THE UNIVERSITY OF RHODE ISLAND COOPERATIVE EXTENSION

VEGETABLE PRODUCTION

THE WEEK IN VEGETABLES

August 10, 2019

PEST ALERTS: It's time to encourage **onions** to be done with it already… if you plan to store, inspect bulbs for soundness; **Basil downy mildew** is very much among us now– resistant varieties are holding up well in the field– what happens after it is bagged and delivered? **Cross-striped cabbage worm, cabbage looper, and diamondback moth larvae** very much present on **Brassicas,** flea beetles heavy in some locations, absent in others, **black rot** seen in CT and NH; **Cucurbits** plagued with [you name it], but notably full force **powdery mildew** on susceptible varieties, and **DOWNY MILDEW** on butternut squash, so far– this is the squash strain, which also attacks watermelons– the other strain that attacks cucumbers and cantaloupe has not yet been seen in RI; **hopper burn** continues on **Eggplant,** but pay attention for **two-spotted spider mite**– symptoms of **Verticillium** are showing up by now where it is present; twisted, distorted young growth on **pepper** plants is usually broad mites, but much more common in tunnels than field; anyone seeing **pepper maggot** damage?- **silvering of pepper skin** seen in a large crop in RI– low, but consistent percentage of fruits affected, which are still sound and marketable– of unknown cause; no surprises reported in **tomatoes,** just the usuals; **Alternaria leaf spot** on **Italian Parsley; QUESTION:** Do you every see celery anthracnose (leaf curl) on celeriac? Researchers would like to know...
--> **Need to discuss? Got something you need looked at? URI Extension: 401-874-2967/andy_radin@uri.edu, hfaubert@uri.edu**

SAVE THE DATE: ANNUAL URI TWILIGHT MEETING

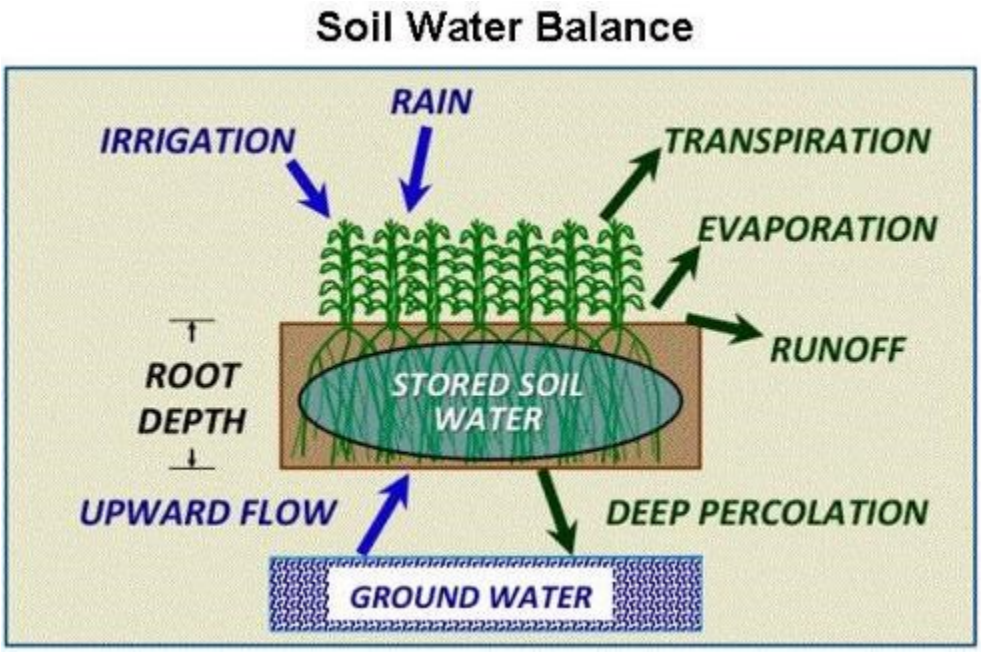
5 PM, WEDNESDAY, SEPTEMBER 11, 2019 at the Agronomy Farm, URI

Summer dry-out

We are now in that summer dry-out period, which is not really a drought. When (not if) rain falls again, it would be ideal if that water could be stored for later, rather than be lost to runoff and evaporation. In fact, with good long-term practices, that's possible. Here's a bit of a look at how water interacts with the soil, and how soil management affects this.

