who are working under another's license. We also want to make sure we are meeting with our local legislators. Because of Covid restrictions we decided not to send any-

one to Washington DC this year. Hopefully next year will be better.

Jason Stringer brought up a community service project the Denton 4-H Club is doing to replace trees that were lost in a fire. We all agreed this would be a great project for AMTOPP to be involved in. AMTOPP will give \$2000 to the project for tree replacement along with a watering plan. Jason Stringer will be the point person for the project.

AMTOPP is providing an educational opportunity on July 29th and 30th at Lake Inez (dates to be confirmed after the meeting). Aerial rescue will be on the 29th and the climbing and rigging class will be on the 30th. Dave Stice from WesSpur will be teaching.

The board also discussed putting together a plan to recognize members of AMTOPP who have done an exceptional job. This went to committee and will be reported on at the next meeting.



July 29 - Quarterly Board Meeting - Lake Inez - 830 Loon Ln, Seeley Lake, MT - 10AM - 3PM

July 29 - Aerial Rescue Class - Lake Inez - 8AM - 3PM -

Preregistration required limited space, Call AMTOPP office for more information

October 28 - Quarterly Board Meeting - Great Falls, - Venue to be determine - 10AM - 3PM

January 31, 2023 - First Aid/CPR - Fairmont Hot Springs - 12 - 6PM

February 1, 2023 - EHAT - Fairmont Hot Springs - 8AM to 5PM -

Preregistration required

Irrigation Class - Fairmont Hot Springs - 8AM to 5PM - More information coming - Preregistration required

Quarterly Board Meeting - Fairmont Hot Springs - 5 - 6:30PM

February 2-3, 2023 - Conference and Trade Show - Fairmont Hot Springs Resort

February 3, 202 - Quarterly Board Meeting - Fairmont Hot Springs - 3 - 5:30PM



YOUR PREMIER PROVIDER

Contact your local Wilbur-Ellis Specialist today.

Great Falls, MT | Rob Warehime | 406-788-4501 Billings, MT | Mike Doty | 406-670-4713

pro.wilburellis.com

1966 6th St NE, Great Falls, MT 59404 | 7175 Trade Center Ave, Billings, MT 59101



WILBUR-ELLIS
Ideas to Grow With

For information only. Not a label. Prior to use, always read and follow the product label directions. WILBUR-ELLIS logo and Ideas to Grow With are registered trademarks of Wilbur-Ellis Company LLC. ©-2013

From Our Affiliates

Grub Alert

By: Laurie Kerzicnik, PhD
Associate Extension Specialist II;
Arthropod Diagnostician

Grubs can be significant pests in lawns. Grubs refer to a specific immature stage of beetles in the Family Scarabaeidae or scarab beetles. The most common grubs we have in Montana that can cause damage to turfgrass are May/June beetles, which include several species in the genus *Phyllophaga*. In several areas around Billings, we also have established populations of Japanese beetles, *Popillia japonica*.

If grubs are present, a few per unit area can be very destructive. For the May/June beetles, grubs prefer grass roots but can feed on other organic matter in the soil. When feeding, the grubs will clip the roots of plants (those with fibrous root systems), causing dead patches in the lawn. The most severe damage occurs in the second year of the life cycle of the beetles. In midsummer, the grubs should be within the first couple inches of the soil. They then migrate lower in the soil for the remaining months to overwinter. Adults are active in midsummer and feed on the leaves of deciduous trees, such as elm, walnut, and poplar, at night. They also fly to porch lights in May and June. The females prefer areas of loose sod in sandy soil near food resources for egg laying. They rarely lay eggs around vegetable gardens unless those areas were



Figure 1. Adult and grub of a May-June beetle, *Phyllophaga* sp.
Photo by W. Cranshaw, CSU, Bugwood.

most recently planted as sod or grass.

