Flanagan State Bank

Specialty Growers Ag Newsletter

April 2023

Lincoln University Soil Testing for the Management of Soil Fertility

Soil fertility is a major factor that affects crop growth and quality. Fertile soil contains all the plant nutrients, in appropriate concentrations and in a form readily available to plants. Deficiencies or toxicities of nutrients result in meager harvest and poor crop quality (Fig. 1).

Plant nutrients are grouped into two categories: macronutrients and micronutrients. Nitrogen (N), phosphorus (P), potassium (K), calcium (Ca), magnesium (Mg) and sulfur (S) are macronutrients because they are needed by the plant in fairly large quantities. Other elements such as zinc (Zn), manganese (Mn), and copper (Cu) are required by the plant in very small amounts and therefore called micronutrients.

Soil testing is very important to ensure that all the plant' nutrients are available in the soil, in appropriate concentrations and in a plant's available form. Soil testing should be done in the fall if possible. If not, spring will be the next best time to get your soil tested.

Fig. 1: Tomato plants suffering from calcium deficiency.

To test your soil, you need a soil probe, a bucket, a small plastic bag, and an order form from the soil laboratory you intend to send your sample to. Once at the field, take at least 12 soil cores from each uniform area of the field, mix them in the bucket and take at least a cup of the mixture and put it in a plastic bag (Fig. 2). The order form should include your name, address, and the crops you intend to grow on the tested soil. This information allows the soil laboratory to give you recommendations on fertilizers and rates, specific for the crops that you intend to grow. Both the soil sample and the order form need to be sent to your laboratory. *(cont. pg. 2)*

In This Issue

FSB Locations

301 W. Falcon, Flanagan

403 State, Benson

2401 E. Washington, Bloomington

111 N. Fayette, El Paso

500 S. Persimmon, Le Roy

208 E. Gridley, Gridley

Soil testing laboratories of the Midwest are listed by State in the Midwest Vegetable Production Guide (https://mwveguide.org/guide). This guide is updated yearly.

The soil analysis results will contain two important pieces of information: the soil pH and the concentration of the nutrients in the soil. The nutrient status in the soil indicates the concentrations of nutrients in the soil. The soil test laboratory uses this information to recommend addition of some fertilizers to the soil to fulfill the needs of the plants in nutrients.

The soil pH indicates the availability of nutrients to plants. In fact, even if a particular nutrient is present in the soil, it might not be available to plants if the pH is not adequate for nutrient availability (Fig. 3). For example, even if P is present in the soil in sufficient quantity, it won't be available to plants if the pH is too acidic. At pH below 5.5, the soil concentration of the hydrogen ion (H^+) is high enough to cause precipitation of P, which makes the P not available to plants. While many plants can tolerate pH ranges between 5.2 and 7.8, most plants grow when soil pH is between 6.0 and 7.0 (slightly acid to neutral). This general rule applies to most of the commonly grown fruits, vegetables, flowers, trees, and shrubs (Havlin et al., 1999).

If the soil pH is below the normal range, addition of lime ($CaCO_3$) is generally recommended by the soil testing laboratory. The most important factor determining the effectiveness of lime is placement. Maximum contact of lime with the soil is essential. Most liming materials are only slightly soluble in water, so incorporation in the soil is a must for lime reaction. Even when properly mixed with the soil, lime will have little effect on pH if the soil is dry. Moisture is essential for the lime-soil reaction to occur. In the case where surface application of lime is a must, as is the case for perennials, lime should be watered into the soil.

If the pH is higher than the normal range, elemental S is commonly used to lower the pH. Sulfur, however, requires some time for the conversion to sulfuric acid with the aid of soil bacteria. The conversion rate of sulfur depends on the fineness of the sulfur particles, the amount of soil moisture, soil temperature and the presence of certain bacteria. The conversion of sulfur may take several months if the conditions are not ideal. For this reason, it is recommended to apply S (if needed) in the fall, thus allowing time for soil acidification to occur.

The soil analysis results do usually recommend the amount of lime or sulfur needed to adjust the soil pH to optimal pH.

