

Germinating Ideas

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As the cotton season is now in full swing there are many issues facing growers in what is proving to be a difficult year. This edition of *Germinating Ideas* will cover some of these issues:

- Plant growth regulators — using PGRs to achieve best results;
- CSD's emergence trials — looking at seedling loss and plant stand establishment;
- Water budgeting — planning for limited water; and,
- Shielded spraying — correctly setting up shielded sprayers to apply herbicides to maximise performance and minimise drift.

PLANT GROWTH REGULATORS

Plant growth regulators — for example, Pix, Reward and Ensign — have proven to be a valuable crop management tool since their introduction. Quantifying crop growth, by measuring the distance between nodes from early to half way through flowering, can help with PGR decision-making. These measurements are normally done on a weekly basis and the data can be used to calculate the vegetative growth rate (VGR) of the crop. The VGR formula is:

$$\text{VGR (cm/node)} = \frac{\text{This week's height (cm)} - \text{Last week's height (cm)}}{\text{This week's node number} - \text{Last week's node number}}$$

Generally, internode lengths above 5.5 cm require a PGR application. This season limited water may be the biggest influ-

TABLE 1: Response of CSIRO varieties to growth regulators (PGRs)

Nominal PGR requirement	Conventional and Roundup Ready	Ingard	Bollgard II
MORE	Sicot 189, Sicot 189RR		
↓	Sicot 80		
	Sicot 53		
	Sicala V-2, Sicala V-2RR		
	Sicot 72,	Sicot 289RRi	CSX415, CSX405
	Sicot 70, Sicot 71	Sicot 289i	
	Sicala 43	Sicot 51i	CSX312, CSX317
	Siokra V-17	Sicala V-3i, Sicot 42i	CSX407
	Siokra V-16	Sicala V-3RRi, Siokra V-17i	CSX409
	Siokra 1-4	Siokra V-16i, Siokra V-16RRi	CSX413, CSX401
	Siokra S-102	Siokra 201i, Siokra S-101i	
LESS	Sicala 40	Sicala 40i, Sicala 40RRi	CSX414, CSX404

Source: Dr. Greg Constable, CSIRO Cotton Research Unit, Narrabri

encing factor on internode length and vegetative growth. It will be extremely important to ensure that crops put maximum effort into fruiting in limited water situations.

An important point to remember is that applying Pix to crops that do not need it, can reduce yield potential in those crops.

All crops should be monitored closely prior to and after PGR applications. A field program should be set up to regularly measure plant height and assess fruit retention levels.

Bollgard II crops that exhibit high early fruit retention will need careful agronomic management with PGR applications to

ensure that they do not cut out early. Fields should be managed on an individual basis and treated as required.

CSD'S EMERGENCE TRIALS

CSD has conducted seedling emergence trials in several areas for the past five seasons to assess seedling vigour, seedling loss (disease, insects and herbicides etc) and final plant stands.

These trials involve regular monitoring of plots in commercial fields from emergence to around 30 days after planting to collect data as seedlings develop.

This season has shown that despite

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Steve Ginns, Joe Kochman, Steve Allen, Linda Swann, David Kelly and Wayne Reeves assessing a plant stand at Emerald.



With the introduction of Roundup Ready technology, shielded spraying has become more popular.

warm to hot conditions in most areas, Rhizoctonia has affected many plant stands, particularly where fields have had to be flushed. With hot and dry conditions continuing, many trials have been affected by the seed zone drying out too quickly and opening of the planting 'Kinze crack'. In some fields the moisture zones in the hills have dried back too quickly for the emerging seed to stay in adequate moisture.

Black root rot has also caused seedling loss with the Namoi Valley being the worst affected. Fusarium wilt (FOV) has not been a significant problem with seedling emergence so far.

Some areas — particularly the Gwydir Valley — have experienced problems with fertiliser burn. This has been caused by the germinating seed's radicle growing into the fertiliser band. The problems have all

been with anhydrous ammonia even though similar problems can be caused by solid fertilisers.

Generally this season has seen final plant establishment between 60 and 65 per cent with some as low as 45.8 per cent.

In the 2002-03 season CSD has been conducting trials to assess the relationship, if any, between the seed vigour index (SVI) and seedling vigour and survival in the field. Trials are looking at several varieties in different areas using seed from a range of SVIs.

WATER BUDGETING

As the long dry continues, growers are now being faced with the dilemma of deciding what to do in limited water situations.

Many fields have had to be flushed to help even up gaps in stands. Fields with a viable plant stand with few gaps can help make it easier to decide which fields are to

be kept and which are to be dropped out.

