◁i...SORGHUM SPRAY-OUT TIMING

KEY MESSAGES

The accompanying article by Dr Guy McMullen highlights the key trial results – some of the main messages are:

- Dramatic negative impact of early spray-out timing on yield and grain quality.
- Little or no advantage from delaying past grain physiological maturity.
- Soil moisture benefits from early timing were erratic and not consistent enough to budget on.
- Approximately 35 days after flowering is a good time to commence checking for crop maturity.
- Identify the latest heads–tillers that you consider important to take to harvest.
- Assess 'black layer' or physiological maturity on grain in heads of that maturity and schedule timing accordingly.

Clearly being aggressive and going before physiological maturity is far too costly in terms of sorghum returns and is not warranted by the soil moisture conserved.

But being overly conservative is also a production constraint to avoid. This was in fact seen at one trial site in 2007–08 where the commercial spray-out timing could have been considered two to three weeks earlier.

TO SUM UP

It is well known that sorghum grain or head colour is a poor indicator of actual maturity as it varies widely by both hybrid and environmental conditions. The rule of thumb used by seed companies such as Pacific Seeds and Pioneer to start looking in field from about 35 DAF was a good starting point but will always need to be refined in individual paddocks. Hybrids with staygreen attributes may take longer to mature but also individual paddock timing will be heavily influenced by row configuration and particularly by the number of late tillers which can be taken successfully to yield.

Although sorghum spray-out can be a very useful management tool, it is unlikely to be appropriate in all cases. In situations with highly moisture stressed crops or with high stalk rot levels, sorghum spray-out may actually result in yield losses due to crop lodging. New research in this area is planned for 2009–10.

Certainly this project has confirmed the use of 'black layer' as the most practical tool for scheduling timing and reinforced the need to judge 'black layer' development on heads of the maturity you want to take to harvest. Although soil moisture benefits were recorded in some trials, the key approach should be to desiccate the sorghum as soon as practical after 'black layer' and treat any soil moisture benefit as a bonus. ■

THE RESEARCH VIEW

The impact of the timing of sorghum spray-out

By Guy McMullen and Alan Bowring, NSW I&I Tamworth

Sorghum desiccation, or spray-out, with glyphosate is a common practice for sorghum growers in NSW and Queensland. Anecdotal evidence has suggested that NSW growers and advisers are generally more conservative when determining the time of desiccation.

Desiccation can reduce the time to harvest, control late season weeds, increase soil water after harvest and increase the length of the fallow period to maximise future cropping opportunities. But desiccating the crop too early can result in increased lodging if harvest is delayed, reduced grain yield and grain quality – particularly grain size.

Typically it is recommended that desiccation should occur when the crop has reached physiological maturity, at about 25–35 per cent grain moisture.

An important indicator that the crop has reached this stage is to assess the later maturing grains in the bottom third of the head for the presence of the abscission or black layer.

Currently there is little published research available on sorghum desiccation and optimal timings for crop yield and quality under Australian conditions. To address this need research trials were conducted in the 2007–08 and 2008–09 seasons to answer the following main questions:

- What is the impact of spray-out timing on sorghum grain yield?
- How is grain quality affected by earlier spray-out? and,
- What are the benefits for soil water conservation with earlier spray-out?

In 2007–08 two small plot replicated trials were established on the Liverpool Plains, NSW in commercial sorghum paddocks. In 2008–09 seven trials were established from Goondiwindi in southern Queensland to Premer in northern NSW. Paddocks were targeted where growers indicated they were at least four weeks from commercially planned desiccation.

The trials evaluated five to six timings

TABLE 1: Location of sites, varieties and dates of desiccation sprays in 2008

Site	Spring Ridge	Spring Ridge	Premer	Pine Ridge	Goondiwindi	Goondiwindi	Millie
Variety	86G56	MR43	Buster	Buster	86G56	MR43	MR43
14 DAF	23/03/2009	9/03/2009	24/02/2009	23/03/2009	22/12/2008	19/02/2009	10/03/2009
21 DAF	30/03/2009	16/03/2009	3/03/2009	30/03/2009	29/12/2008	26/02/2009	17/03/2009
28 DAF	8/04/2009	23/03/2009	10/03/2009	8/04/2009	5/01/2009	4/03/2009	24/03/2009
35 DAF	26/04/2009	30/03/2009	17/03/2009	17/04/2009	12/01/2009	12/03/2009	1/04/2009
42 DAF	26/04/2009	6/04/2009	24/03/2009	27/04/2009	19/01/2009	19/03/2009	7/04/2009
49 DAF	—	—	—	—	28/01/2009	25/03/2009	15/04/2009

of desiccation, applied at weekly intervals commencing approximately 14 days after flowering (DAF) on the main heads. Glyphosate was applied using a hand-boom. Grain samples were taken for quality assessment and grain moisture determined at each spray timing.

