

Canola desiccation, direct heading and PodGuard™ canola - just a few of the things GOA has been investigating the last few years

Maurie Street, Grain Orana Alliance

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Take home message

Reglone™ when applied as a desiccant in canola has shown some advantage in hastening ripening and bringing harvest forward but generally only by a few days.

Weedmaster™ DST when applied for pre-harvest weed control has shown little to no practical effect in hastening ripening and bringing harvest forward.

Windrowing canola crops at an optimal time may not bring harvest forward compared to direct heading as much as conventionally thought - differences may be as little as 2-5 days in some situations.

Yield loss through pod shattering if direct heading of canola is delayed is not likely to be a linear decline but as a result of extremes in weather conditions which are inconsistent and unpredictable in their timing.

Yield loss if direct heading is delayed and in the absence of an extreme event may be lower than first thought.

PodGuard™ canola varieties developed by Bayer, promoted to have increase tolerance to pod shattering, may give growers some insurance against extreme weather conditions and confidence to either delay windrowing later or to direct head crops

Background

GOA has been undertaking research in the space of canola harvesting since 2009. Some of their research work has demonstrated the importance of getting windrowing timing right to avoid potentially large yield penalties. Other trial work has demonstrated that direct heading of canola is also a viable alternative to windrowing.

Prior to this work, windrowing was the default harvesting process for canola in the region. But largely from GOA's promotion of direct heading, some advisors are suggesting that up to 50% of canola is now direct headed in some districts.

But there are still some barriers to further adoption with some of the key concerns for growers including:

- Direct heading delays the commencement and conclusion of canola harvest which can adversely impact the harvest of other crops compared to windrowed crops
- Delays in the harvesting of direct headed crops after the crop is ripe can see a rapid decline in yield through pod shattering

In an attempt to address some of these issues, GOA has run a number of different trials over the past three years which are summarised in this paper. More in depth analysis can be found in the individual trial reports published on the GOA website.

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Canola Desiccation Trials

A key concern for growers when considering direct heading is the perceived delay in the commencement of harvesting of direct headed crops.

It is thought that compared to windrowed crops, ones left for direct heading take longer to dry down to acceptable grain moisture content before harvesting can commence. This situation can be further exacerbated by greener patches such as those caused by changes in soil type.

One option to potentially manage this issue in direct headed crops is to apply a desiccant to the crop ahead of harvest to speed up the ripening process. Reglone™ has been registered for this purpose for some time but its cost, difficulties in application and perceived unreliability often deters many from its use.

More recently a glyphosate formulation, Weedmaster™ DST marketed by Nufarm has been registered for use in canola for pre harvest application. Its main label claim is for pre harvest weed control but there are suggestions that it could offer some advantage in reducing grain moisture quicker, facilitating an earlier harvest.

Since 2013 GOA has run four trials comparing Weedmaster™ DST¹ against Reglone™. Details of how the trials were run are explained below

- All trials were small plot, randomised and replicated complete block design trials.
 - The various herbicides were applied at various stages in relation to seed colour change (SCC) or pod colour change for Reglone™.
 - Weedmaster™ DST was specifically applied in the 2015 trials. In the 2013 and 2014 trials used a similar predecessor product now no longer available but will be referred to as Weedmaster DST for consistency
 - Only Weedmaster DST carries the registration for application to canola pre harvest- no other glyphosate product should be used.
 - Four different harvest timings were then undertaken. The earliest timing targeted well before grain moistures had reached the deliverable grain moisture content (GMC) of 8%. Subsequent harvest timings were spaced to have GMC from all treatments below 8% by the final harvest.
 - Harvesting was undertaken by plot header and samples taken immediately following harvesting. These were stored in airtight containers until testing. It should be noted that at the earlier harvest timing much of the crop would not even thrash and as such, the measured GMC over estimates the dryness of the grain at those timings.
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2013

In this trial both the Weedmaster™ DST and Reglone™ were applied both at ~60% SCC. This is much later than what was actually detailed in the subsequent and recent registration of the Weedmaster™ DST which allows for application as early as 20% SCC.

As illustrated in Figure 1 below Reglone™ resulted in GMC dropping below 8% within 13 days of application. This would have allowed harvest to commence nearly seven days earlier than when the UTC would have allowed. The Weedmaster™ DST did not see GMC achieve harvestable levels until somewhere between 17 and 20 days which was practically no different to the UTC.

