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Crop Management Newsletter

News about Crop Management for producers in Dawson, Lynn and surrounding Counties.

Thanks to the sponsors and the gins who support the Dawson/Lynn IPM Program
(found on page 2)

Current Conditions

Cotton is developing at a near optimal rate even with the extreme temperatures. That can change in a hurry without the help of rain in many areas.

Tuesday saw many areas of Dawson County get pretty rattled up with hail and high winds - even turning beautiful cotton to nothing more than sticks.

Square set is still adequate at an average of 96% (ranging from 89% - 100%) with 90% of fields squaring. The most advanced fields, in the scouting program, are at 1/3-grown+ square. Might see our first bloom next week but for sure the following week.

Insect activity remains very light to non-existent.

However, the sugarcane aphid is sitting on our, the High Plains, doorstep. It has been confirmed in the San Angelo area and 175 miles east of Amarillo, in Oklahoma.

Nitrogen Fertility

Idealy we would like to have all the nitrogen in place at first bloom or shortly there after - exception would be drip irrigated fields where we are spoon feeding the crop with daily nitrogen.

High Temperature Effects on Cotton

(from Physiology Today - July 1990)

Cotton yields skyrocket or plummet in response to weekly changes in temperature. This is particularly true for dryland cotton where hot temperatures mean high water use with little rainfall.

Much of the confusion regarding high temperature and its effect on cotton growth derives from the many factors that determine how hot the plant tissue actually gets. Air temperature is important, but so also are sunlight, soil moisture, relative humidity, and air movement. Plants attempt to regulate their tissue temperature, just like warm blooded animals. Although cotton can only cool itself, not heat itself. Cotton attempts to keeps its plant tissue temperature between 74 and 90, in the optimum range for growth and photosynthesis. It accomplishes this by opening stomates in the leaves allowing water to evaporate when the air temperature and sunlight heats up the plant. Thus during a hot dry afternoon, well-watered cotton plants are often 10 degrees cooler than the air temperature. Under the extremely hot June 1990 weather in Arizona, where the air temperature reached 121°F, plant canopy temperatures of 88°F were measured in

well watered cotton fields. At the same time, canopy temperatures in less than well watered fields reached 104°F, which certainly was not favorable for carbohydrate production. Over 99.9% of the water taken up by plants is used to evaporatively cool the plant. Drought and hot weather work together to damage the plant primarily from high tissue temperature and not tissue desiccation. The following conditions restrict cottons ability to cool itself causing high temperature damage:

• Dry soil restricts the flow of water into the plant and out the leaves. The actual soil water content is less important than the ability of the soil to conduct or move water into the plant. Cotton growing in sandy soils will often wilt during the afternoon, despite good soil moisture, due to the poor movement of water in sandy soils after they have drained.

• High relative humidity will restrict evaporative cooling because the air is near saturation and can only hold so much water at that temperature. When high humidity occurs in combination with bright sunlight, well-watered cotton tissue temperature can often exceed air temperature by 3-4°F.

• Bright sunny days increase plant tissue temperature because cotton is a strong absorber of solar radiation. When a cloud passes overhead cotton tissue temperature may drop by 5°F.

• High night temperatures (minimum above 80°F) increase plant temperature because the cotton closes its stomates and ceases evaporative cooling when the sun sets. At night the only source of evaporative cooling is from a moist soil surface, or free water on the plant from a recent rain or sprinkle irrigation.

Temperature is the driving force that allows the chemicals in the cells to react. The warmer the temperature the faster they react, which is beneficial during the day because photosynthesis and growth is faster, until the temperature gets so warm that the cells start to leak rather than react.

Since the plant is unable to cool itself during the night, high night temperatures (minimum above 80°F) are detrimental regardless of dryland or irrigated cotton. During early square development pollen grains undergo a temperature-sensitive stage; the physiological effect is a dramatic reduction in boll set. When high night temperatures coincide with peak bloom, the plant sheds many of its small bolls. As the duration of

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Tommy Doederlein

Tommy Doederlein
Extension Agent - IPM
(806)872-3444 (office)
(806)759-7030 (cell)
t-doederlein@tamu.edu

high temperature stress extends, larger and larger bolls will be shed.

Without adequate moisture, high air temperatures during the day the damaging effect is most severe on cotton in bloom. Respiration of "hot" cotton is dramatically increased while photosynthesis is decreased, causing a severe shortage of carbohydrates which limits the plant's ability to fill bolls. The plant responds to this "carbohydrate squeeze" by adjusting the boll load. The plant retains only the number of bolls that it currently has carbohydrate supply to mature.

When hot temperatures occur prior to bloom or after boll set, yield is often increased. Hot temperatures pre-bloom speed the arrival of the bloom period and occur at a time when water use is low and the root system is still expanding into fresh soil moisture. Hot temperatures after boll set hasten the maturation and opening of the crop. High night temperatures are detrimental to young boll set and boll size regardless of the moisture status, because the plant does not cool itself at night.

When dryland cotton is wilted with no forecast of rain there is little we can do to remedy the situation, but there are certain practices that should be avoided. Cultivations that damage roots can aggravate plant stress and increase shed. Even shallow cultivations, when the soil is dry, can break roots at a deeper depth. Plant Growht Regulators such as PIX should not be applied to water stressed cotton.

Where irrigation is available the management of cotton during high temperatures is summed up by "frequent light irrigations." Keep the availability of soil moisture high and the surface soil moist. Avoid heavy irrigations that saturate the soil and cause anaerobic (lack of oxygen) stress, because cotton will wilt and die rapidly in warm waterlogged conditions.