References:
Havlin, J. L., Beaton, J. D., Tisdale, S. L., and Nelson, W.L. (eds.). 1999. Soil Fertility and Fertilizers: An Introduction to Nutrient Management. (6th Ed.). Upper Saddle River, NJ: Prentice Hall.
Mullen, R., Lentz, E., and Watson, M. 2007. Soil Acidification: How to Lower Soil pH. AGF-507-07. Ohio State University.
Nardozzi, C. 2012. How to Adjust Soil pH for Your Garden. The Essentials of Garden Soil. Series 2 in Vegetable Gardening, 2nd Edition.
Roques, S., S. Kendall, K.A. Smith, and P.M. Berry. 2013. Review of the non-NPKs nutrient requirements of UK cereals and oilseed rape. Technical Report. https://www.researchgate.net/figure/The-effect-of-soil-pH-on-nutrient-availability_fig2_277669269
Williamson, J. 2012. Changing the pH of Your Soil. HGIC. Clemson University.

Touria Eaton, Ph.D.
Lincoln University of Missouri
Associate Professor of Horticulture
EatonT@LincolnU.edu

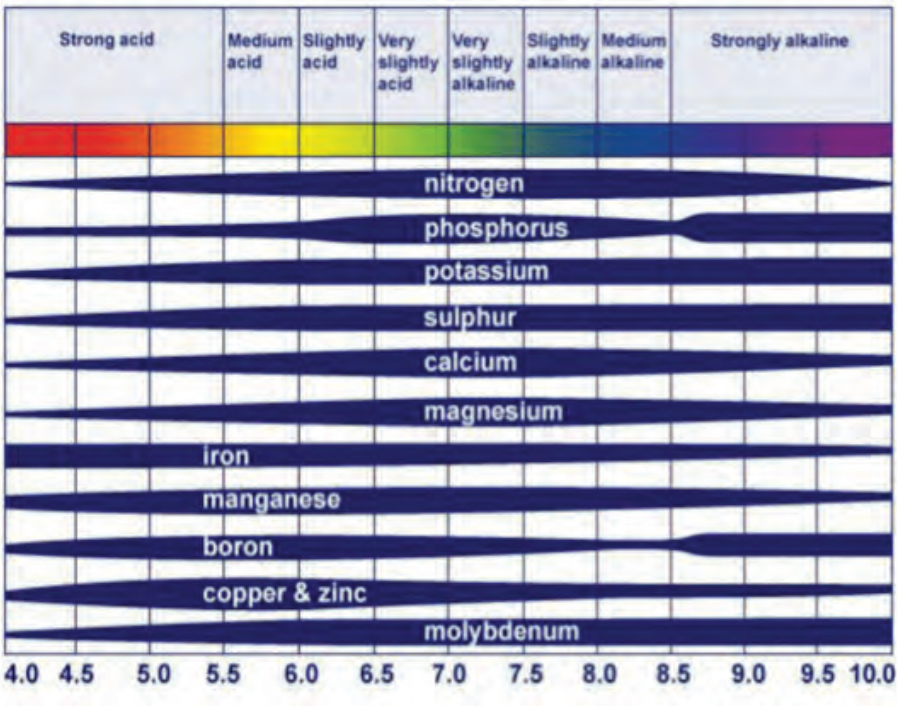

Fig. 3: Nutrients' availability in the soil as affected by soil pH; the wider the band, the greater the availability (Roques et al., 2013)

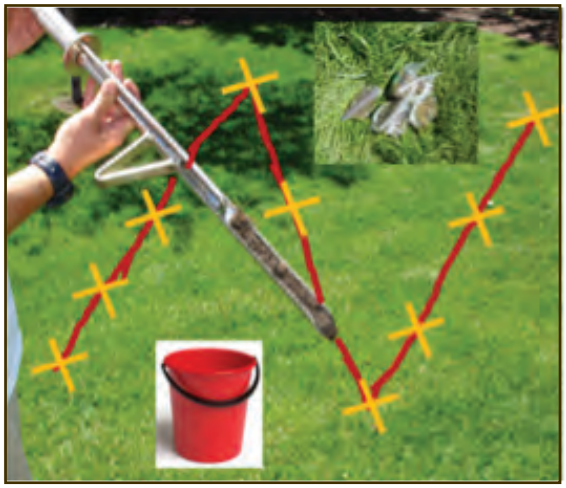

Fig. 2: Take 12 cores of soil by zigzagging to cover as much of the sampling area as possible.