Obviously, water is acted upon by the force of **Gravity**, which causes **Infiltration** (entrance of water into the soil surface) and **Percolation** (downward movement of water into the soil profile). It also powers **Run-off** (the down-hill flow of water.) **Matric forces** of **Cohesion** and **Adhesion** are attractions of water molecules to each other, and attraction of water molecules to mineral surfaces, respectively. In soil, water forms films (water molecules sticking to each other) that stick to surfaces. Water films can be thin or thick. Thin water films moves slowly, since it is held tightly by soil particles, while the water molecules of thick films moves more rapidly.

In fully saturated soils, when water films are thick, it takes little energy for plant roots to draw water out of the soil. In dry soils, water films are very thin, and are said to be at



Report from Middletown

Who turned off the lights? Sunset is before 8.00 p.m., and those late afternoon shadows are getting longer and longer. Someone also turned off the water – just a measly .2 inches delivered via a thunderstorm since our last report two weeks ago. We have been irrigating steadily, and now is a good time to double-check whether critters have made their way under your plastic to chew the drip lines.

Hot and dry means plenty of opportunity for cucurbit powdery mildew, which rolled in on August 5th, right on schedule. For a small operation, we grow a decent amount of pie pumpkins and winter squash, and we always wrestle with PM this time of year. Our first strategy is using resistant varieties, including "Bush Delicata" and "Honeybaby." But some of our favorites, including the "Long Pie" pumpkin, have zero resistance.

We are using Cueva this year, a fixed copper combined with a fatty acid – Certis claims that this formulation makes a barrier on the leaf. As with any strategy for spraying for PM, you have to get good coverage of the lower leaves, the underside of the upper canopy, and the top surfaces of leaves. This is relatively easy for your next round of zucchini and cukes, and a lot more challenging and time-consuming for pumpkins and winter squash. Two observations: first, the initial application was successful; whether we can get in there and spray a second time at the recommended five days remains to be seen. Second, be a little judicious on your more tender zucchini and cukes, as we did observe some phytotoxicity in those younger plants after spraying.

We can't say whether flea beetles are done for the season, but we have rolled out quite a bit of brassica seed in the last couple weeks and the beetles either haven't found the seedlings or they're not here. We have plenty of squash bugs, cucumber beetles, and every moth in the world. Still, the apparent absence of flea beetles give us a hope for a long and pleasant late summer and fall. We hope you are all well and that slicers are flying out of your market stalls!

Photo by A. Radin

The Downy Mildews…

Are very much here. Turns out Basil DM has been in RI for 4 weeks now… If you are growing one of the new resistant varieties and you see no disease, please let us know so we can document its efficacy. As for Cucurbit DM, it seems to be newly arrived, and this date is in the typical range. Be sure to check out Meg McGrath's Cucurbit DM article in UMass Veg Notes: http://ag.umass.edu/sites/ag.umass.edu/files/newsletters/june_13_2019_vegetable_notes.pdf

Meg's article on managing Basil DM can be found here: http://vegetablemdonline.ppath.cornell.edu/NewsArticles/Basil%20Downy%20Mildew-VegMD-McGrath-2019.pdf

Even preparing for BDM with a late planting is risky….

Soil water, continued

high tension. The force that holds the remaining water to soil particles increases. This means that it takes more energy for roots to pull water out of that soil.

Water molecules form bridges across very tiny spaces between mineral particles; these spaces can be referred to as micropores. Larger spaces (macropores) are too big for this water-film bridge to stand the force of gravity, so this becomes a drainage pathway. Whether or not films are bridging across spaces, when the water film becomes thick enough, gravity acts upon it and the water moves downward into the soil profile, where it connects to more water film, thickening it, and the downward flow continues in a chain reaction. If a water film is moving slowly through a fine particle layer with lots of micropores and then encounters a layer with large pore spaces, the matric force holding water to the fine particles is stronger than the force of gravity and a temporary water table builds up… until hanging drops at the bottom of the fine particle layer become subject to gravity and the water begins to flow into the coarse layer. This takes place in Rhode Island soils underlain by coarse sand and gravel. This is often an advantage– the new rainfall doesn't just drain away right after it happens.