Plots were harvested using a small plot harvester and grain yield, protein, screenings, hectolitre weights and grain size determined. Soil cores were taken from each plot immediately after harvest and soil moisture determined gravimetrically.

GRAIN YIELD

Very early spray-out (around 14 DAF) resulted in dramatic yield losses at all sites (Figure 1). The minimum yield loss across the eight trials was about 35 per cent while the average was over 50 per cent. The most severe yield penalty at this stage was 78 per cent of the yield of the final spray timing. When spraying at 28 DAF,

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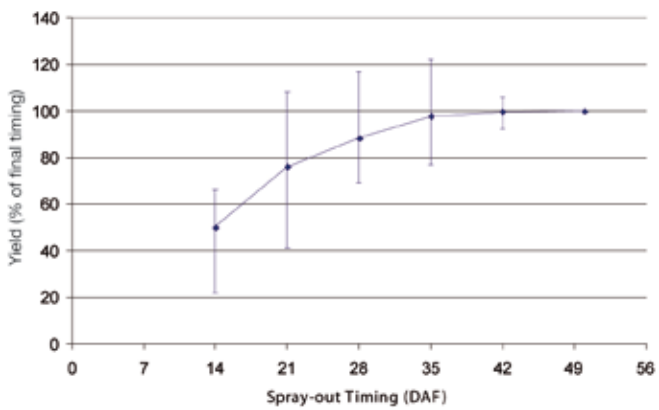
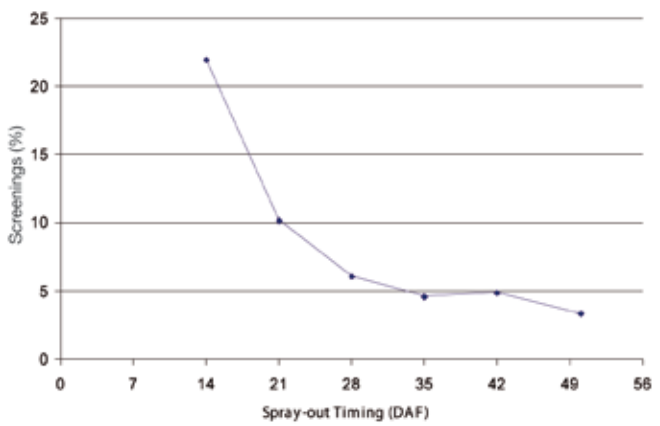
Sorghum (Buster) at Premer prior to (left) and after desiccation (right) in 2008.

FIGURE 1: Average grain yield in 2008 from seven sites as a percentage of the final desiccation timing



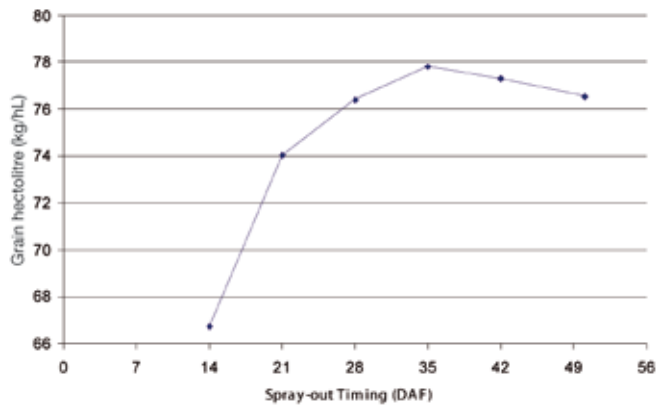
(Top and bottom of the vertical bar represents the maximum and the minimum yields respectively, while the points represent average yield).

