NW Panhandle Crop Notes

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November 2021

Looks like the good weather for harvesting continues and according to reports, crop yields have been relatively good across the Panhandle. However, fields supporting various stages of small grain crops could benefit from a gentle, soaking shower. Improved pastures and native grass rangelands need a soaking rain too. The Water Weekly, an online, state-wide map published by the Texas Water Development Board is updated weekly and indicates areas experiencing less than average rainfall. Recently published maps indicated that dry conditions were gradually spreading across the Panhandle and with increasing severity in certain areas. We all would like to see improvement in this map as we round the corner to December. We'll know the outcome soon.

Fertilizer pricing is back in the news. The current trend is much like it is with other resources most of us need. I recently read about fertilizer prices skyrocketing and soaring to record highs. That is a concern for farmers looking to purchase, apply or top off those nonvolatile, immobile nutrients (all excepting nitrogen) during the off, cool season for next year's row crops. This adds even greater value and relevance to soil testing and should strengthen our reliance on utilizing representative soil test results. Better engagement with the 4R nutrient management idea of right timing of fertilizer application, source, amount, and placement will pay dividends in the long run.

Those managing small grain crops such as wheat and oats will want to be on the lookout for symptoms of disease. If there is older, infected, volunteer wheat adjacent on pivot corners or in the nearby vicinity of fall planted wheat, that is a concern. Reason being that a disease pathogen in the older, volunteer wheat plants could eventually transfer to a nearby, younger wheat crop if the older wheat is not eliminated. One example of this could be the wheat kernel mite overwintering in older, volunteer wheat and then spreading in wind currents to a younger wheat crop. Wheat Streak Mosaic Virus is known to be vectored or transferred by these same mites to infect and cause damage in any wheat plants that are susceptible to the disease.

The remainder of this blog and newsletter is primarily targeted toward discussion about water inputs and management for cotton production in the semi-arid Northwest Panhandle of Texas. Some readers may wonder why continue addressing details about cotton production as the year went along. Well, the following are a few of the supporting drivers previously pointed out and I think are worth mentioning again. One, there has been a significant increase in acres of cotton planted in the Texas High Plains since 2013 https://www.morningagclips.com/northern-high-plains-cotton-acres-up/ . Cotton production grew by over 300 percent in five northern tier counties of the Panhandle from 2013-2018 with Moore and Sherman included among the five. Secondly, it is well known that the saturated thickness of the Ogallala Aquifer has been declining over the past couple of decades which means that irrigation well capacities have also declined. However, the good news is cotton requires considerably less water than corn so that favors it

fitting into a corn-cotton rotation. Additionally, cotton is well known across growing areas of the Beltwide as a cash crop.

Plate 1. Early growth of irrigated, fall planted wheat in eastern Sherman County, 2020.

Crop Water Requirements for Cotton:

It is of great benefit come planting time that the soil profile is near maximum water holding capacity, especially for dryland cotton production. This means that the soil moisture reserve is robust on the front end and more water is available for drawdown season long. Said another way, a best reserve moisture scenario is having needed water banked in the soil profile to cover evaporative losses from the soil surface plus water loss from leaves due to transpiration, together known as evapotranspiration (ET) by a developing cotton crop.

Adequate soil moisture in the upper profile and seed zone at planting time is critical for quickest seed germination, seedling emergence and arrival at the cotyledon stage. Dr. Seth Byrd pointed out in his post https://agrilife.org/texasrowcrops/2016/05/06/considerations-for-cotton-planting-and-early-season-growth/ that water and temperature are primary drivers of cotton growth, early stages and throughout the season. Cotton doesn't require a big supply of water for growth early in the season; however, sowing seed into adequate moisture is critical for germination.

Plant demand for soil moisture reserves through the early true leaf stages gradually increases up to the pinhead square or beginning reproductive stage of growth. Besides warm temperatures, adequate soil moisture promotes rapid growth and ability of seedlings to withstand stressed conditions. Examples of stress include possible injury from preemergent herbicides and feeding

of thrips on tender leaves that originate from plant terminals. As additional squares develop, the demand for water uptake rapidly increases, in part due to the continuous development of additional mainstem and fruiting branch leaves. To the extent that vegetative branches develop, the associated leaves also require water for transpiration. If limited to two irrigation events post seedling establishment and drought conditions present, the authors recommended one irrigation before squaring and the second before peak flowering https://agrilifeextension.tamu.edu/library/farming/irrigation-timing-during-drought-corn-cotton-and-sorghum-furrow-systems/.

Plate 2. First position square and subtending leaf on the first fruiting branch of a cotton plant growing in a dryland field. From Replicated Agronomic Cotton Evaluation (RACE) trial in eastern Moore County, 2021.