Entrance of water into the soil surface (infiltration) is the critical first point of restoring soil water. The frequency of tillage operations has a major influence on this. First, consider the physical state of an untilled soil, or one that hasn't been tilled for several years. Vegetation deflects rain droplets, reducing surface impact, which would otherwise shatter soil aggregates into fine particles. Roots provide exudates to microorganisms that colonize their surfaces. Microorganisms, including symbiotic and free-living fungi and bacteria, consume the exudates, breaking them down into by products that cement fine particles together, creating aggregates, which is the basis of soil structure. Within aggregates are micropores that hold water films and support microbial life. Some of the organic matter forms complex assemblages with very fine mineral particles, which then "protects" that organic matter from being decomposed. Between aggregates are larger pore spaces that allow infiltration of oxygen, required by both plant roots and microorganisms, and drainage. As roots and microbial populations grow, die and decay, organic matter accumulates, which helps to hold nutrient cations, buffers pH, and provides carbon, the energy source of the soil's ecosystem. On the surface of the soil, dead plant material accumulates over time, and decomposes from underneath through the action of a variety of macroorganisms such as earthworms, mites, crustaceans, millipedes, and many insects. Mixing of the mineral and organic components occurs, creating aggregates at the surface. Aggregates at the surface, combined with vegetation, disrupts raindrop impact and provides stable channels for water infiltration. Then, the nice downward chain-reaction of percolation can take place.

Now consider what physically takes place in the soil during and after a tillage operation. Aggregates take a beating if the soil moisture content isn't right. If soil is too wet, aggregates get smeared and compacted, and when the soil dries, irregular, impermeable, crusty clods are left behind, along with a compaction layer under the surface, which is a loss of pore space. If the soil is too dry, aggregates get pulverized into fine powder, and pore space is also lost. When conditions are "ideal" for tillage (a squeezed fistful of soil just holds together), less damage is done, though surface aggregates are still broken up and the surface is left bare.

When using a rototiller in particular, there is a great deal of aeration, initially, which stimulates bacterial activity and results in some nutrient mineralization- release of formally insoluble organic N and P. The top 4 to 6 inches is light and fluffy and it's the perfect texture for direct seeding or sinking transplants. But with repeated rainfall, fine particles get carried down into the soil profile, where they lodge in large pore spaces, eventually filling them with solid particles. This is the beginning of the formation of a crust; water stops percolating as the large pores below the surface become clogged. Water then sits on the surface, where it is subject to rapid evaporation, leaving behind a surface crust. Because the rainfall didn't percolate but instead, sat on the surface, it was lost to evaporation- a tragedy!

In vegetable production, tillage of the soil is often necessary for many reasons which don't need to be listed here.

Soil water, continued

Many growers and researchers are experimenting with no-till and reduced tillage vegetable production schemes. One of these is the use of impermeable, heavy black plastic tarps which smother out weeds and hold in moisture, while earthworms build soil structure underneath. This leaves behind an un-vegetated, ready-to-plant seedbed. Tarps can be rotated around over the course of a season, though they are only effective if left in place for at least three weeks in warm weather conditions, longer in cooler weather. Covering an acre could cost $2,000, though they can be used over and over for quite a few years if they remain undamaged. This could be the answer for a small-scale operation. On a larger scale, a strategy that has been employed is intercropping of cover crop. If your fields are already well maintained with respect to weed pressure, this can work. If you have enough land to take a significant portion out of production, biennial or perennial cover crops, when well-established, eliminates tillage for at least a whole year. For many, however, having land available to do that is a luxury.

Zero tillage vegetable production is difficult, but reduction of tillage helps. Mowing is an important way to prevent weed seed production and hasten decomposition of crop residue, except on plastic mulch that isn't degradable. It may be possible to only perform one tillage per year, depending on the crop. Remember that there can be pest and disease side-effects to leaving residue on the surface. In fact that is one very important reason why post-season tillage is valuable.

Farming is full of compromises. Making a commitment to *ending* tillage of your soil is extreme. Making a commitment to *reducing frequency* of tillage is achievable.

Gallery of sightings...

Cucurbit Downy Mildew on Butternut Squash, topside, underside

Above: Silvering of Bell Pepper

Alternaria on Italian Parsley