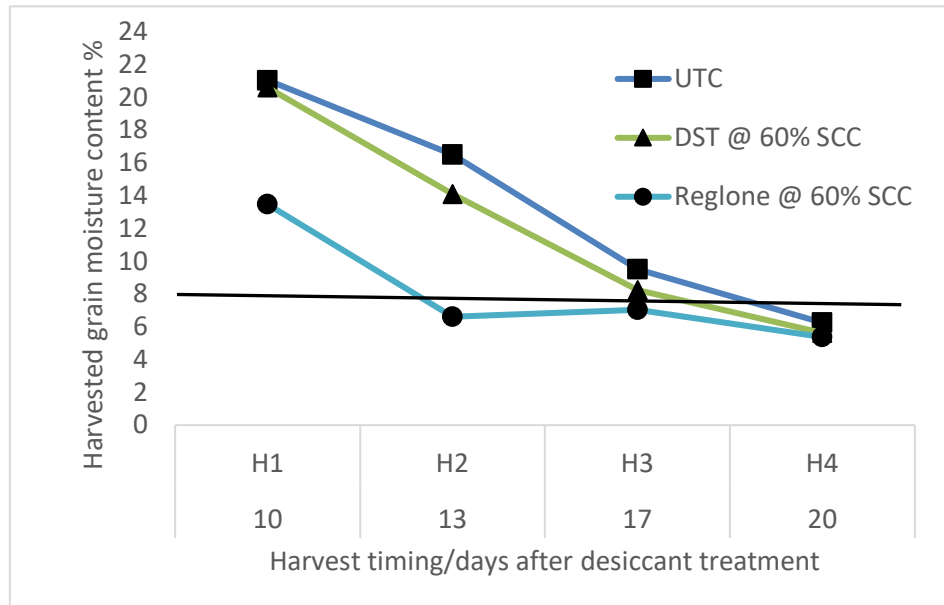


Figure 1. Harvested grain moisture content at four harvest timings in response to various desiccation treatments- Wellington 2013

Earlier application of the Weedmaster™ DST may have resulted in a different outcome. However, it should be noted though that the GMC of the Weedmaster™ DST treatment tracked very closely to that of the UTC for the 20 days since application that was monitored in this trial.

2014

Two trials were run in 2014. One at Geurie and the other at Coolah. In both trials three desiccant application timing were used to reflect the earlier timing allowed by the pending label registration.

At the Geurie trial Weedmaster™ DST was applied at ~40%, 70% and 99% SCC. Last timing coincided with the label timing for Reglone™ of ~70% of **PODS** changing colour.

As can be seen in Figure 2, GMC in all treatments at the first harvest timing were already below the 8% GMC. This was despite the first harvest timing starting only 8 days after the final desiccant application was applied. Some of the desiccant treatments did result in lower GMC at some of the harvest timings but the difference in practical terms is not relevant and in any case none of them were over 8% GMC.

Examination of weather conditions around this period and obvious moisture deficits at the time are the most likely explanation of the rapid ripening of the crop.

What is interesting to note from this trial is the rapid ripening of the crop. At application the second timing, SCC was estimated at ~70%- this would be around a good windrowing timing. However, the standing crop had dried to <6% GMC in less than 10 days, possibly in less than 7 days. Given windrows are often left to cure for around 10 days in this district in many cases little advantage in terms of time to harvest may have been gained if windrowing was employed in similar circumstances rather than direct heading.

