

Germinating ideas

By Craig McDonald, CSD Extension and Development Agronomist

Welcome to this addition of Germinating Ideas. It will look at the cotton root zone and factors that can affect development. It will also cover some of the key considerations for managing Roundup Ready Flex cotton for maximum weed control. This information has been compiled by the CSD Extension and Development Team and further detail is available from the CSD website.

ROOT DEVELOPMENT

Some areas have received scattered storms since planting, which have helped top up moisture levels following pre irrigation or watering up. In those areas that have remained dry, soil moisture levels can quickly become depleted with warm and windy conditions. Low water allocations add to the difficulties of deciding when to apply the first in-crop watering to ensure plant growth and root development is not restricted.

The growth of the root system is favoured by warm conditions where the soil

is moist. Roots also require oxygen, so the soil should not be anaerobic. The lack of any of these factors can slow or stop root growth.

As the root system moves through the soil profile, it sends out 'feeder roots' and root hairs to increase the volume of soil that it can extract water and nutrients. The root system will adapt its development to the soil conditions.

Dry start scenario

If there is no early season rain and the soil surface dries, the root system will tend to move downwards to follow moisture and produce very few feeder roots near the surface. While this produces a robust root system, it makes the plant more susceptible to water logging during the first irrigation. This is because as the upper part of the soil profile is the first to come out of anaerobic conditions following irrigation, and there are fewer surface roots to utilise this.

The impact of this water logging can

be minimised by doing anything that improves drainage and prevents water sitting across an entire soil profile for too long. This is very difficult in poorly leveled fields with low patches. Watering alternate rows or increasing flow rates may minimise the problem in some cases.

Wet start scenario

If the soil surface remains wet during the early part of the season due to frequent rainfall events or an early first irrigation, then the root system will remain in the upper levels of the soil profile where oxygen and nutrient concentrations are often at their highest.

While the crop will display good early vigour in this situation, when crop water use increases rapidly around the time of flowering, irrigation deficits may need to be decreased to supply the needs to a less expansive root system.

Restrictive zones

If roots hit an unfavourable zone they will grow away from it, resulting in bent or 'right angle' roots. Common causes of this include soil compaction, dry subsoils and incorrectly placed fertiliser bands. These situations can result in a less expansive root system, lacking the ability to access water and nutrients. Effectively managing these crops relies on decreasing irrigation deficits and supplementing additional nitrogen during the season.

A cotton root system develops in a very similar manner to the above ground plant parts, including the fact that its ability to adapt to changed conditions and compensate for damage decreases once boll filling is initiated. Consequently, if a plant does have a wet start, and shallow root system, there is still some opportunity to establish a deeper root system throughout flowering.

Caution must be given to attempting to do this with a large increase in deficits under hot conditions as a crop is very susceptible to yield and staple length penalties from stress at this time.



Black root rot can severely restrict early season root growth.

Disease issues

Diseases such as black root rot can severely restrict root growth and delay plant maturity. This pathogen will not kill plants but it may predispose plants to other setbacks, which may cause death with reductions in plants stands. If disease affected plants continue to suffer setbacks, serious delays can cause maturity and potential yield concerns.

Identifying potential problems

There are many methods to determine how robust a root system is, so that corrective management can be undertaken if necessary.

Moisture probes

Many growers across the industry have become very proficient in using moisture probes of various types to aid in irrigation management. These systems identify very accurately parts of the profile where water is being drawn from and so identify the water extraction pattern of a root system.

In field examination — shovel

Digging beneath a young crop and examining the root system. Bent roots will indicate a restrictive zone. An extensive surface root system with a short tap root may indicate that the crop had a wet start.

Plant mapping

Keeping a good eye on what's going on above the ground can help address what's happening below the ground, especially if used in conjunction with the previous two

methods. The CSIRO/Cotton CRC Crop Diagnostic Tool, when used regularly, provides an excellent picture of a young crop's vegetative state. A crop with an inadequate root system may rapidly reduce vegetative development when it would appear there is still adequate moisture in the soil profile.

ROUNDUP READY FLEX CONSIDERATIONS

As more varieties have become commercially available and the quantity of seed has increased, the uptake of Roundup Ready Flex this season has increased to almost 30 per cent. The introduction of Roundup Ready Flex has seen many benefits across the industry, including:

- Spraying efficiency — being able to cover more area using wider broadacre sprayers compared to shielded eight row machines.
- Reductions in the reliance on pre emergent herbicides.
- The ability to spray when the weed size is correct, not having to compromise efficacy by trying to apply two over-the-top herbicide sprays prior to the fifth leaf stage.
- The ease of spraying head ditch and ro-tobuck areas, tail ditch and sides of fields for all round weed control.

The impact of drift

Many farms have both Roundup Ready and Roundup Ready Flex in fields that may be close to each other. Good communication amongst farm staff, field signage and

correct record keeping can help reduce the risk of spray drift onto susceptible Roundup Ready fields and other nearby crops.

There have been reports of late season drift onto Roundup Ready crops. Quite often these crops have experienced delays in maturity with subsequently more irrigations and later insect control requirements. Segmented picking work by the CSD Extension and Development team has shown that the fruit setting pattern is different to a more normal crop with more earlier fruit being shed.

There is then a need to grow the crop longer in order to pick the later fruit. Quite often the yields have been similar to non drift affected fields but the later maturity is the main issue.

The future

Roundup Ready Flex seed increase crops are now growing and there will be a greater varietal choice available for growers for the 2008 planting. The phasing out of Roundup Ready technology will be relatively quick.

The industry will have the opportunity to experience growing the new varieties both as stand alone products or stacked with Bollgard II. Varietal availability will be a major driver in the uptake of Roundup Ready Flex.

As part of the Resistance Management Plan there will be ongoing monitoring of weed behaviour and application regimes to help prevent the potential for resistance to Roundup Ready herbicide.



Field signage can help reduce drift issues.