Ventilation in Greenhouses and High Tunnels

Original Blog with pictures can be found at http://go.uvm.edu/tunnelventilation

I had the pleasure of facilitating a workshop at the 2019 NOFA-MA Summer Conference about Ventilation in Greenhouses and High Tunnels. It provided an opportunity to collect information from various sources, ground truth observations with growers, and to revisit some fundamentals. The big takeaway, for me, is that there are many, many ways to ventilate a protected culture environment and opportunities for improvement abound. I hope this review provides a framework for troubleshooting some issues that may be common in the field.

Background

Greenhouses and high tunnels provide a protected area for growing vegetables. Greenhouses can be used to start plants and high tunnels can provide season extension. These partially enclosed spaces, however, require attention to climate control. In addition to heating, ventilation and air circulation are important practices that help to provide consistent, well-distributed, healthy conditions for plant growth and production.

Ventilation vs. Circulation

It is important to differentiate two types of air flow that are needed in high tunnels and greenhouses:

Ventilation

Ventilation is the exchange of inside air for outside air. This results in exhausting warm, humid air and replenishing it with cooler, drier air. Ventilation strips the humidity and heat from the space using exhaust fans, ridge vents and/or roll-up sides. Ventilation is the active exchange of inside air for outside air. This exchange is important to remove heat and humidity from inside the structure and replace it with drier, cooler outside air. This also helps to replenish carbon dioxide which is consumed in the process of photosynthesis. Ventilation is accomplished in several ways including end-wall exhaust fans combined with inlet louvers, passive peak vents or ridge vents combined with roll-up sides, roll-up sides alone in an area with reliable crosswind, or even large doors on each endwall.

Circulation

Circulation is the mixing or stirring of air within the structure. This results in relatively equal conditions being well-distributed throughout the space. Circulation "averages" conditions using HAF fans. Circulation is mixing the air inside the structure. This is most often accomplished with horizontal air flow (HAF) fans. Circulation is important to ensure each square foot of growing space is getting roughly equivalent growing conditions. HAF's push the air around the growing area and should ensure that there are no areas without some air flow. These fans help to make up for the limitations of ventilation that often lead to zones of no air flow, typically in the corners.

If you ventilate without circulation, you run the risk of having corners or other zones not benefiting from the exchange of air. If you circulate without ventilation, you run the risk of having conditions in the structure growing overly hot and humid leading to plant stress and disease.

Passive vs. Active Systems

When considering ventilation of a high tunnel or greenhouse, there are both active and passive options. Active systems use electric motors to spin fans and move air. Active systems, therefore, require electricity to operate and siting of a high tunnel or greenhouse may impact the feasibility of this. An example of an active system includes two end wall exhaust fans, two inlet louvers on the opposite end wall and a thermostat that opens the louvers and turns the fans on when the temperature is above 85°F. A heated greenhouse with manually operated roll-up sides and a ridge vent that provide passive ventilation.

Passive systems use openings in the envelope of the structure to allow airflow to happen naturally. Passive systems are often preferred overactive systems due to their inherent lower initial cost and energy efficiency and because they offer greater flexibility in siting (e.g. electric utilities are not needed). However, passively ventilated tunnels depend on steady, gentle prevailing winds to assist with ventilation. Avoid siting these tunnels too close to large structures, dense tree lines, or other obstructions that will prevent ventilation.

Airflow Requirements

Guidance for ventilation flow rates are provided as volumetric flow of cubic feet per minute (CFM, ft3/min) per square foot of growing area in the publication, Greenhouse Engineering by Bartok and Aldrich (NRAES-33).

For hot season growing use 8 CFM/ft2 of growing space for cooler season growing use 2 CFM/ft2. For a 30 ft x 96 ft tunnel the total growing area is approximately 2,900 ft2. The hot season ventilation requirement is, therefore 23,200 CFM and the cool season requirement is 5,800 CFM. If a structure is used in both cool and hot seasons, two stages of ventilation can be used with two fans controlled by a two stage thermostat. A variable speed control can also be used to adjust the ventilation flow rate. More resources for winter growing are available on our Winter Growing page.

Guidance for circulation flow rates is 25% of the overall growing volume per minute (also from Bartok and Aldrich's Greenhouse Engineering). For a 30 ft x 96 ft tunnel with 15 ft peak, the total volume is approximately 34,000 ft3. One quarter of that volume is approximately 8,500 ft3, so the total HAF flow rate required is 8,500 CFM (ft3/min).