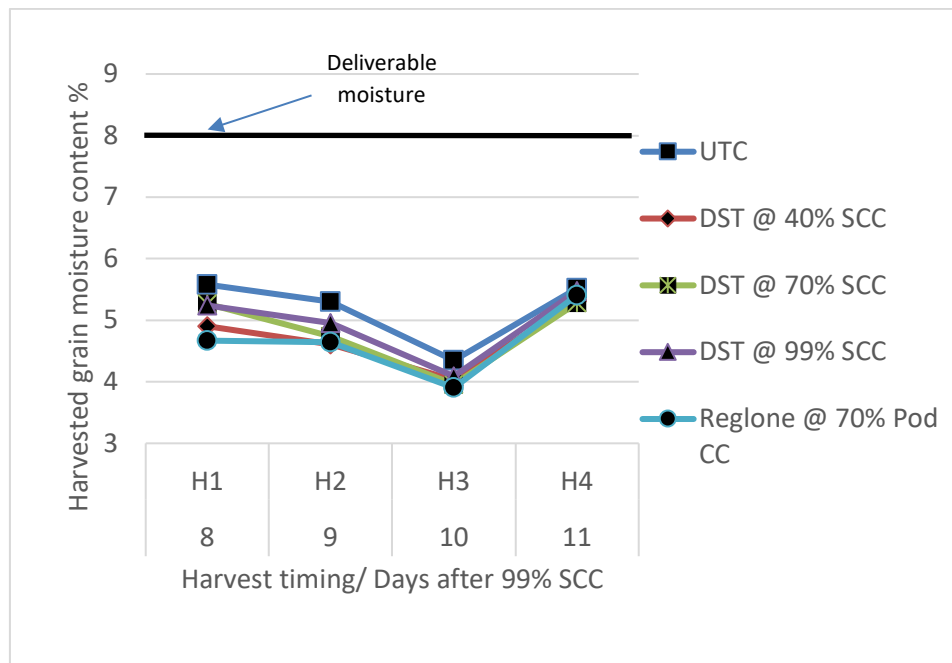


Figure 2. Harvested grain moisture content at four harvest timings in response to various desiccation treatments- Geurie 2014

At the Coolah trial application timings were similar at ~45%, 60% and 70% SCC. Figure 3 illustrates the results from this trial. As can be seen at the first harvest timing the application of Reglone™ has reduced the GMC quite substantially but not quite below the 8% GMC. At the second harvest date GMC from the Reglone™ treatments and the earlier timings of Weedmaster™ DST were below 8% GMC. The UTC and the delayed applications of Weedmaster™ DST are still above the deliverable 8% GMC. However, 11 days after the last desiccant application, all treatment including the UTC are under the 8% GMC.

In this trial the use of Reglone™ and Weedmaster™ DST (when applied early) would have allowed harvest to start earlier. However, any benefit would be quickly lost as within two more days all treatments including the UTC would be able to be harvested.

Again it should be noted the short time it takes the UTC to dry to 8% GMC. From a windrowing timing of around 70% SCC to harvestable moisture was around only 10 days, which probably matches a typical curing time for windrows in many cases. Alternatively, if growers were to apply Reglone™ or Weedmaster™ DST @ 45% SCC, the time to harvest would be shortened to around 8 days.

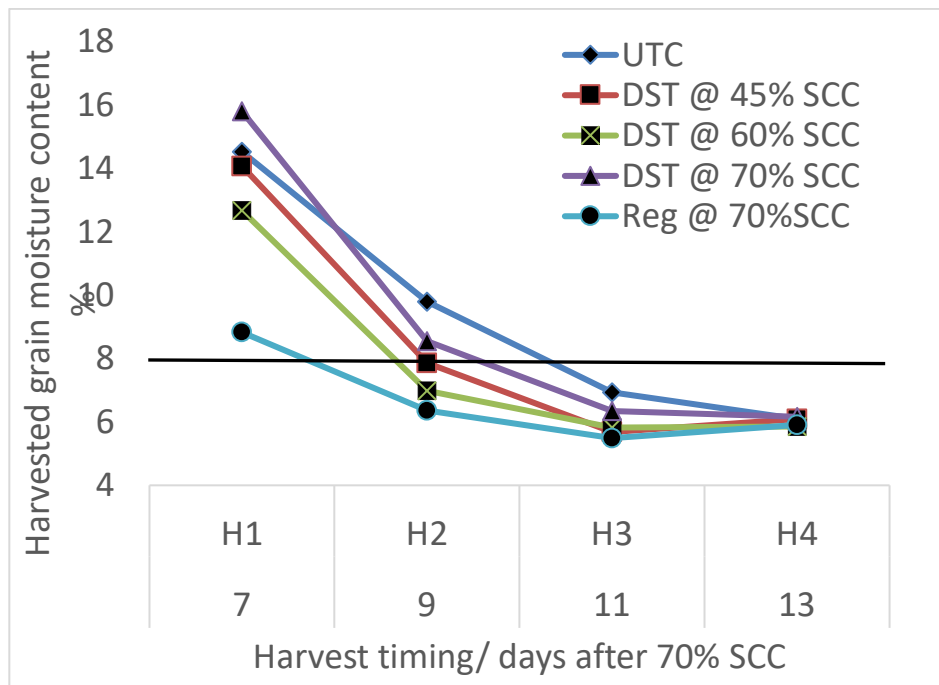


Figure 3. Harvested grain moisture content at four harvest timings in response to various desiccation treatments- Coolah 2014

2015

One trial was run in 2015 at Wellington NSW. Desiccant application timings were reduced to only two, the first applying now registered Weedmaster™ DST at earliest label timing of 20% SCC and the second at ~70% pod colour change (93% SCC) where Weedmaster™ DST and Reglone™ were applied. Again the Reglone™ has resulted in lower GMC at H1 but was still well above the deliverable standard of 8%. By H2 all treatments were resulting in a similar level of GMC with the desiccants only slightly lower GMC than the UTC. By H3 there was little difference between any of the treatments with GMC measuring very close to 8%.

