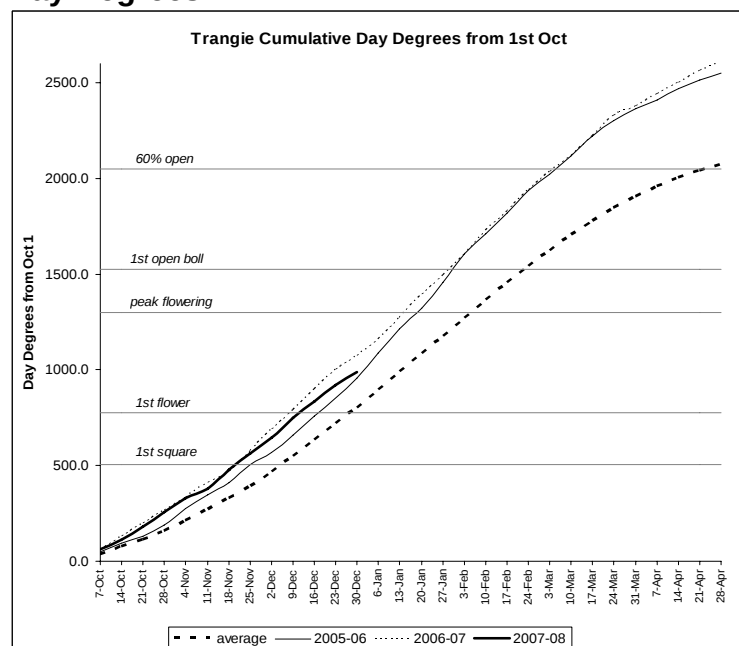


Day Degrees



Water Logging in Cotton

With the recent rain activity in the district, water logging has become an issue for some crops. Because clay soils drain slowly, many cotton crops are subjected to some degree of water logging. This problem is accentuated by rainfall after irrigation, cloudy conditions, and inadequate land preparation. On heavy clay soils adequate field drainage and slope and a high plant bed height are essential to reducing the effects of waterlogging.

Water logging may reduce crop yield by up to 1 bale/ha with yields affected before symptoms are noticed. Symptoms of waterlogged cotton include a general yellowing of the crop and stunted growth.

The major and immediate effect of waterlogging is blocking transfer of oxygen between the roots and the soil atmosphere. Plant roots may become so oxygen deficient that they cannot respire. As a consequence, root growth and absorption of nutrients is decreased leading to less overall plant growth.

Waterlogging also tends to increase sodium uptake by cotton - this is being researched this summer. As the roots of some crops (eg maize) have their roots exposed to low levels of oxygen in the soil, as occurs with waterlogging, an enzyme that helps to exclude sodium from the plants is disabled, hence sodium can move into the root more freely. This may then affect the uptake of other nutrients and the growth of the plant.

In addition to the physiological impacts of waterlogging on the crop, there are also significant impacts on nutrient availability and uptake.

The availability of Nitrogen (N), Iron (Fe) and Zinc (Zn) (reduced) and Manganese (Mn) (increased) are directly affected by the decline in soil oxygen, and uptake of N, K, P and Fe by the roots is also impaired.

Nitrogen

Besides impairment of root uptake activity, an added penalty under waterlogging is the denitrification of soil mineral nitrogen. Therefore, even after waterlogging has ceased, there may be less N available for the crop. In this circumstance, much of the yield loss through temporary waterlogging may be recovered by supplying N directly to the leaves as a foliar spray.

Yield reduction from waterlogging may be severe but applying foliar fertilizer or water run N (about 8 kg N/ha before each of the first three irrigations) can help recover yield loss by encouraging further growth.

Foliar N is more effective in increasing the yields of waterlogged cotton when applied one day *before* irrigation or predicted large rainfall events under hot, sunny conditions.

Application to a field that is waterlogged will not necessarily alleviate existing damage, however if a field has suffered from waterlogging and further rainfall events are forecast that could cause more waterlogged conditions then a foliar application of N (and possibly Iron) prior to this event may help prevent or minimise further yield losses. Plant tissue testing may be used as a guide to indicate susceptibility to waterlogging and response to foliar N.

Potassium and Phosphorus

Waterlogging is possibly involved in premature senescence of cotton. Under waterlogged conditions, uptake of P and K by the cotton crop may be reduced, predisposing the crop to the premature senescence syndrome.

Iron

The young leaves of iron deficient plants become yellow between the veins (chlorosis). The veins usually remain green, unless the deficiency is severe. The whole leaf may eventually turn white. Although the plant may contain high concentrations of iron, most of it is unavailable for chlorophyll production and the leaves lose their green colour. Foliar application of 200 g Fe/ha with ferrous sulphate may return foliage to its normal colour within 2-3 days. *(For more info on waterlogging refer to NutriPak & WaterPak. Thanks to Susan Maas and Ian Rochester for their assistance with this article.)*

The **Macquarie Valley Trial Book** compiling the 2004/05, 2005/06 and 2006/07 seasons has been mailed out. If you did not receive a copy or would like more copies please contact me or drop into the Warren NSW DPI office and pick one up.