Equipment and Controls

Ventilation Fans & Inlet Louvers

Exhaust ventilation fans can be found in sizes typically ranging from 12" to 48" in diameter, cost $150 to $1,000 each, and provide between 1,000 and 22,000 CFM each respectively. Exhaust fans can be direct drive or belt driven and can be setup to run as single, dual or variable speed. Multiple fans can also be setup with staged temperature controls to achieve at least two levels of ventilation for different growing seasons. Exhaust fans are typically all installed on a common endwall with inlet louvers installed on the opposite endwall to provide sweeping flow. Inlet louvers should be sized with an area equal to the exhaust fans. Motorized louvers with a flange

(cont. pg. 4)

to ensure good sealing are recommended to improve energy efficiency and plant health by reducing drafts. Louvers cost $50 to $250 each. Exhaust fans are a common approach to providing active ventilation. Motorized louvers can be used to open or close air inlet areas. These are often connected to the same control circuit that run exhaust fans so that the air inlet is opened when the fans are turned on.

Roll-up or Fold-down Sides
Roll-up sides can serve as both inlet and outlet for ventilation depending on the siting, use of other vents and prevailing wind. This method of ventilating is typically accomplished using sheets of plastic that run the length of the tunnel and are rolled up around a pipe to an appropriate degree of opening for the desired conditions. The rolling mechanism can be manual with a simple pipe and tee or can make use of a gear hand crank. Additionally, motorized roll-up motors are available with controllers that automate this task. It is also possible to achieve the same side venting using a fold-down or roll-down system. Some of these use inflation fans to "blow up" side curtains to seal them closed while others use rope and pulleys to lift or lower the side walls.

Ridge and Peak Vents
Ridge vents and peak vents are sections of the roof that are designed to open and allow warm, humid air to escape out the top. The differ slightly in their design with ridge vents resulting from one side of the tunnel terminating above the other side at the ridge leaving a vertical section that can be opened or closed. Peak vents are typically a section of roof that runs the length of a gothic type house which can be opened or closed. Both offer an alternative to exhaust fans. When combined with roll-up sides, these vents can provide very effective, quiet, and energy efficiency ventilation. Both are typically easiest and least costly to install when the tunnel or greenhouse is first built. They are operated by a motor and a rack and pinion and can be adjusted to different levels of opening depending on the temperature and the control system.

Gable Vents
Ventilation openings placed high toward the very top of the end wall are called gable vents. These can be effective when combined with roll-up sides as a passive ventilation option. Large gable vents, in this case with insect screen, allow for hot, humid air to escape from the top of this tunnel.

Horizontal Air Flow (HAF) Fans
Horizontal air flow (HAF) fans are typically 12" to 24" in diameter, cost $80 to $300 each, and provide between 1,000 and 5,250 CFM each respectively. Some growers have had success using inexpensive box fans, noting that even though they need more of them per house and also need repeated replacements they are less expensive than commercially available HAF's. In either case, it is important to note that HAF fans provide the rated flow for a certain length of "throw." To ensure well-distributed mixing flow throughout the growing area, it is generally recommended to place HAF fans every 50 feet along the length of flow. In practice, especially with dense vegetation in certain crops (e.g. tomato and cucumbers) a maximum distance between HAF fans of 20-30 feet is more appropriate. HAF fans are typically installed in a "race track" layout intended to stimulate flow all around the growing area. This layout does sometimes leave at least two corners with relatively low flow in practice and growers should test the intended layout before finalizing it.

Heaters
Although this article is mainly focused on ventilation, heaters are useful for improving the impact of ventilation when humidity control is needed. Heated air can carry more moisture which allows ventilation air flow to reduce humidity more effectively. There are a number of factors involved in sizing a heater for a greenhouse or high tunnel including the size, the desired indoor temperature, the outside temperature, and the envelope of the tunnel. More information about determining heat load for greenhouses and tunnels can be found in the post, Calculating Greenhouse and High Tunnel Heat Loss.

Switches
The most basic controls take the form of switches that turn fans on or off. These are inexpensive and easy to install, but depend on an operator to make changes. It is common to have ventilation fans and HAF fans on separate switches to provide flexibility in their operation.