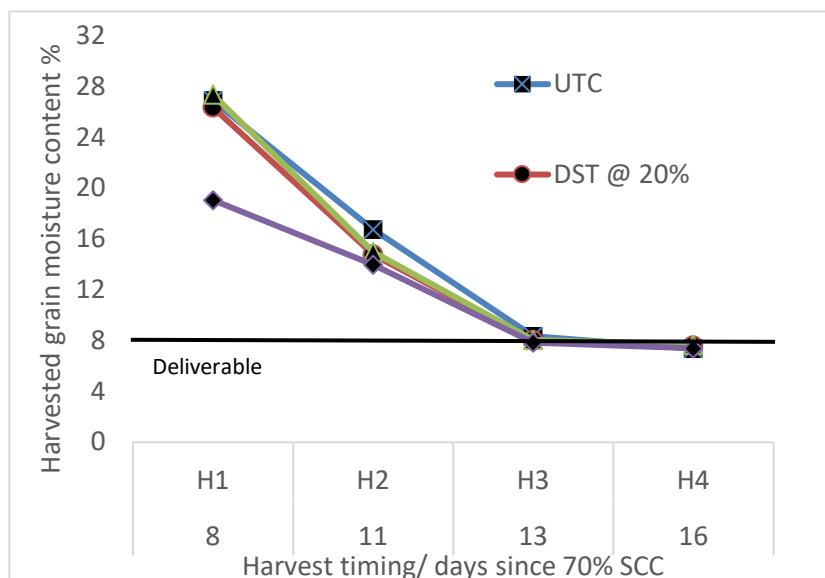


Figure 4. Harvested grain moisture content at four harvest timings in response to various desiccation treatments- Wellington 2015

Similarly, in this trial as the ones above the Weedmaster™ DST has not demonstrated much useful benefit in reducing GMC quicker than doing nothing. Reglone™ again showed some ability to reduce GMC rapidly soon after application but any effect seems to be short lived and in this trial would not have allowed harvest to start any sooner.

Again in this trial, GMC of the UTC fell to the deliverable 8% within 13 days of 93% SCC. Windrows in the Wellington district are most left to cure for around 10 days suggesting windrowing in this circumstance may have offered some shortening of the time to commence harvest but again only by a small number of days.

In summary of the three years' trials-

- Reglone™ has shown the most potential to reduce GMC quicker than natural maturation but in many cases the effect has been short lived and/or has not offered any practical advantages.
- Weedmaster™ DST has shown even less practical advantage in terms of fostering earlier direct heading. But this is not to say there is not advantage in pre-harvest weed control for which it was actually registered for.
- The rate of natural ripening in many of the trials does put some question as to the perceived improvement in the time to harvest when windrowing crop. In many case it could be speculated to be as little as a couple of days' advantage not weeks as sometimes thought.

Delayed Direct heading and Pod Shattering

One of the other key barriers to further adoption of direct heading is the risk of pre harvest shattering whilst the ripe crop is awaiting harvest. GOA undertook one trial in 2013 to quantify the rate at which yield may decline if direct heading is delayed.

In a commercial crop of canola, an even and representative area of crop was left when the balance of the field was windrowed. This standing crop was then pegged out in a randomised and replicated trial design to accommodate ten different harvest dates. At each specified date the four replicates were harvested with a plot header and grain was retained to assess yields, the results of which are illustrated in Figure 5 below. The earlier harvest dates had only short intervals between them but they increased as time went on.

Some attempts were also made to assess any standing losses in the crop between harvest timings which is not discussed here.

As can be seen in Figure 5 with the exception of the yield at Day 3, the harvested yields were quite stable until Day 17. By Day 21, the harvested yields had dropped by approximately 500kg/ha but then stabilised at Day 25. The final two harvest dates showed similar yields but around another 300g/ha less.

