‘Dry season woes’ reduce plant stands

By John Marshall, CSD Extension and Development Agronomist

Extremely dry weather conditions since late September have conspired to produce one of the toughest starts for the cotton crop for a number of years across most growing regions. While a number of fields have been flushed in an effort to stabilise plant stands and kick start growth, drastic water shortages have often curtailed or delayed this strategy.

This season’s problems might best be described as ‘dry season woes’ as opposed to the more frequently encountered ‘cold, wet start syndrome’. In brief, the season in most areas has been characterised by large diurnal (maximum and minimum) temperature extremes, above average evaporation rates, sustained periods of strong gusty winds, low humidity and generally high intensity, low yielding rainfall events.

Difficult seedbed conditions for achieving successful plant establishment.

For instance Dalby had 16 cold shock days, 16 days with maximum temperatures above 35°C and eight mm of rainfall from late September to mid November. These factors combined to rob the seed zone of adequate levels of soil moisture during the germination process. Seedling root growth has also been restricted. Table 1 compares emergence and final establishment in the CSD trial site at Dalby over the past four seasons. Management practices for planting have been identical each season.

Rolling behind the planter to minimise moisture loss from the bed.

Measurable seed quality characteristics appear to have had little influence on final achieved emergence of stands this season. Because of the dry hot conditions leading up to picking last season, a large proportion of commercial seed this season had standard germination of more than 90 per cent and seed vigour index (SVI) values above 160.

In other words, the seed that went into most fields this season was of above average quality. As the data for 2002 in Table 1 illustrates, climatic factors have had a far greater influence on final emergence than seed quality.

Soil tilth and stubble levels have also

exacerbated climatic difficulties. The dry winter conditions meant that cotton trash breakdown was slower than usual. The very dry conditions late season meant that centre busting operations produced large cloddy aggregates throughout the bed which did not weather down during the winter because of the infrequent rainfall events.

Seedbeds were coarser than normal, leading to more rapid dry down after planting, especially in pre-watered situations. Most growers meshed fields pre-plant, and then followed the planter with a roller to preserve moisture.

Pre-watered versus watered up

The general tight water situation, as well as the increasing use of Roundup Ready technology, has resulted in a significant increase in the proportion of the crop watered up. Weather conditions during October were generally favourable for this method of establishment, with fairly rapid emergence being achieved from shallow plantings. But there were instances where the speed of drydown was too rapid for the shallow established seedlings, leaving them stranded in dry soil.

Table 2 illustrates the peak emergence of the variety Sicot 80 across a number of CSD variety trial sites this season. Seed in all instances was from the same lot number, with standard germination of more than 90 per cent and SVI of more than 170. The data supports the general observation that, under the weather conditions experienced this season, especially during October, watering up resulted in a better emergence than planting into pre-watered beds.

The availability of the Roundup Ready technology has resulted in some cases of cotton being planted into seedbeds with very cloddy tilth, considerable quantities of undecomposed trash mixed in the surface layer and poorly formed and shaped hills. This has been a recipe for establishment problems in early planted, watered up fields in particular. Variable seed depth, poor seed-soil contact and seedling-trash interaction have all contributed to this poor establishment.

The ability to mesh beds before planting, thereby reducing the trash level on the top of the bed — and apply an in-furrow fungicidal spray during planting — greatly reduced potential Rhizoctonia problems in pre-watered fields.

Flushing up

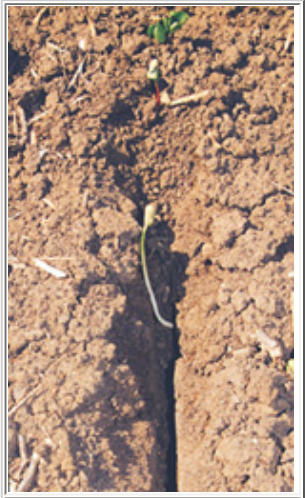
TABLE 1: Four seasons of emergence/establishment assessment data from CSD conventional variety trial site, Dalby

Planting date	Varieties assessed[a]	Seed quality		Days to 80% emergence	Final emergence (%)	Loss after emergence (%)	Final establishment (%)
		Germ (%)	SVI[b]				
12/10/99	8	78–90	126–170	7	84–96	6	78–90
29/10/00	7	–	–	<10	77–87	4	73–83
10/10/01	3	59–79	111–157	14–15	74–83	5	69–78
12/10/02	3	74–93	155–173	8	60–61	14	46–47

a: Includes non-commercial experimental lines. b: Seed Vigour Index.

TABLE 2: Emergence of Sicot 80 at a number of CSD variety trial sites in 2002

CSD trial site	Establishment method	Emergence (%)
Emerald	Pre-watered	80
Moura	Pre-watered	80
Dalby	Pre-watered	47
St George	Pre-watered	65
Boggabilla	Watered up	85
Moree	Watered up	90
Merah North	Watered up	90



Seed trench slot promoting seedcoat capping.

Ungerminated seed anchored in dry soil, low early seedling vigour and seedling damage from stem abrasion on open seed trenches has caused many growers to resort to an early irrigation or field ‘flushing’ to improve or save their stand. The biggest concern with the practice — apart from use of unbudgeted irrigation water — is the potential for Rhizoctonia to impact on existing weakened plants.

Fortunately, conditions in most areas have not been conducive to the disease this season. Counts on two fields in Central Queensland which were flushed showed a plant stand loss of 0.5 plants per metre from Rhizoctonia, while stand improvement was 2.5 plants per metre.

Seedcoat capping

We see seedcoat capping to some extent most seasons. Rapid drying of wet soil compacted by the passage of the disc opener depth control wheels can produce an open, hard faced planter slot.

In the normal process of emergence, friction from surrounding soil prevents the hypocotyl carrying the seedcoat with it as it pushes the cotyledons towards the surface.

When the seed trench opens up while germination is still underway or where planting has been shallow, the seedcoat is often carried to the surface, interfering with the cotyledons unfolding. If the seedling becomes stressed because of poor root growth, it may find it hard to throw the seedcoat off because of low turgor in the cotyledons.

Because of a relatively larger seedcoat and more rapidly expanding cotyledons, bigger-seeded varieties are more prone than small-seeded varieties to seedcoat capping.

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