

# Germinating ideas

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This edition will cover some of the key management considerations with growing Bollgard II cotton. We will see the full introduction of Bollgard II in Australia following the removal of Ingard cotton after the 2003-04 season.

Bollgard II cotton has been grown commercially for two seasons and in small plot trials for longer. These management points have been developed by the evaluation and monitoring of those crops and general experience of what has been documented in the field and research.

We are now able to grow a cotton plant that has been modified to better fit into our environment. We have been conditioned to trying to modify the environment to make it more suitable for the plants we have tried to grow with sometimes disastrous affects.

There is now an enormous opportunity to pay more attention to other aspects of cotton production as the risk of *Helicoverpa* damage has been substantially reduced.

This edition will also look at silverleaf whitefly (*Bemisia tabaci* – biotype B) that can be a potential problem for many cotton growing areas. If not detected early



The introduction of Bollgard II brings a whole new learning curve.

enough they can cause large reductions in fibre quality from honeydew contamination, reductions in carbohydrates and potentially cause the spread of viruses. A brief overview is provided.

## BOLLGARD II MANAGEMENT

### Planting date

There may be an opportunity to plant Bollgard II cotton slightly later than nor-

mal. This is particularly relevant in western, northern and warmer areas with longer growing seasons.

For the more southern areas, a later planting date is still possible but care should be taken to minimise potential losses from late season rain and cool weather. Varietal choice is an important issue. This is discussed in a later section. Due to good crop growth and higher fruit retention, a picking date close to normal will be achieved.

By planting later it may be possible to avoid some seedling mortality by early season diseases and Fusarium.

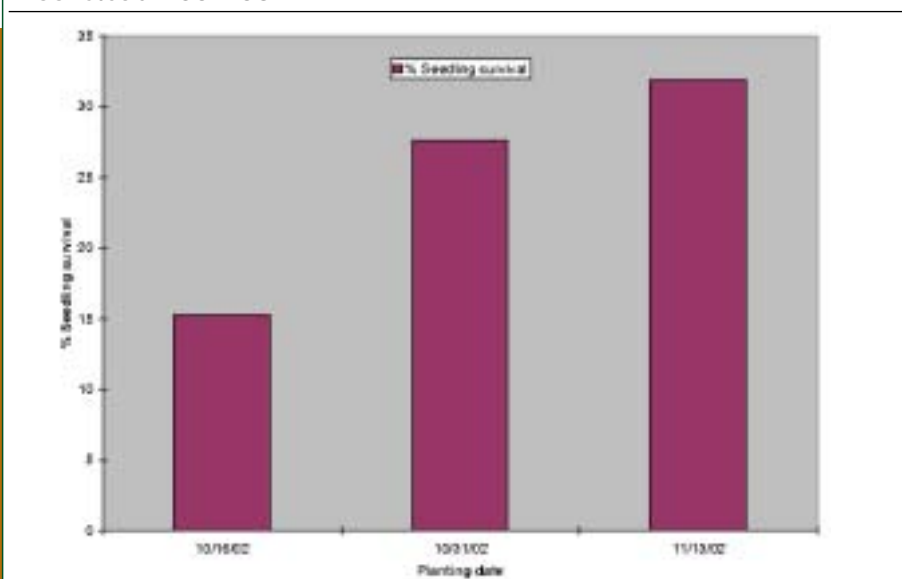
Figure 1 shows how later plantings can help improve seedling survival.

### Varietal selection

The correct selection of Bollgard II varieties is important to help ensure the best agronomic fit for each growing region. The same principles apply with the hot, central and cool region delineations based on average daily growing degree day contours.

The availability of stacked varieties (those with both the Bollgard II and Roundup Ready genes) offers even greater choices for particular cropping systems. Seed companies' variety guides and trial result publications are an excellent source of information on the varieties available. Many management decisions and crops inputs will be determined by varietal selections. Full

FIGURE 1: Differences in seedling survival from three planting dates at Brookstead 2002-03



SOURCE: Dr S Allen, CSD and Cotton CRC.

Fusarium Resistance Ranks and Verticillium rank are available for all varieties. The number of trials in brackets is important — for example Sicot 14B FRR 145 (15).

### Planting rate

Trials conducted by CSD over five years at several sites have shown that Ingard and more recently Bollgard II crops require around 12.5 established plants per metre to optimise yields. Fields with below eight plants per metre should be avoided along with stands that have gaps in them.

