Research and Extension
DONIPHAN COUNTY
AG NEWS

How Much Moisture is in that Snow?

http://bit.ly/2F20fqI

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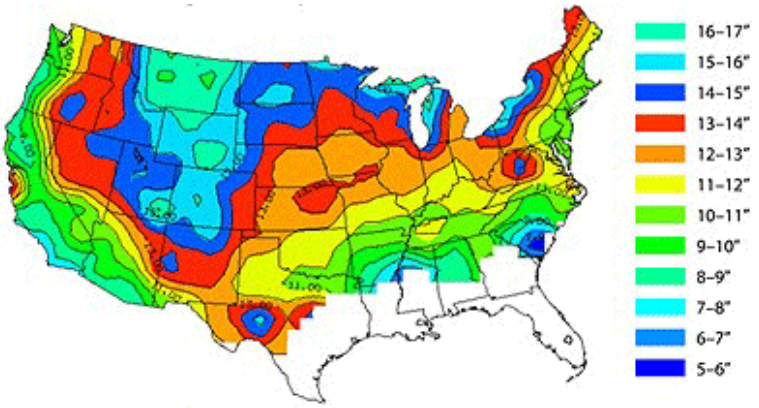
The latest Drought Monitor reports that over 60 percent of Kansas is under some form of drought with the remainder of the state experiencing abnormally dry conditions. At times like these, every precipitation event, whether it's rain or snow, becomes important. The predominant form of precipitation falling the last several weeks has been in the form of snow. This begs the question, "How much moisture is actually in that snow?"

Several terms are used when talking about how much moisture is contained in a certain amount of snow. In Kansas, the most frequently used term is often *liquid equivalent*. This is the depth of water that would result from melting a sample of snow. Liquid equivalent is the amount of measurable moisture if the snow were to have fallen as rain. This is where the infamous "10-to-1" ratio has its roots. The "10-to-1" ratio is the assumption that for every 10 inches of snow that falls, there is roughly 1 inch of actual moisture. This ratio is actually only an estimate and is based on snow forming in the 28-34 degrees F range. If temperatures are colder, say in the 10 to 15 degree F range, estimates can be as high as 30-to-1 (30 inches of snow equal to 1 inch of moisture/precipitation). This is a simplified estimation because snow liquid equivalent is also subject to temperature and humidity above the surface as well. Historically, average Kansas snow ranges from 12-14 inches per 1 inch of moisture (Figure 1).

Figure 1. Average amount of snow per inch of water, 1971-2000. Graphic by Marty Baxter, Saint Louis University, courtesy of UCAR Comet Program – www.comet.ucar.edu.



In the mountains, however, there is more interest in the *snow water equivalent*. This is the amount of water stored in the entire snowpack not just the most recent snowfall. It is determined by the snow density or the specific gravity of the snow sample. Freshly fallen snow usually has a snow density of 7-15 percent while values as low as 0.4 percent have been measured. The amount of moisture stored in the snowpack is important for predicting runoff, reservoir refill, and flood potential. Unlike in Kansas, snow accumulates all winter and rapidly melts in the spring/summer contributing to issues. Thus far in 2018, snow packs are very low in southwest United States, Oregon, and Colorado with only 9.8-20 inches (Figure 2). Still, snow water equivalents in these mountainous regions are substantial when considered to the little snow Kansas typically receives.

Finally, snow is very difficult to measure, especially with a typical automated rain gauge. With manual gauges, samples are taken and then melted. The latest storms, as reported at the Manhattan NWS Coop station, show the differences that can occur with similar snow depths but slightly different temperatures (Table 1).

Table 1. Daily records from Manhattan Coop station (NWS)

Date	Max. Temp. (ºF)	Min. Temp. (ºF)	Precipitation (inches)	Snowfall (inches)
1/14/2018	19	11	0.14	1.5
2/5/2018	16	1	0.09	1.5

Often, with automated gauges, snow blows out of the gauge before it has a chance to melt. Therefore, estimates can be greatly under-measured. This is the case with the Kansas Mesonet. While we do have some heated rain gauges, they only activate once snow covers the sensor. If strong winds continually blow the snow around, it doesn't have a chance to trigger the heater sensor and thus, is not measured. Snow that is melted (either by the heater or by warmer temperatures the next day on non-heated rain gauges) and drips into the rain gauge is measured as liquid. The data from these gauges is the liquid equivalent of the accumulated snow. You can see the current measured liquid equivalent or rainfall on the Kansas Mesonet here: mesonet.ksu.edu

Introducing Farmers.gov

I'm sure every farmer has dealt with the "alphabet soup" of government agencies. Luckily in Doniphan County, we have a fantastic team at the USDA office (hosting the USDA, FSA, NRCS, and CD) and they'll help you find exactly who and what you need. But if the office isn't just a quick drive for you, how about getting things set up online?

The USDA recently launched www.farmers.gov, a one-stop shop site that will let producers make appointments with their local USDA offices, file forms, and apply for programs from home. The three agencies that comprise the USDA's Farm Production and Conservation mission area are included: the Farm Service Agency (FSA), Natural Resources Conservation Service (NRCS), and the Risk Management Agency (RMA).

Over the next few months, more and more features will be rolled out. The next time you need some extra info or need the forms for a specific program, check out the site and be ready when you step into the office!

Upcoming Events of Interest

A few K-State events that might be of interest to producers.

