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UW—EXTENSION—LANGLADE COUNTY

Langlade Ag-Letter

The Math of Soil Moisture

The last two years have posed significant challenges to maintaining a low stress environment to high value crops such as potatoes. For optimal size and yield characteristics, potatoes require consistent and adequate water. Just one water stress event can cause significant tuber malformation.

There are two basic considerations for irrigation management whether you are going by "feel" or by a checkbook style/computer based system. The soil has only so much water available at the potatoes rooting depth. Of the total available water (TAW) in the root zone depth there is a critical amount needed for stress free growth. This is called the Allowable Depletion (AD). If soil moisture falls below this level, plants will be operating under a deficit and eventually photo-synthesis slows effecting plant growth and tuber bulking.

The total available water (TAW) differs by soil type. Generally, the allowable depletion (AD) is 35-40% of the total available water for potatoes, 50% for most other crops.

An example the research plot soils are both Antigo silt loam, and Pence sandy loam. Assuming a potato rooting depth of 12", there is about 4" of available water for Antigo and 2.5" for Pence. If the allowable depletion is 35% of this, we need to irrigate after a depletion of 1.4" inches for Antigo and .9" for Pence.

The second part that comes into play is evapotranspiration (ET). This is the amount of moisture removed by a crop. Without a potted greenhouse plant and balance scale, this is an estimate. Instead, ET is calculated from weather station data For example on June 1, when it was 78ºF, our weather station gave us an ET of .171". This is based on a full (80%) canopy. With mostly early emergence potatoes the ET is really quite negligible.

In the case of forages this ET is not neglible. Statewide we have seen lower yields thus far due the dry and windy May.

So how do we put this all together? We add ET's daily, subtracting rainfalls inches. When we near the allowable depletion we irrigate.

This is the basis for most of the irrigation schedule-ing software and management tools listed below.

KanSched
www.oznet.ksu.edu/mil

WISDOM Gempler's 608-424-1544

WISP spreadsheet (www.soils.wisc.edu/wimnext/water.html)

If you go by the "feel" method here are some general guidelines:

Loam, silt loam, clay loam
Irrigate when soil forms a ball readily, holds it's shape. No moist feeling is left on hand nor will any soil fragments cling to palm. Ball is very brittle and breaks readily. Soil crumbles or falls into small granules when broken. No finger print.

Sand and loamy sand soil texture
Irrigate when soil forms a very weak ball. If soil is well broken up, it will form more than one ball upon squeezing. Fingerprint outline is barely discernable. Soil grains will stick to hand.

Generally the absence of a fingerprints is a indication available soil moisture is below 60%.

Adapted from *Irrigation Management in Wisconsin—the Wisconsin Irrigation Scheduling Program (WISP),* Pub A3600

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