Plants with high fruit retention and little tipping out will have reduced lateral branch growth and will not be able to compensate for gaps in the plant stand as well as lower retention crops. Fibre quality is not affected by these higher plant stands.

### Plant growth regulators

Making Pix decisions for Bollgard II crops will be similar to conventional cotton. The vegetative growth rate will need to be measured and decisions can then be based on the rate of increase in the internode length. These measurements are usually started at around 12 main stem nodes (first flower). High retention crops may not need PGR applications and applying them to crops that don't need them can actually reduce yields.

### Irrigation management

The same principles will apply for Bollgard II cotton as for conventional cotton but water demand may be earlier and a lower irrigation deficit may be required. This is particularly relevant in areas with higher temperatures and in lighter soils.

In high retention crops with rapid boll set, there may be a reduction in root growth as leaves and bolls compete for available soil moisture. Accurate monitoring is required to avoid any potential for moisture stress.

### Nutrition

Adequate nutrition for Bollgard II crops will be important for maximum production. The principles will be the same as for conventional cotton but amounts and peak demand times may vary for different nutrients.

Bollgard II cotton may have higher fruit retention on lower branches. This is generally a good thing with higher retention and yields, but it can also lead to an early cut out with limited yields if nothing is done.

Where possible Bollgard II crops should be grown on the best soils. Soil testing and in-crop leaf and petiole testing can be valuable tools for measuring and monitoring the crop's nutrient status. Steps can then



Variety choice is important in UNR or 15 inch cropping systems.

be taken if these levels or time of application need adjusting.

### Early season monitoring

There is now greater opportunity to monitor early season Bollgard II cotton growth and to make management decisions earlier if the crop is not reaching set criteria in its early growth. There are a number of ways of measuring the plant's performance including:

- Fruiting factors;
- Fruit retention (percentage);
- Vegetative growth rate (used for Pix decisions); and,
- The early season diagnostic tool.

The University of Arkansas used the early season diagnostic tool in the development of the COTMAN Expert System.

Before flowering it uses the number of squaring nodes per plant. This gives an indication of potential problems and allows early remedial action rather than waiting until the crop flowers before finding there may be a problem.

After flowering it uses nodes above white flower (NAWF).

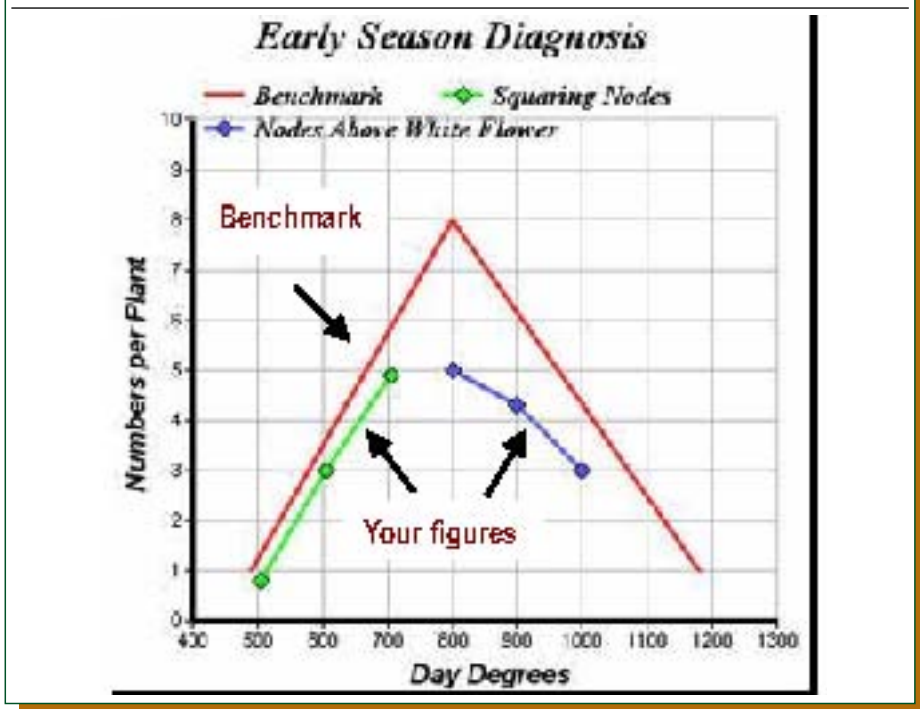
You only need two pieces of information:

**Day degrees:** This can be calculated on the Cotton CRC Website. All you need to know is the planting date for your crop and the region you are in.