Grubs can be falsely accused of causing turfgrass damage; it can often be another issue. To test for grub damage, dig around

See Grub page 5



ROCKY MOUNTAIN
TREE AND TURF SUPPLY LLC

Recently founded in January of 2021, Rocky Mountain Tree and Turf Supply, LLC is the newest premier distributor of tree and turf supplies in the Northern Rockies area. We are dedicated to providing you the very best professional grade lawn fertilizers (including golf course blends), insect and disease control products, along with soil nutrients that are tried and tested in the Rocky Mountain soils. We also sell Arboriculture Equipment, offering Stump Grinders, Chippers and BEAST equipment. Check out our booth for more information!

307-620-9303
rmtreeandturf@gmail.com
rmттsupply.com





FFA Scholarship Presentation

By: Lydia Hesel
Director

The AMTOPP scholarship recipient this year went to Olivia Collins from Joliet. Olivia has been working with Nana's Bloomers Greenhouse out of Laurel for her FFA project. She started working with Glasgow Flower and Gift and enjoyed learning Floriculture. Because Glasgow Flower is located in Glasgow and Olivia lives in Joliet she was able to find a nursery closer in Laurel, Nana's Bloomers Greenhouse. As Olivia has worked with flowers they have become her passion. She has also learned what it takes to become a florist. Olivia plans to pursue a degree in

Horticulture. She hopes to one day own her own flower shop or nursery. I had the pleasure of attending the FFA Banquet in Bozeman on March 31st and awarding Olivia with the AMTOPP Scholarship. Olivia was a delightful young lady and we hope the best for her in her next season of life.

***Lydia Hesel (L) AMTOPP's Secretary/
Treasurer presents Olivia Collins the
AMTOPP Scholarship of \$500.***



Rainbow Quantum™
POWERED TREE INJECTION

- Protect more trees in a day
- Crew-friendly design
- Accurate and efficient

Sometimes innovation occurs incrementally, sometimes it occurs in leaps. The Rainbow Quantum™ Micro-Injector represents a new era in battery-powered tree injection design and performance for the care of urban ecosystems.

Rainbow Ecoscience
Formerly Rainbow Treecare Scientific Advancements

Pricing/Ordering:
Toni Smith
720-484-1763
tsmith@rainbowecoscience.com

For More Info: **877-272-6747** www.RainbowEcoscience.com

©2021 Rainbow Ecoscience

Grub continued from page 4

the dead patches and surrounding areas. The grubs should be within the first couple of inches of the soil in the summer. They are white with a brown head, c-shaped, and can reach up to one-inch long. The adult May/June beetles are light to dark brown or mahogany. If grubs are present, they might also attract mammals, such as skunks, to feed. Also, pull on the grass to test for root attachment; if the roots are strong, then it is not likely a grub issue. It could be drought stress, winter kill, or another problem.



Irrigation Corner

Troubleshooting drip irrigation

Avoid these 5 mistakes for better drip installation and function.

You're on a site visit and the first thing you notice is the lackluster plants. There is a glaring difference in the same plant species' height, color and vitality. Some look wilted, nearly dead, and others show signs of disease.

You know there's a functioning drip irrigation system and wonder, what is going on?

When you're out troubleshooting an existing system, see if one of these five mistakes might be to blame.

When preparing to install a drip system, keep these common errors in mind to avoid callbacks or dissatisfied customers.

Installing it and walking away

Whether comprised of rotors and sprays or drip, an irrigation system is a mechanical system.

And it's sometimes considered "finished" upon installation. However, Declan Keane, owner of Life Source Irrigation Inc., a New York City-based drip irrigation specialist, disagrees.

Life Source specializes in rooftop gardens across Manhattan and Brooklyn. His clients include private residences, hotels, restaurants and property management companies with small- to medium-sized spaces along the buildings in front of Park Avenue, Central Avenue and Fifth Avenue.

He says the ideal situation is to check the system weekly and make decisions for repairs or adjustments in collaboration with a gardener or landscaper, if plant maintenance is outside your contract. He starts his weekly check-ins inspecting the plants and determining if any changes are needed.

"I like to run a deep watering twice a week in spring. Then I water every other day in the summer," he says.