FIGURE 2: Average grain screenings from six sites as a percentage of the final desiccation timing



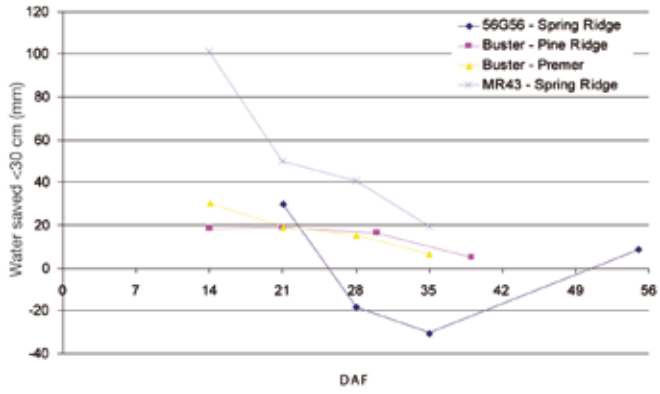
(Grain quality analysis not conducted on samples from Millie trial)

FIGURE 3: Average hectolitre weight from six sites



(Grain quality analysis not conducted on samples from Millie trial)

FIGURE 4: Soil water (mm) saved below 30 cm by earlier desiccation compared to the final desiccation timing



◁iii...IMPACT OF THE TIMING

three of seven sites in 2008 had significant yield reduction after desiccation. Desiccation at 35 DAF resulted in only one site that had a significant yield loss compared to the final timing. Desiccation at 35 DAF in 2008 resulted in mean yields across all seven sites of 98 per cent of the final desiccation timing.

GRAIN QUALITY

Screenings increased dramatically at all sites at the earliest spray-out timing. When desiccation occurred at 21 DAF screenings were increased at five to seven sites. When desiccation was timed after 28 DAF there was no significant increase in grain screenings.

For grain test weight (a measure of grain density) and grain size, early desiccation resulted in severe penalties. There was a large decrease in both at the earliest timing while desiccation later than 21 DAF resulted in no significant change in test weight.

SOIL WATER CONSERVATION

One of the other key questions was the impact of earlier desiccation on residual soil water levels. If growers were able to spray-out sorghum earlier, would this increase the soil water remaining post-harvest and improve production in the subsequent crop in the rotation?

Soil water conservation ranged from 0–40 mm when grain yield was not reduced by desiccation. Much of the soil water that was conserved was at depth (below 30 cm) which can have significant benefits for the next crop in the rotation as it may be used with greater efficiency.

TO SUM UP

Spray-out timing

Overall, 35 DAF provided a good starting point when planning sorghum spray-out timing. But it is critical to fine tune the actual timing by variety and situation. Identify and assess the maturity of the youngest heads that you are targeting for harvest and time your spray-out accordingly.

The penalties of desiccation too early can be extreme in terms of both yield and quality.

Costs and benefits

Getting the spray-out timing right can lead to benefits in the conservation of soil water for the next crop in the rotation while contributing to late season weed control. But in these trials the soil water benefit from optimal spray-out timings, was generally less than 10 mm.

Overall

To maximise the benefit from sorghum spray-out, it is important to assess each paddock individually for physiological maturity. It is important to identify the maturity of the head that you are targeting for harvest – particularly in skip row configuration where there is often a higher proportion of later developing heads – and judge paddock timing on these.

Going too early is obviously fraught with danger. But ensure you time spray-out as close as practical to physiological maturity to avoid yield/quality impacts while maximising the chance of retaining soil moisture to benefit the next crop in the rotation. ■

Sorghum spray-out has been common practice on the Liverpool Plains for more than 10 years.

COMMERCIAL VIEW

PRE-HARVEST SPRAYING OF SORGHUM

By Greg Giblett, AMPS Research

Pre-harvest spray-out of sorghum has been common practice on the Liverpool Plains for over 10 years. The main reasons for the popularity of pre-harvest spraying include:

- Evening up crops and bringing the harvest date forward;
- Stopping current crop water use and storing more water in the soil profile for the next crop; and,
- Speed of harvest is increased with more tonnes per hour possible through the header.

Farming programs are run on the basis that all stubble is retained and most growers are using or moving towards controlled traffic and no-till systems with the aid of tractor guidance. Overall farm profitability is based on maximising cropping frequency without taking undue risk on fallows with less than 70 cm of wet soil. So crop sequences are developed on the assumption that we need to have as many re-cropping options as is possible after the sorghum.

For example, sorghum harvested in April has the possibility of being:

- Long fallowed into cereal (14 month fallow);
- Double cropped into cereal given adequate soil moisture (two month fallow);
- Double cropped into a legume such as chickpea (two month fallow); or,
- Short fallowed to a second summer crop such as sorghum or sunflower (seven month fallow).