

### Day Degree Accumulation

| District |                  | Season<br>10/11 | Season<br>09/10 | Average | Hot<br>Shock | Cold<br>Shock |
|----------|------------------|-----------------|-----------------|---------|--------------|---------------|
| Emerald  | From<br>05/10/10 | 949             | 1129            | 1108    | 2            | 2             |
| Emerald  | From<br>15/11/09 | 494             | 622             | 577     | 2            | 0             |
| Theodore | From<br>02/10/10 | 904             | 1126            | 1023    | 2            | 4             |
| Theodore | From<br>12/11/09 | 512             | 655             | 563     | 2            | 0             |

### Impact of flooding on Nutrition – Q&A with David Lester, DEEDI

**Q.** How much N (and other elements) do you think would be lost where country has been flooded?

**A.** There are two loss pathways in this situation, denitrification and leaching loss. Denitrification occurs under three conditions: (i) N being present in the nitrate form, (ii) the soil having an oxygen deficit (waterlogging) and the (ii) availability of reasonable quantities of biological carbon for the soil microbes to chew on. If one of these three isn't there, then the rate of N loss as denitrification is reduced.

The highest levels of labile carbon are in the surface, so this is where most likelihood of denitrification can occur. Nitrate lower in the profile may be less likely to be lost, as there is less biologically available C and so a lower microbial activity, meaning lower oxygen demand.

Rough rules of thumb are that nitrate moves at about 1/4 the speed of the wetting front (i.e. dry soils wetting up). **If there is no water movement, you have a full soil profile, and deep drainage is slow - the movement of nitrate may not be much.** There is a difference in nitrate not moving, not being lost and being plant available. Until the profile dries out so that you can get viable root activity, N recovery by the crop will be poor.

Mineralisation is biologically driven, hence it's a function of soil temperature, moisture and C availability. Under hot wet (not saturated) conditions, microbes go to town and so process the soil organic matter faster, mineralising more N as a result.

Once the profile is full, whatever N that has mineralized during the drier periods will be retained near the soil surface due to the lack of infiltration and hence leaching. Therefore it is very vulnerable. That said, once you have wet the soil (and perhaps denitrified the first batch of N from when nitrate was high), the subsequent wetting events probably won't cause more loss, as mineralization will have been retarded by the lack of oxygen.

Availability of other nutrients will be influenced by the rate at which the waterlogging passes. Under periods of long-term waterlogging some changes in soil P can occur. The main point about both P and K, which rely on diffusive supply, is that waterlogged root systems, or root systems that are only able to access a small volume of aerobic soil profile, may run into deficits that would not be seen under normal conditions. The volume of soil accessed is a key component of the P and K supply processes, so where crops are struggling, there may be short term periods of P and or K deficit on soils that were at the lower end of the normally optimal range. There should be no big losses, like there will probably have been for N.

**Q.** I'm considering flying on urea, will I loose much?

**A.** Volatilisation loss of urea, or ammonium forming fertilisers, is greatest on wet soils drying out – conditions that may exist often this year. Flying or broadcasting urea onto an alkaline soil surface without incorporating it, and without rain or irrigation to move it into the soil is most likely going to result in significant loss of that applied N. There are some additives available for use with urea to decrease the loss potential, for a few days at least, but some mechanism (tillage or water movement) to get it into the soil is still needed.

It is also important to consider risk of too much nitrogen. Too much or too late application of N will encourage excessive vegetative growth, & delay maturity, resulting in smaller bolls.

### Can mechanical tipping out help flood effected cotton? By Paul Grundy & Steve Yeates

One of the questions raised by Emerald growers at last Thursdays shed meeting was whether or not crop "slashing" could be used to stimulate the recovery of flood effected crops.

As part of our R&D program for developing a cotton production system in the Burdekin we have been investigating the use of mechanical tipping out as a strategy for managing flowering and the risk of wet weather. The premise for tipping a crop out mechanically is to delay flowering until a later time when wet weather may be abating. For the Burdekin region the best time to plant cotton is between December 20 and January 20. Planting in January is a more successful option as crops planted in mid-January will commence flowering in March which is more likely to be dry. The problem for many growers, particularly on heavy clay soils is that waiting to sow until January is risky with the threat of monsoon weather and therefore it is generally easier to plant in late December. However, these crops flower in mid-

February which is the wettest month and often end up with extensive fruit shedding (see plant below). We looked at tipping out as a potential solution to this problem whereby December sown crops could be tipped out anywhere between 6 nodes and first flower with a light-weight tractor and cutter bar to delay fruit set until March.

We have conducted 3 experiments looking at when and how cut cotton and have concluded that the most reliable results are achieved with the removal of 3-4 nodes from the top of the plant and that this can occur at any stage between 6-7 nodes and first flower. The resultant delay in flowering is generally between 350-400DD, with little effect on crop maturity in the Burdekin climate. The delay in flower is due to the interruption of the usual progression of main-stem flowers with the plant forced to rely on the production of new sites on vegetative branches, hence the delay. A proportion of the lost time is then made up by tandem flowering on multiple vegetative branches when flowering recommences. In short, flowering on the main stem ceases but is then followed by a very rapid period of fruit set on vegetative branches. Advantages of tipping out in the Burdekin are due to the avoidance of February rain on flowers for December sown crops, better light interception due to the creation of a open "vase" like canopy, reduced crop height and an additional 2-3 weeks of time after sowing to complete nitrogen side-dressing before boll setting.

For flood affected fields in Emerald slashing might be of benefit by encouraging more rapid compensation via stimulation of vegetative branch growth and rapid production of new squares, improved light interception if cloudy weather continues and a reduction in crop height.

**However, as this is untested for flood effected cotton it should be realised that slashing may**

**provide little overall benefit compared to a plant left untouched.** In Burdekin experiments there have either been only marginal increases in yield or no significant differences compared to un-tipped controls. The response ultimately depends on the weather once flowering re-commences.

For people considering the use of mechanical tipping please consider the following-

- Use a cutter bar or very sharp, height controllable flail mower. The aim should be to only remove the top few nodes in a controlled manner with as clean a cut as possible. Swinging blade rotary style slashers tend to "smash" the main stem and can significantly damage a crop.
- Avoid damaging vegetative branch terminals. If vegetative branches are damaged crop maturity can be delayed by several weeks.
- Assess the fruit load. Slashing is only likely to be of benefit up until very early flowering or for a crop has suffered extensive shedding/fruit loss. A crop that has set bolls on the lower branches is likely to respond slowly to tipping out and result in delayed maturity due to a "second flowering" affect.
- The first 3-4 nodes of vegetative branch growth after tipping can be rapid and a little leggy. This can be managed with low doses of pix (300-400mL/ha). This response will cease as new squares develop on the branches.
- Please leave an area un-slashed to compare. It is not known whether or not slashing will ultimately improve a flood effected cotton so by leaving a comparison strip we might all learn something for next time.



*Despite the delay in flowering, tipped-out plants mature at the same time as un-cut controls in the Burdekin. This is because shedding and poor boll set on the lower branches as seen in the above control (left) results in a maturity delay and the need to grow a compensatory top crop, something that requires high level management and is not always easy to achieve. The tipped plant on the right has set bolls on multiple branches with the age of difference between the youngest and oldest bolls being less than the untipped plant on the left.*