"If you water heavily and then let the plants dry out, they do much better. You must factor in what type of plants and environment and make changes accordingly."

In addition to checking plant health, it's important to examine the system mechanics.

Mismatched watering needs

Plantings have specific and varying water needs. Without planning in the design phase, it's common to overlook this detail. Keane suggests grouping plants with similar watering needs in the same zone. For example, put all the grasses together, annuals on another zone and succulents that require less water on a separate zone.

"The environments can even vary on the same building. One corner might be more sunny, another more shaded and another more windy,"



he says. "You have to factor that into the settings and make adjustments."

In the perfect scenario, Scott Todd, co-owner of Innovative Irrigation Solutions in Rochester, New York, says spaghetti tubing with emitters matched to individual plant needs is the best option. It allows for mixing 0.5 gph to a drier plant like boxwoods, 1 gph to plants like arborvitae that need more water and 2 gph emitters on thirstier plants.

Keane added that he installs filters on every job. It doesn't matter how clean the water source is; dirt and debris get into the lines and clog the micropore filtration. At the end of the season, the system is drained and flushed to eliminate any particles in the lines.

"If you install dripline without using filters, you'll end up with problems because no water source is 100% clean," he says.

Incorrect placement

A drip irrigation design must consider tubing and emitter placement to provide the maximum moisture benefits to the root system, Navarra says. "I often see dripline run along only one side of the plant," he says. "It needs to be on both to provide equal coverage and have a healthy, well-balanced plant."

How close the drip is located to the plant is just as important. For example, Navarra frequently sees drip in planter beds spaced 4 inches from the stump of a tree.

"The root hairs can't absorb water that far out from the main stem," he says.

The same principle applies when using microtubing and emitters in raised planters and hanging pots. Using only one emitter in the central ring of the planter doesn't provide enough water for those plants along

See Troubleshooting page 8



Distributing Professional Irrigation, Landscape and
Turf Care products to the professionals since 1920

www.midlandimplement.com

Billings
800-677-6426

Bozeman
866-388-6166

Missoula
800-288-3448



406-453-4344 | GREAT FALLS, MT
WWW.NMEQCO.COM

**YOUR TRUSTED TREE AND LAWN CARE
EQUIPMENT SUPPLIER SINCE 1947....**



MORBARK



RAYCO

4-H Scholarship

Lillian Wages of Victor, MT is the winner of both \$250 4-H Scholarships that AMTOPP awarded this year. The list of projects she would benefit from receiving the funds included, dairy goats, poultry and gardening projects.

This is Lilian's senior year before turning the page and starting a new chapter of her life. Something she says on her application about what she hopes to benefit from her project could teach us and the up and coming generation of horticulturist, arborist, and irrigation specialist that no matter how insignificant a task may seem, it contributes and reflects on the entire job at hand.

"Now knowing how to get a newborn kid breathing and nursing or how to trim and shave a goat in under ten minutes are not skills taught in high school. Blow-drying a chicken isn't something I ever thought I'd do. Yet the effort that goes into preparing an animal for fair is not necessarily the action itself but the responsibility of it. Of learning and completing a task to the best of your ability and taking pride in the results, even if the result is just a really clean chicken."

A photo of Lilian was not available for this newsletter, however a representative of AMTOPP will be attending a Scholarship Banquet later in July, where a photo will be available; look for it in the next newsletter.

As most of you know the raffle tick-



ets sold during the conference are what funds the AMTOPP Scholarship Program. Proceeds from ticket sales are used to purchase the prizes, to distribute to Scholarship recipients the current year as well as carry over for the next year. This additional year funded made it possible for AMTOPP to honor it's Scholarship Program during 2021, when no raffle tickets were sold.

The Board is open to suggestions on how to build on our Scholarship Program. Please let us know your thoughts; Do you consider this program to be beneficial? Do you think we should offer more to these two or expand it into other areas? Do you think it is good the way it is? Any other suggestions are welcomed.