- Dicamba applicator training: March 14; Junction City KS.
  - Master list of dicamba applicator trainings: http://bit.ly/2ETYPiZ
- Soybean School and dicamba applicator training: March 21; Phillips County Fair Building, 1481 US-183, Phillipsburg KS. Pre-register by March 19, either by contacting Cody Miller (codym@ksu.edu or 785-543-6845) or going to http://bit.ly/2jCFS6V)
- Soil Health Workshop: March 8; Pottorf Hall, Manhattan KS. Pre-register by March 5 by contacting Aubrey Evans (Aubrey.evans@ks.nacdnet.net or 785-537-8764).

Horticulture Information and Updates

Is anyone else as ready for spring as I am? I don't mean the part where things start to warm up…no, I'd rather skip mud season! I mean once things are growing and I don't have to worry about ice skating on my driveway every morning or chopping ice.

We're getting there, so I'm told, but we haven't made it yet. Until then, there are a few ways to cure the gardening and outdoorsy itch.

Fruit trees – time to prune!

Fruit trees should be pruned, ideally annually, during the dormant (aka winter) season. Pruning actually helps *increase* fruit yield by essentially focusing the tree's efforts on fewer branches and buds, allowing more resources to be dedicated to each individual remaining bud. A long-unpruned tree will often produce lots of fruit, but each individual piece is small and weak. A pruned tree will produce slightly fewer, but much larger and more robust fruit. Pruning also removes any dead or diseased branches, promoting overall tree health – and again, preventing it from "wasting" its resources on nonproductive branches.

The basics:

- Remove any suckers – branches that grow straight up.
- Remove damaged, diseased, or broken branches.
- If two branches rub, remove one.
- Keep the tree at a reasonable (reachable!) height overall.
- Thin the "inside" of the canopy.

For more details, including tips for different fruit tree varieties, go to http://bit.ly/2ClpL9N.

Soil Tests

The following articles by Ward Upham are taken from the K-State horticulture newsletter: http://bit.ly/2CJDTp5

I've written about soil tests before and why they're important. Here are two pieces regarding testing when the soil is wet, and the limits of soil testing.

Soil Tests When Soils are Wet

In many parts of the state, this would be a good problem to have. So let's say you just had a rain and need to take a soil test. It would be best to wait until the soil dries but it is possible to take soil tests when soils are wet though there are precautions.

Soil samples should be air-dried before being submitted for testing. Do NOT use artificial means of drying such as an oven or microwave as such treatment may result in inaccurate readings of nutrient levels. Also, be sure to use a clean container to collect the sample. Wet samples are more likely to absorb foreign materials adhering to the container, which may also influence soil test results.

For more detail on taking a soil test, click here and choose "Soil Analysis" in the left column. Take the sample into your local extension office. If you don't know the address for your local, county extension office, see http://www.ksre.ksu.edu/Map.aspx

What a Soil Test Does Not Tell You

Though soil tests are useful for identifying nutrient deficiencies as well as soil pH, they do not tell the whole story. We often receive soils from gardeners that are having a difficult time growing crops even though the soil test shows the pH is fine and nutrients are not deficient. Here are some factors that can affect plant growth that are not due to nutrient deficiencies or pH.

Not enough sun: Plants need a certain minimum amount of sun before they will grow well. As a general rule, flowering (and fruiting) plants need at least 6 to 8 hours of full sun per day. There are, of course, exceptions such as impatiens that bloom well in shade. Move sun-loving plants into more sun or use plants that are better adapted to shady conditions.

Poor soil physical characteristics: Roots need oxygen as much as they need water. A tight clay soil or excessive water can restrict soil oxygen levels as well as make root penetration of the soil difficult. Increasing the organic matter content of clay soils can help rebuild good structure. Add a 2-inch layer of organic matter and till it in.

Walnut trees: Walnuts give off a natural herbicide that interferes with the growth of some plants such as tomatoes. Vegetable gardens should be at least 50 feet away from walnut trees if possible. For a listing of plants that are susceptible to walnut, go to: http://www.omafra.gov.on.ca/english/crops/facts/info_walnut_toxicity.htm

Tree roots: Trees not only compete with other plants for sun but also for water and nutrients. Extra water and nutrients may be needed.

Shallow soils: When new homes are built, the topsoil is often stripped off before the soils are brought to grade. Though the topsoil should be replaced, it sometimes is not or is not replaced to the same depth as it was originally. You are left with a subsoil that usually does not allow plants to grow well due to a lack of soil structure. Adding topsoil to a depth of 8 to 12 inches would be best but this often is not practical. In such cases, try to rebuild structure by adding organic matter and working it into the soil.

Too much phosphorus: Most Kansas soils are naturally low in phosphorus. However, soils that have been fertilized for a number of years may have phosphorus levels that are quite high. As a matter of fact, the majority ofsoil tests we receive show phosphorus levels in the "high" category. Extremely high phosphorus levels can interfere with the uptake of some micronutrients such as iron, manganese and zinc. High phosphorus soils should only be fertilized with fertilizers that have relatively low amounts of phosphorus.

Improper watering: Roots develop where conditions are best for growth. Shallow, frequent watering leads to roots developing primarily near the surface of the soil where the soil is moist. Such shallow root systems are easily damaged by heat and any interruption in the watering schedule. It is better to water less frequently and to a greater depth to encourage a deeper root system that is less sensitive to heat and water stress. Watering during the evening can also be detrimental to plants if the irrigation wets the foliage. Many diseases are encouraged by free water on the leaves. Watering late in the day often will keep the foliage wet until dew forms. Dew will keep the foliage wet until it evaporates the next morning. It is better to water early in the morning so leaves do not stay wet as long. If you must water late in the day, use drip irrigation if practical (such as in a vegetable garden).

Overwatering: Roots need to breathe. In other words, they must have oxygen in order to survive. Be careful to not water so heavily that the soil remains saturated. Water deeply but allow soil to dry somewhat between waterings.