Thermostats
The next step up is a thermostat, which is a switch that opens or closes automatically based on the temperature that has been set on it. Thermostats can be setup for heating control (close on dropping temperature) or cooling control (close on rising temperature). The sensing probe of the thermostat should ideally be aspirated (air flowing over it), shielded from radiation gain (the increase in heat due to incident sunshine), and located to accurately measure the air temperature the plants are experiencing.

More information about selecting and using thermostats is available from John Bartok's article in Greenhouse Management and in our post about Thermostats for Agriculture.

Wax Cylinders
Wax cylinders can be used to open and close louvers, peak and gable vents when electricity is not available. These sealed cylinders are filled with wax that expands with increasing temperature. That expansion results in increased pressure and moves a piston out. They come in a variety of load ratings and can be adjusted for very specific temperature response. More information about wax cylinders for opening and closing tunnel vents can be found in our post, Improved Ventilation for High Tunnels.

Integrated Controls
A higher level of control system comes in the form of an integrated control. These systems monitor multiple inputs such as different temperature readings and humidity and control multiple outputs. Previously, these have been considered too expensive for smaller farms or individual tunnels. However, the prices have been reduced significantly. These controls can be helpful for automating more complex high tunnels or greenhouses that include heating systems, ventilation fans, circulation fans, roll-up sides and even irrigation. These systems can generally be accessed from a computer or smartphone for checking conditions and changing setpoints.

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Ventilation in Greenhouses and High Tunnels (CONT.)

Pitfalls, Tips and Tricks

Poor Ventilation
Inadequate ventilation can lead to excessive heat and humidity. High temperatures can lead to plant stress and reduced yield while high humidity can lead to fungal diseases. If you are experiencing high temperatures and have exhaust fans running constantly or have all passive ventilation options completely open, you likely have inadequate ventilation. If you are seeing wide-spread fungal disease, you likely have inadequate ventilation. The effectiveness of your ventilation system can change over the course of the growing season as increased vegetation introduces more restriction to air flow. You should be able to stand in the middle of the tunnel or greenhouse and feel a comfortable breeze.

Poor Circulation
Inadequate circulation can lead to inconsistent conditions throughout the tunnel or greenhouse. This can show up as hot spots with high temperature, cool spots with low temperature, areas of high humidity, and condensation. Look for leaf movement in every part of the tunnel or greenhouse as a sign that there is air flow present. Strips of survey tape, cut to equal lengths and tied to the tunnel framing to hang down can also be helpful to show where air is flowing and where it is not.

Labor vs Automation
Keeping tabs on a high tunnel or greenhouse can be a real chore that consumes a lot of time and attention often resulting in heightened anxiety. Automating certain controls can reduce the amount of labor required considerably. This convenience and peace of mind comes at a cost, typically $1,500-$2,000 for a controller, sensors and roll-up motors in addition to any fans already in place. With a labor cost of $15 per hour and 15 minutes of labor required per house twice daily, an automated controller will pay for itself in about 250 growing days.

To see original post along with photos, visit http://go.uvm.edu/tunnelventilation

Chris Callahan
Extension Associate Professor:
Agricultural Engineering
University of Vermont Extension

References
•Bartok, J. (2012, October 29). Improving thermostat performance. Retrieved August 10, 2019, from Greenhouse Management website: https://www.greenhousemag.com/article/gm1112-using-thermostats-greenhouses/
•Bartok, J., & Aldrich, R. (1994). Greenhouse Engineering, NRAES – 33. Retrieved from http://blog.uvm.edu/cwcallah/files/2021/03/NRAES-33_Web.pdf
•Blomgren, T., & Frisch, T. (2007). High Tunnels: Using Low-Cost Technology to Increase Yields, Improve Quality and Extend the Season. Retrieved from USDA NE SARE and University of Vermont Center for Sustainable Agriculture website: http://www.sare.org/Learning-Center/SARE-Project-Products/Northeast-SARE-Project-Products/High-Tunnels
•Brockman, T., Cummings, C., & Hake, J. (2015). A Guide to Season Extension for Illinois Specialty Crop Growers. Retrieved from http://thelandconnection.org/sites/default/files/TLCSeasonExtensionGuide-forweb_0.pdf
•Callahan, C. (2019, April 15). Thermostats for Agriculture – UVM Extension AgEngineering. Retrieved August 10, 2019, from http://go.uvm.edu/thermostats
•Ebert, K., & Rivard, C. (2012). Kansas State High Tunnel Video Series. Retrieved from Kansas State University and USDA NC SARE website: http://www.sare.org/Learning-Center/SARE-Project-Products/North-Central-SARE-Project-Products/Kansas-State-High-Tunnel-Video-Series
•High Tunnel Manual. (n.d.). Retrieved April 9, 2019, from Penn State Extension website: https://extension.psu.edu/high-tunnel-manual.
•Upson, S. (2014). High Tunnel Hoop House Construction Guide (An Agricultural Division Publication. NF-HO-14-01). Retrieved from Noble Foundation website: https://web.extension.illinois.edu/bcjmw/downloads/54183.pdf