RAIN  BIRD

An advertisement for the WesSpur 2022 Catalog. It features a background image of a person in a blue shirt and safety harness working on a tree. Overlaid on the left is a smaller image of the catalog cover, which includes the text 'WesSpur 2022 Catalog' and 'FREE'. Below the catalog image is a green box with the text: (800) 268-2141, WesSpur.com, GET YOUR FREE COPY TODAY!. To the right of the catalog image is a white box with the text: WESSPUR 2022 CATALOG, • NEW GEAR, • NEW SHOP, • SAME GREAT SERVICE!, and a QR code.

WesSpur
Tree Equipment, Inc.

**JENNISON TREE
SERVICES LLC**

Rick - Robert - Misty - Sackett

the perimeter. In these scenarios, Navarra recommends using microtubing to accommodate multiple emitters.

As a rule of thumb, he suggests using two to three emitters inside 16-inch to 20-inch diameter pots. He recommends spacing emitters about 10 inches apart in larger containers depending on the growing media.

One of the biggest errors Todd finds is mixing rotors, sprays and dripline all on the same zone. On some jobs contractors run out of zones and don't want the added expense of upgrading the clock. But "we'll be called to a site where we know there is drip irrigation and the client says it's not working," he says. "We get there, walk around to the drip and find it's running with sprinkler heads. There's not enough pressure."

Todd adds that proper placement is as important with the stakes to hold the drip in place as it is in the dripline layout. He spaces staples no more than 6 inches to 8 inches apart on the dripline for

nearly every application to prevent the line from shifting. Driving them in at 45-degree angles anchors them into the

ground securely, he says

Misunderstanding soil media

Failing to understand or account for the planting media is a common mistake. Knowing the soil's water holding capacity, evapotranspiration rates, soil percolation and absorption is critical.

These can vary from one site to the next and even in different locations on the same site.

"I can't emphasize knowing the growing media enough," Navarra says.

If the soil media is a heavy mulch that retains water, you will have to limit watering. If it's clay-based soil, it's essential to know this soil type prevents water from being absorbed. Loamy soil allows the water to percolate through before the plant has time to absorb the moisture.

Too much or too little water can have negative consequences. Un-

derwatering in hot, dry climates can lead to costly plant loss. However, regular site checks and supplemental hand watering create opportunities to make adjustments as needed at the first signs of stress.

"Overwatering tends to be the bigger issue," Keane says. "My experience is that plants can get away with a lot less water than we think. You get more color, more flowers and blossoms, and less fungus and disease."

You may have to supplement with hand watering, but it is worth the time and effort."

Todd agrees that too much water is a common mistake on job sites. He only installs drip irrigation on new plantings and only runs the system for a few years, until the planting is established. On older plantings on his projects, a system may only run in August if there are drought conditions.

Inadequate pressure regulation

Pressure-compensating pipe is more costly upfront, but skimping at installation can have expensive long-term consequences. Without a pressure-compensating pipe, it's impossible to maintain equal pressure from the head to the foot of the system, especially if it is not a looped system.

To guarantee the system has enough pressure, Todd limits each drip zone to 2,000 feet per 45 psi high-flow regulator. He runs 1-inch line off the valve then splits the zone sending tubing 1,000 feet in one direction and

1,000 feet in another dividing the area in the middle rather than looping from front to back on the property.

"We don't reduce the main line down to one-half inch until we

get to the middle to be sure we get equal flow on both sides," he says.

The best practice is to plan each zone with consideration given to the water volume available, Navarra explains. Pressure and volume drop as the distance from the water source increases, and when run in excess of the water availability the result is uneven water distribution, which impacts plant health. Using friction loss calculations and manufacturer dripline specifications determine proper distance.

"Some people try to cheat on that rule because they think they can push water further down the pipe without the pressure regulator," he says. "It might work, but it creates other problems. Dripline is not manufactured to exceed 35 to 40 pounds of pressure. Beyond that, you'll start to get pipe failure."