By first white flower, the cotton canopy has reached near maximum amount of leaf area. Every leaf needs to lose sufficient water for cooling, so the water requirement increases sharply. As flowering continues and retained bolls develop, demand for water resources increases further until at which point it reaches a maximum of around 0.28 inches per day according to Dr. Jourdan Bell https://agrilifetoday.tamu.edu/2020/02/24/cotton-key-player-in-water-conservation-in-northern-high-plains/ . Average daily water use is approximately 0.25-0.28 inches per day for about 40 days (known as peak flowering and boll development stage). Water is the driver for maintaining adequate turgor pressure in developing bolls. Individual fiber cells born from seed lengthen by the presence of water. Potassium (K) is the principal nutrient ion responsible for maintaining turgor pressure by drawing needed water to the developing bolls.

My previous blog and newsletter addressed the term “soil health” and discussed ways that soil chemical and physical properties are integral to building and maintaining soil health for a cotton cropping system. When it comes to meeting the water requirements for an irrigated or dryland cotton crop, soil health plays a big role. Keeping residue cover on the soil surface reduces evaporative water loss via lower wind speed, less radiation load, greater reflectance of light, a cooler soil surface temperature, all of which promote greater soil moisture available for plant transpiration. Transpiration or water loss from leaves to the atmosphere is essential for adequate cooling and physiological maintenance of the leaves.

Plate 3. Subsurface drip irrigated cotton planted into a strip-tilled field that has a considerable inter-row accumulation of the previous season’s corn residue. Cotton nearing the 5th true leaf stage, just prior to initiation of first squares. North Plains Water Conservation Farm, Moore County, 2021.

Irrigation Scheduling, Tools:

It is quite common, especially in a semi-arid environment that growers make difficult decisions about irrigation such as when is best, how much water per event, and the number of events. Irrigation scheduling involves adding the appropriate amount of water to top off what is needed and available for plant growth in the soil profile against the combined losses of water to evaporation from the soil surface and that lost from leaves via transpiration. The combination of these loss pathways is evapotranspiration which fortunately we can get a good estimate of as the season progresses.

Depending on the amount of supplemental water available, farmers may realize that their crop is experiencing a deficit. However, the thing to remember is that cotton is known for being drought tolerant and a strategic approach to irrigation scheduling will deliver the most profitable outcome in terms of fiber yield and quality. In part, that means targeting water application events just before the most sensitive stages of growth to water deficit. Where soil moisture has been monitored with buried soil sensors and most bolls have reached maturity, it may be possible to reduce the amount of water applied or eliminate the last irrigation without affecting yield.

Soil moisture sensors and web-based schedulers built on crop water use models appear to be the principal means of tracking soil moisture budgets throughout the growing season. The key is making sure a person can get access to all pieces of information that need to be plugged in. These are tools that farmers can use to manage irrigation events, boost water use efficiency and

see greater return on investment. From a demonstration standpoint, it will be valuable to clarify over time if using soil moisture sensors in conjunction with one or more of the irrigation scheduling programs is better than relying on a single measurement or technology.

Plate 4. Electronic-based soil moisture sensors installed before planting and used to monitor the status of moisture season long and beyond at interval depths in the soil profile. North Plains Groundwater Conservation Farm, Moore County, 2020.

Resources for Irrigation Management:

There is a wide range of resources for information related to irrigation management. Land Grant University Systems in the Mid-Western and Western U.S. have Research and Extension units with Specialists and other staff including Agents who publish applied research findings, results from on-farm demonstrations, as well as guideline updates. See links to publications and active programs at https://amarillo.tamu.edu/amarillo-center-programs/ the Texas A&M AgriLife Research and Extension Center at Amarillo and at Lubbock https://lubbock.tamu.edu/.

One source of great overviews on water management for semi-arid, High Plains crop production supported by groundwater from the Ogallala Aquifer is www.OgallalaWater.org . Browse through the drop-down menus for detailed information on irrigation scheduling tools, irrigation management technologies, soil health, soil moisture monitoring, drought planning and more. Researchers and scientists in all states that share the presence of Ogallala groundwater resources contribute to this information database. The North Plains Groundwater Conservation District's website http://northplainsgcd.org/ is a great source for local, educational information including the Cotton & Conservation video series that provides season long updates on variety trial sites in the area.

This wraps up today's blog on matters related to crop water requirements, irrigation scheduling and resources to assist managing irrigation for cotton production in the northwest Panhandle of Texas. Happy Thanksgiving to all. Be on the lookout for upcoming announcements about the winter, educational meetings ahead.