When we started reaching out to specialty farmers, I knew that listening was going to be one our top priorities. We had to know what their needs are and how we could be of service to them. As a corn and soybean farmer, it wasn't hard to see that I was in a very different part of agriculture. The true reality of it surprised me at times though. Every farm is different, these types are farm are not what we normally talk about in the state of Illinois and the Midwest, but they play important roles in our communities. So, if you are out grocery shopping this year, consider buying local. Get to know your local farmers and go visit their farms. It has truly been a pleasure to be able to get to know this part of agriculture and I look forward to working with and listening to more farmers this year.

To those who have talked with me, I appreciate your time and your honesty. I look forward to our conversations in the future. Here are some of the things I have really noticed about specialty farms:

• Farmers Markets are a lot of work. I knew it was work, but I guess I never really stopped to think about all the work that goes into being a farmer who sells at a Famers Markets. It's like going on vacation with kids, but you do it once a week for weeks. You work hard throughout the week. Then you pack everything into the van. You then have to be in town super early on a Saturday morning. Then there is no guarantee you will sell everything and have to pack it all up again. Some weeks you will sell out and other weeks you won't and if there is rain then it's a day gone. Then it's "rinse and repeat" for months. They are, however, one of the best ways to meet your customers directly and are a great place to find new customers. It also gives the public the chance to talk with farmers directly.

• Crop insurance is not utilized as much for specialty growers. It's available, but unlike corn/soybean crops it does not have the same depth of coverage. From what I've seen and heard they (RMA and USDA) are working on it, but it remains to be seen if specialty growers will see the value in it. (For a good article on crop insurance please see Megan Vaith's article in our December 2022 newsletter.)

• Harvest last months. As a row crop farmer, I can say late September to the end of October /early November is when Harvest normally is. So maybe 6 weeks and sometimes shorter. For specialty growers with all the different types of produce they grow, they have harvest for months as each crop has different maturities and seasons. The exciting part for me as a consumer is to see all the crops sold throughout the growing season.

• Labor is a huge barrier to growth. Agriculture overall needs labor, but Specialty Farms are still very labor intensive and big equipment will not necessarily cover what they need to do, or it is too expensive. I've heard of many people who loved farming and were making money farming but gave it up due to it being so labor intensive and lack of labor to help.

• Distribution is an issue. When I harvest my grain in the fall, I take it up to the local elevator. That grain gets mixed in with all my neighbors and then taken to its final locations. Specialty markets have demand but getting the products from the farm to its final locations is lacking distribution. Someone at a conference said, "corn and soybeans have had a lot longer to develop their Co-ops. Specialty Co-ops are just getting started." I am excited to see Co-ops getting developed and other discussions around this issue happening.

The Table Farm, & Workshop
Bloomington Farmer's Market 2022

• More and more urban farms are popping up in the city and they face issues that those of us outside of the city don't necessarily deal with. The main city I am referring to is Chicago. Let's talk about empty lots. If a farmer wants to utilize an empty lot, there are lots of rules from the city on how they can grow. Someone explained that there was most likely a building on that lot at one time. So, there could be lead and such in the soil. Soil mitigation or special practices have to occur to limit/eliminate exposure to the produce (see next point on Sunflowers). Cook county also has different rules when it comes to assessing property taxes and what is considered for farmland assessment.