Drip irrigation lets you deliver water precisely where you want it. The systems are designed to provide a specific volume of water and nutrients where plants need it most, below the root zone. It limits moisture on plant material, reducing the opportunity for disease and fungus and providing equal water distribution.

But like anything, simply avoiding these mistakes is not a cure-all solution. Instead, it takes knowledge and frequent monitoring to leverage a drip system's benefits. Brushing up on the properties of soil media, evapotranspiration rates and friction loss are your best bet for having the greatest success with dripline irrigation systems.

*Taken from Irrigation & Lighting magazine, May 9, 2022 issue.
Article written by: Katie Navarra, a freelance writer in Mechanicville, New York*



Three Locations To Serve You
www.mountainsupply.com

MISSOULA
406-543-8255

BOZEMAN
406-587-0713

BILLINGS
406-259-2909

NorthWestern[®] Energy

Delivering a Bright Future

Water: Garden Friend...and Foe? – Water, Relative Humidity, and Plant Diseases

We all know that water is essential for life and that we have to ensure our landscapes, gardens, and houseplants all have a sufficient supply of the stuff. Forget to water your garden during a hot, dry spell and it could mean disaster for your plants. But water can also create issues for plants, usually when it is in an overabundance – water helps spread and develop diseases on foliage and excess soil moisture can damage roots, creating opportunities for root rots and other diseases. How do you meet the water needs of the plant while also avoiding issues associated water? Understanding how water affects disease organisms will help, along with some tried and true Integrated Pest Management Strategies.

Water and Pathogenic Microbes

Both bacteria and fungi require water to grow and reproduce. Most do not have a mechanism to actively take up and manage water, so they uptake water mainly through osmosis. This means there must be some form of water present for those microbes that are actively growing and especially for processes like reproduction which use not only a lot of energy but might also be required to carry spores in order to spread.

Both pathogenic microbes and beneficial (or neutral) microbes require water to thrive. It is one side of what we refer to as the disease triangle. Water (along with temperature) are major components of the “favorable environment” side of the triangle, with the other sides being a plant capable of being infected and a population of pathogens capable of infecting. Those last two sides meaning you have to have a population of the pathogen big enough to initiate or sustain an infection and a plant that can actually be infected by that pathogen. For example – one disease spore may or may not be enough to start an infection (depending on the pathogen), but several hundreds or thousands definitely can. And the pathogen has to be one that can actually infect the plant – it doesn’t matter if you have a million spores of *Alternaria solani* (one of two closely related fungi that cause early blight in tomatoes) on your cucumber plants, they likely won’t get a disease. But if there are spores of *A. cucumerina*, a different species, you’ll likely get leaf spot on those cucumbers. But it doesn’t matter if you have both a susceptible plant and a pathogen, there has to be a favorable environment (water and temperature) for there to be a disease infection.

As this paper points out, water in the form of liquid (rain, ground water, dew, etc) and vapor (air humidity, fog) can provide the environment for microbe development in the soil and on foliage. Microbes in the soil are ubiquitous as water is typically available in most soils (except in droughty or arid areas), but excess soil moisture can create booms in populations for both the “good” microbes and the “bad” ones. Microbes that live on foliage (sometimes referred to as epiphytic since they rely on moisture from the atmosphere) are much more likely to be water stressed since they are exposed to the atmosphere. When there isn’t water available on the surface of leaves (from rain, fog, etc.) microbes tend to colonize around areas where water leaves the plant – stomata and to a lesser extent around trichomes and hairs.

The paper also points out high atmospheric humidity is positively correlated with the number of fungi on a leaf surface. It’s also a requirement for diseases microbe spores to germinate, for filamentous fungi to break dormancy, for pathogen survival, for microbe movement on the leaf surface, and for disease infections to be sustained. It is also shown that heavy precipitation increases water availability to these microbes thus hastening their growth. Precipitation also dislodges and disperses pathogen spores and cells to adjacent plant tissues, and to leaves of nearby plants. High humidity also makes leaf cuticles more permeable and promotes opening of the stomata, which can serve as an entry point for pathogenic infection.