CSIRO's cotton plant breeder Dr Greg Constable says it is important to know exactly how much water you have so a budget can be done to assess possible strategies. There have been comments from growers recently about some very worn out fingers after doing water calculations almost on a daily basis.

Some of these strategies for limited or no water include:

- Do nothing. Sometimes this is the only option when water has run out;
- Convert fields to single skip. Consider soil type and compaction levels so that plant roots can utilise soil moisture; and,
- Drop area out and water cotton with the best potential. Remember to keep Ingard and refuges in mind (the correct ratios must be maintained).

Research carried out at the ACRI over several years has shown it is better to stretch irrigations out during the season rather than run out of water completely. Varieties with longer staple length may be able to be stretched in comparison to shorter fibre types.

Fields that run out of water later in the season run the risk of low micronaire as

TABLE 2: Summary of emergence and final plant stands for Sicot 80 at four locations, 2002-03 season

Location	Variety	Seeds planted/m	Final plant stand/m	% establishment
Emerald	Sicot 80	11.1	8.5	76.6
Dalby	Sicot 80	15.3	7.0	45.8
Boggabilla	Sicot 80	13.1	11.1	84.4
Moree	Sicot 80	12.2	10.5	85.7

Source: CSD agronomic trials 2002

the amount of photosynthates will be limited when fibre thickening occurs. This is on top of obvious yield reductions.

SETTING UP SHIELDED SPRAYERS FOR ROUNDUP READY COTTON

With the introduction of Roundup Ready technology, shielded spraying has become more popular as a way of getting the most out of the technology. Vine weeds such as yellow vine can be controlled better than using cultivation because even vines in the plant line will be controlled.

A well set up shielded sprayer is also capable of getting small burrs and other weeds right in the plant line. Obviously shielded sprayers can also be used on non Roundup cotton with similar results. The following comments from Robert Eveleigh, CSD Extension and Development

Agronomist, deals with settings to ensure the best safety and efficacy.

Sprayer design

Many types of machines are on the market as well as grower designed and built shielded sprayers. The best types are fully enclosed and allow adjustment of shields laterally (closer to the row) and vertically (to allow sprays to reach the stem below the cotyledons). Units fitted to a parallelogram with wheels or skids may be required in some situations to follow ground contours but this may be unnecessary on well prepared irrigation fields. Units that are not fully enclosed should be fitted with drift reduction materials such as brushes or shade cloth.

Adjusting the sprayer

When spraying small cotton (less than 15 cm high) keep the shields close to the

ground and a safe distance from the cotton. The aim should be to minimise any spray contacting any part of the plant.

As the cotton gets taller it may be possible to set the sprayer up to allow a pattern of spray to contact small weeds in the plant line without spraying above the cotyledons. This will require accurate driving and a speed that ensures uniform spray position.

Nozzle selection

Selecting spray tips is a compromise between minimising fine droplets and having the spray so coarse it misses small weeds. As many shielded sprayers operate tips very close to the ground, striping is possible.

There are literally hundreds of tips on the market. Some have names that suggest no drift will occur. Don't believe this, as all hydraulic nozzles will generate some very fine droplets that can, and do, drift under the right conditions. In general, choose spray tips that generate a higher proportion of coarse droplets.

Raindrop type tips are usually ideal provided enough volume is applied to obtain coverage with the Roundup. Clean the nozzles regularly as they are prone to dust and the pattern will be affected. Some rules of thumb to reduce fine droplets are:

- Larger orifice sizes reduce fines (for example, 04s produce less fines than 02s);
- Operating at lower pressure reduces fines (be careful not to compromise the pattern); and,
- 80 degree tips produce less fines but may not be suitable for all sprayer designs.

Speed of operation

Depending on the machine design and wind strength, speeds should not encourage wind shear and excessive movement of the droplets. This is particularly the case with small cotton and skip row cotton. A slight breeze of two to five km per hour can actually reduce drift potential but wind speeds above 10 km per hour should be avoided except in taller dense crops.

As a rule of thumb, don't spray when the leaves are moving on short cotton. Operating speeds greater than 10 km per hour are usually not recommended.

Spraying conditions

As mentioned above the wind is an important variable, but so too are the temperature and humidity when shielded spraying. Conditions that encourage high evaporation should be avoided as they can evaporate droplets, reducing droplet size and increasing the drift potential. Spraying below 30°C is recommended. In many cases this will mean spraying at night and the early morning during the summer months.



There are many designs of shielded sprayer on the market.