• Sunflowers are great at getting bad things out of the soil. They detox the soil essentially. https://www.farmersalmanac.com/sunflowers-to-the-rescue-15614. I've been told getting rid of the sunflowers if they are used to remove bad things from the soil means they are considered toxic waste and have to be treated as such. So, if an urban farmer wants to clean the soil in an empty lot they could plant sunflowers, but then they have to treat them like toxic waste. Again, I haven't looked too much into this myself, but if you have more information on the proper way to get rid of sunflowers when used to get rid of bad things in the soil, I want to know more.

• Urban farmers in Chicago cannot capture rainwater in tanks and use it. They have to use city water. I haven't looked into the science of this and have not really found a reason why this is the case. My sister who has lived in the city for nearly 20 years said, "Maybe the rain makes a lot of noise when it hits the empty barrel?". So, if anyone knows exactly why the city won't allow urban farmers to capture rainwater, let me know. I am curious as to why they won't allow urban farmers to capture and use rainwater.

Again, thank you to everyone who has talked with us and shared their experiences. You have helped us learn how we can best be of service to this part of agriculture.

Sarah Hoerner
Flanagan State Bank

Taking the Initiative to Help Farmers

Over the past few years, the topic of mental health has become more prevalent in our daily lives. Constant change and stress, compounded by the pandemic, has left many people feeling depressed or anxious – to the point it affects their health. Farmers and those involved in agriculture are not immune to these challenges.

Help is here and it's only a phone call away. SIU Medicine has a program to assist farmers and their families, and to train medical professionals to understand the specific needs for those in rural areas.

The Farm Family Resource Initiative (FFRI) is a network of support and resources for farmers and their families, including a helpline *(1-833-FARM-SOS)*. The confidential 24/7 helpline connects you to health professionals who specialize in ag-related stress.

This means you are talking to medical professionals living in Illinois who can relate to the local economy, weather, and other daily stressors specific to our region. If you are not located in Illinois, check your state's Department of Agriculture for resources.

In addition to text, email and website services, telehealth counseling sessions are available for those in need of additional support. Farmers and farm families can receive up to six individual, couple or group sessions. FFRI services are offered at no cost to the farmer or farm family members with the support of grant funding. provided by Illinois Department of Human Services, Division of Mental Health and the Illinois Department of Agriculture in cooperation with USDA National Institute of Food and Agriculture.

FFRI Ag Resource Specialist Karen Stallman lives on a farm in southern Illinois and understands the challenges farm families may encounter.

"I call it the drip, drip, drip of constant stress. In farming there tends to be a new challenge each day and nothing seems easy." Stallman says.

FFRI also provides opportunities for health care professionals to learn more about farming-related issues and earn CME credits through its Rural Community Mental Health program. The virtual training illuminates how mental and physical health issues can impact those working in farming and agriculture. To learn more, visit *siumed.edu/ffri-webinars.*

In addition, the AgriSafe Nurse Scholar Program is available to rural nurses through on-demand webinars. These lessons will increase knowledge in prevention, identification and assessment of diseases related to agricultural work exposures. Details are at *learning.agrisafe.org/nurse-scholar-program*.

Many stressful issues confront those in agriculture. Please check on friends, family members and neighbors regularly. Spread the word about the Farm Family Resource Initiative and encourage others to reach out and talk to someone. It may save the life of someone you know!

Find out more at siumed.org/farm.

Red Beet Chocolate Cake Recipe

Red Beet Chocolate Cake

1-1/2 cups sugar - We use 1 cup
3 eggs
3/4 cup Oil - We use lard
2 cups pureed cooked beets
1 teaspoon Vanilla
2 squares melted Chocolate or 4 Tablespoons Cocoa
1-3/4 cups flour
1-1/2 teaspoons soda
1/4 teaspoon salt
Mix all ingredients in mixing bowl. Beat 2 minutes.
Pour in greased 9x13 inch baking pan for 20-25 minutes.

Frost with Chocolate frosting

Christina Kaeb
Arrowsmith, IL

Ag Lending Team

Rich Ritter
Gridley
rritter@fsbfamily.com
309-747-3600

David Wyss
Flanagan
dwyss@fsbfamily.com
815-796-2264

Sarah Hoerner
LeRoy
shoerner@fsbfamily.com
309-962-4707

Logan Weber
Benson
lweber@fsbfamily.com
309-394-2785

www.flanaganstatebank.com

Flanagan State Bank