Once inside the plant, microbes such as fungi and bacteria can thrive on the aqueous environment inside a plant, moving easily between cells or into the vascular tissue (depending on disease). Pathogens that thrive in wet conditions, however, may initiate water soaked lesions on the plant to develop conditions favorable to their growth.

Water, water everywhere – so is there anything you can do?

Of course, water is naturally occurring and in most places falls from the sky in some form or another. In some places very little precipitation falls, in others there’s a lot. And don’t forget about the humidity, dew, and fog (which are often more common in places that get more rain, but provide moisture even in dry climates). There are a few places where the atmospheric moisture levels are in that “just right” zone to support plant growth but not pathogen growth, which makes agricultural production of certain crops easier. You could consider these areas the “Goldilocks” zone for crop production. For example, a lot of seed crops are produced in the Midwest and arid north West, potatoes in Idaho, apples in Washington, etc. The conditions there mean that, at least when those crops were getting established (before the advent of modern pesticides) in those regions, disease pressure was low.

You can’t stop the rain, of course, if you’re in a place both blessed and cursed with abundant rainfall or atmospheric humidity. But there are some things that you can do reduce the likelihood of diseases spread or supported by that water and humidity.

Evidence shows that there is a positive correlation between the density of planting and disease incidence. Therefore, proper plant spacing and pruning can do at least three major things. First, having space between plants, especially in the vegetable garden, can reduce the splashing of pathogens from one plant to the next during a precipitation event. Second, it increases air flow through the plant,

which can reduce the likelihood of pathogen spores that might float in and land on foliage. Third, it reduces humidity in the immediate microclimate around the plant. The increased air flow in addition to the reduced amount of foliage that is releasing water through transpiration can have a significant effect on the humidity, which can have a big effect on the germination, establishment, and survival.

Utilize diverse planting plans in the vegetable garden and the landscape. Research shows that while having a variety of plants increases the diversity of disease organisms, it actually reduces the infection rate possibly because pathogens splashing from plant to plant are less likely to find a host plant if they are surrounded by non-host plants. This practice is promoted in intensive vegetable plantings such as square foot gardening.

As stated earlier, precipitation can drastically increase the population of microbes on foliage. This also includes water from overhead irrigation. For example, this study found that overhead watering of cabbage led to significantly higher and faster rates of spread of the black rot fungus as compared to drip irrigation. Therefore, reducing or avoiding overhead watering can reduce the likelihood of disease incidence.

Timing of watering may also contribute to disease development. The dew point, which usually happens during the night time hours, is when the air is totally saturated at 100% relative humidity and therefore cannot hold any more water. This is the point where excess moisture is deposited as dew on surfaces (another source of water on the foliage) and little to no evaporation of water already on surfaces happens (learn more at weather.gov). As shared in this book chapter review, lower temperatures resulting in reaching the dew point can extend the time leaves are exposed to high moisture and result in higher disease incidence.

As our own GP Linda Chalker-Scott points out in this review, mulching not only retains soil moisture, reduces erosion and more but also reduces the incidence of disease in plants by reducing the splashing of soil or spores from rain or irrigation onto the plant. This drastically reduces disease spread from pathogens found in the soil or on plant debris. The organic matter from organic mulches also has the benefit of increasing the population of beneficial microbes, which out-compete the pathogenic microbes.

Mulching and drip irrigation can both significantly reduce disease incidence in gardens.

Crop rotation, where crops are not grown in the same soil or plot for a number of years, also reduces disease incidence by reducing pathogen loads in the soil or from crop residues left in the garden. This study shows significantly reduced disease incidence on potato and onion when a crop rotation plan of four years is utilized (meaning that either onions or potatoes are not planted in the plot for a minimum of four years, with other crops planted between those years).

If root rots and pathogens are a problem, try improving drainage around the garden. Adding organic matter can help with water permeability of the soil over time. Raised beds can also drain faster than in-ground gardens.

Of course, if you’re having lots of problems with certain diseases on your plants, these cultural controls may not be enough. Finding resistant varieties may be a necessary step in breaking the disease cycle in your garden.