**Fruiting nodes:** Count the number of nodes per plant that have a square.

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FIGURE 2: The early season diagnostic Tool is available at the Cotton CRC website



This tool is available at the Cotton CRC website ([www.cotton.crc.org.au/tools/esd.cgi](http://www.cotton.crc.org.au/tools/esd.cgi)).

The ESD tool is one that is quick and easy to use and your crop's performance is plotted on the graph according to its progress. These can then be used to make management decisions as required.

### Waterlogging

Losses from waterlogging can be significant. If waterlogging occurs early and if there is still enough season length, the plant may be able to compensate by adding more fruit and increasing the size of remaining fruit. This may also delay the crop.

With high retention Bollgard II crops, the impact may be higher than in conventional cotton as there will be more squares and bolls prone to shedding at any one time. Losses from waterlogging can be up to 30 kg lint per hectare per day of waterlogging.

Older plants are generally less affected by waterlogging as the total supply of assimilates will be greater.

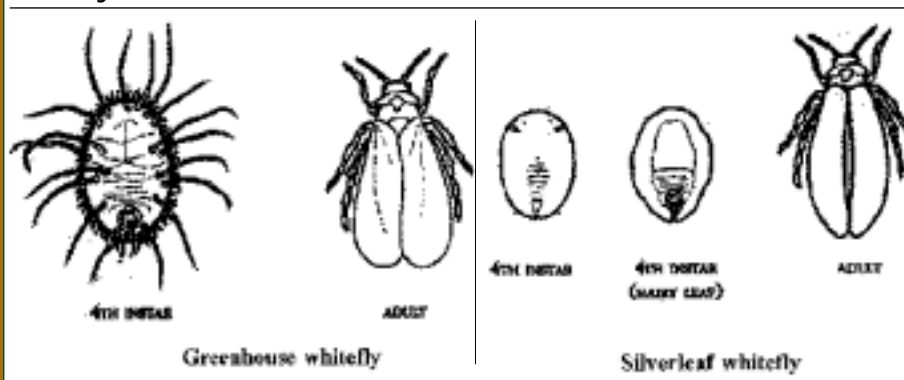
Applications of foliar N prior to a water-logging event can reduce its impact.

### Sucking pest control

Pests such as mirids have been a problem in Bollgard II crops. There has been much research over many years on these pests and the impact of the damage they cause.

Mirids can be present from early squaring right through to crop maturity and can cause reductions in yields and also gin out-turns and lint quality in extreme cases. Monitoring for mirids is required

**FIGURE 3: Difference between greenhouse whitefly and silverleaf whitefly**



all season. Other sucking pests should also be monitored, including apple dimpling bugs.

Thresholds have been determined and further research work is continuing. The current thresholds for mirids are:

- 0.5 per metre in cooler season areas; and,
- One per metre in warmer areas.

These thresholds should be dynamic and adjusted according to damage and fruit retention levels.

Beat sheets are a very effective way to monitor for mirids. They have a three to one advantage in sampling effectiveness for mirids over visual checks. For example, where three mirid adults and nymphs were found with a beat sheet check, only one would be found with a visual check.

### Utilising later fruit

There is now the potential to utilise later fruit in Bollgard II cotton to contribute to yield and fibre quality and to dilute micronaire. In the past, late fruit was generally seen as undesirable due to the potential damage from *Helicoverpa*.

With Bollgard II cotton giving season-long protection from damaging grubs, this later fruit may now be able to make it through to picking. Crop maturity and the full development of later fruit will be dependent on season length and temperatures from cut out through to defoliation.

### SILVERLEAF WHITEFLY MONITORING

It will be important for all areas to monitor for the presence of whitefly (*Bemisia tabaci* Biotype B) in the 2004-05 cotton season.

Whiteflies have been a pest in northern areas (Central Queensland) in previous summers and they have the potential to cause significant contamination in open cotton if left uncontrolled.

Whitefly does not have a diapause phase and may over-winter on weeds and other crops. Milk thistle is a very good host. There are thresholds established and regular sampling is required throughout the season. This is applicable for both Bollgard II and conventional cotton.

### Key points for whitefly management

- Avoid organophosphates early;
- Farm hygiene — remove weeds, volunteer cotton and regrowth;
- Be diligent;
- Area Wide Management is better — work together to control this pest;
- Correct identification is important (Figure 3 shows the difference between the greenhouse whitefly and the silverleaf whitefly). 🌱