What is demonstrated in this trial was that the yield was relatively stable for quite a long period of over two weeks. On two occasions there appeared to be a major event which led to reduced yields but after each, yields stabilised again. So this suggests that in this situation yield decline when harvesting is delayed is not a strait linear decline but more in steps. Yield losses are most likely a function of weather extremes which are fortunately infrequent but unfortunately unpredictable in their nature.

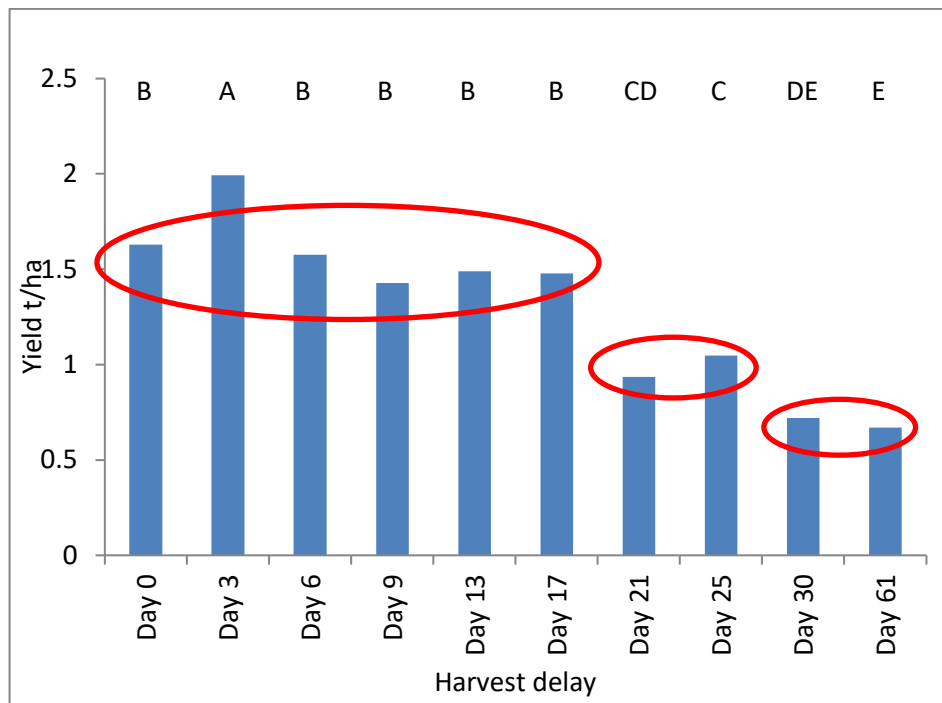


Figure 5. Harvested grain yields in response to delays in direct heading- Wellington 2013

It should also be noted the extended period for which this trial ran- two months.

PodGuard™ Canola- Promises of Enhanced Shatter Tolerance

Recently Bayer has developed a unique genetic trait bred into some of their new canola varieties promising increased tolerance to shattering. This trait has been trademarked PodGuard™.

GOA ran one trial in 2015 in conjunction with Bayer to test these claims. The trial contained the PodGuard™ variety IH51RR and a similar maturity Round Up Ready line 45Y25. Both varieties were assessed for yields at two harvest timings but a simulated shattering event was employed on some treatments at both harvest timings. This shattering event was simulated by dragging a 40mm piece of water pipe through the ripe crop twice, which was very aggressive.

The results of this trial is illustrated in Figure 6 below. As can be seen at harvest timing 1 (H1) without shattering the yields of the two varieties are comparable. However, when the simulated shattering was applied only the yield of the variety 45Y25 was affected, reducing yields by around 600kg/ha.

Delaying harvest by 14 days resulted in no statistically significant yield decline in the PodGuard™ variety but ~500kg/ha in the 45Y25. But by applying the simulated shattering event following the delay in harvest the 45Y25 suffered around a 500kg/ha yield loss again, the PodGuard experienced no loss of yield.