Overview

While water is required for plant growth, it can cause issues with plant diseases if there is too much or if it lingers on the wrong parts of the plant for too long. Water from rainfall, irrigation, high humidity, fog, and dew can all lead to the initiation, development, and longevity of plant fungal or bacterial diseases. Reducing the amount, persistence of water or humidity on or around foliage can significantly reduce the likelihood of plant disease incidence. Methods such as reducing overhead irrigation, timing of irrigation, mulching, and crop rotation are key cultural methods in reducing diseases spread by water.

Taken from the “The Garden Professor” website: <https://gardenprofessors.com/water-garden-friend-and-foe-water-relative-humidity-and-plant-diseases/>

Article published by: John Porter who is the Urban Agriculture Program Coordinator/Educator for Nebraska Extension

Sources: - Aung, K., Jiang, Y., & He, S. Y. (2018). The role of water in plant-microbe interactions. *The Plant Journal*, 93(4), 771-780

Burdon, J., & Chilvers, G. A. (1982). Host density as a factor in plant disease ecology. *Annual review of phytopathology*, 20(1), 143-166.

Café-Filho, A. C., Lopes, C. A., & Rossato, M. (2019). Management of plant disease epidemics with irrigation practices. *Irrigation in Agroecosystems*, 123.

Chalker-Scott, L. (2007). Impact of mulches on landscape plants and the environment—a review. *Journal of Environmental Horticulture*, 25(4), 239-249.

Krauthausen, H. J., Laun, N., & Wohanka, W. (2011). Methods to reduce the spread of the black rot pathogen, *Xanthomonas campestris* pv. *campestris*, in brassica transplants. *Journal of Plant Diseases and Protection*, 118(1), 7-16.

Rottstock, T., Joshi, J., Kummer, V., & Fischer, M. (2014). Higher plant diversity promotes higher diversity of fungal pathogens, while it decreases pathogen infection per plant. *Ecology*, 95(7), 1907-1917.

Wright, P. J., Falloon, R. E., & Hedderley, D. (2017). A long-term vegetable crop rotation study to determine effects on soil microbial communities and soilborne diseases of potato and onion. *New Zealand Journal of Crop and Horticultural Science*, 45(1), 29-54.

2022 OFFICERS - Executive Board

President -Dudley Marburger, Dudley's Trees; 406-212-3391; dudleystrees@centurytel.net;

Term Expires: 2024

Vice President - Tom Molitor, Big Twig Tree Care; (406) 600-9365; tom@bigtwigtrecare.com;

Term Expires: 2025

Secretary/Treasurer -Lydia Hesel, Hesel Tree Service; (406) 740-0931; clheser@gmail.com: Term Expires 2026

Past President - Cooper Elwood, Mountain Tree Company; 406-529-0185; coopere@gmail.com;

Term Expires: 2023

DIRECTORS

James Roberts TruGreen; 406-860-9443; @gmail.com: Term Expires 1/2025

Steve Jonas Jonas Sprinklers and Fertilizer; 406-216-2281; stevejonas84@gmail.com: Term Expires 2025

Chris Galanti; Galanti Lawn & Landscape; (406) 212-4850; chris@galantilandscaping.com: Term Expires 2023

Owen Nickol; Oxen Tree Services (406) 270-1506; oxen@ronan.net: Term Expires 2026

Matt Means, NorMont Equipment Co; (406) 44; mmeans@nmeqco.com: Term Expires 2024

Jason Stringer, Tree Amigos Tree Service; 406-268-8733; jcstringer12365@msm.com; Term Expires 2025

EXECUTIVE DIRECTOR

Trudie Southwick - amtopp@amtopp.org - (406) 204-0100

amtopp@amtopp.org

AMTOPP

www.amtopp.org

173 Cottonwood Road,
Townsend, MT 59644
(406) 204-0100

Association of Montana
Turf, Ornamental, and Pest Professionals
173 Cottonwood Road
Townsend, MT 59644