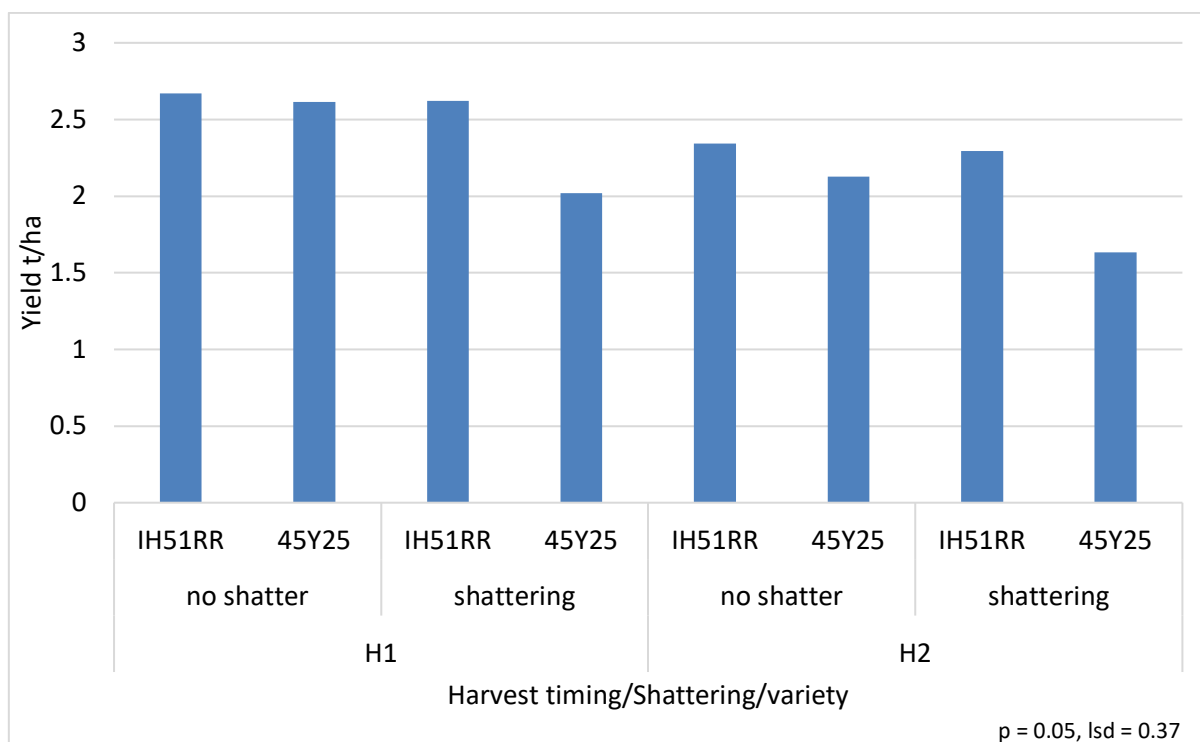


Figure 6. Harvested yield in response to harvest timing, +/- simulated shattering by variety- Wellington 2015

During this trial a number of measurements were made to quantify the source and timing of the losses encountered. Details of these are covered in the full trial report on the GOA website.

In summary the PodGuard variety IH51RR has shown good potential to resist shattering if conditions are conducive. Delays in direct heading or shattering events such as high winds or hail may see losses minimised as a result of the PodGuard trait. However, in the absence of such conditions non PodGuard varieties may perform similar or potentially much better for their better inherent genetic ability or suitability to their growing environment.

Conclusion

Windrowing of canola is and will continue for many growers to be the main harvesting method but there is increasing interest and advantages in further adoption of direct heading. There are a number of barriers to this further adoption and GOA has tried to address just a few of them.

In an attempt to investigate if desiccation will close the gap between the harvesting of windrowed crops versus direct headed a few surprises were found. The use of either Reglone™ or Weedmaster™ DST appears to offer little advantage to facilitate an earlier harvest. But also from these trials it can be speculated that the time difference between the harvesting of a well-timed windrowed crop and one that is direct headed is likely much shorter than many would expect anyway.

In terms of growers' concerns over pre harvest shattering in direct headed crops, if harvest is delayed the jury is still out. We have one trial that has shown yields to be stable for more than two weeks and another trial that has shown losses within two weeks of 500kg/ha. But there is evidence that yield decline is not linear but more a function of extreme weather conditions that are unpredictable. Wind, hail or extreme heat may occur tomorrow, next week or next month. Growers should consider direct headed canola crops no different to a wheat crop, the best way to mitigate damage is to get the crop off the paddock as quick as possible. And it should be remembered that windrowed crops are not immune to those same extremes and subsequent yield loss.

GOA's experience with the new PodGuard trait of Bayer was a positive one. The work showed the potential for it to offer growers some insurance if such conditions do strike. Bayer's breeding program will no doubt

be aiming to breed this trait into a wider range of genetic material than what is currently available which will give growers more options to pick varieties more appropriate to their environment.

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Contact details

Maurie Street
GOA
PO Box 2880
Dubbo NSW
Ph: 0400 066 201
Email: maurie.street@grainorana.com.au

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