Evaluating management strategies to reduce pod shatter in lentils

Mikaela Tiller and Kaidy Morgan

Hart Field-Site Group

Key findings

- Pod loss (pods/m^2) and yield (t/ha) were affected by time of harvest (TOH), as environmental conditions between the two harvest timings were conducive to pod loss.
- The application of a desiccant reduced seed loss (seeds/m^2) when compared to non-dessicated treatments.
- The application of Enviroshield® or iron sulphate had no effect on pod shatter (seeds/m^2), pod loss (pods/m^2) or grain yield (t/ha).

Introduction

In agricultural systems, pod shatter and pod drop remain a significant cause of pre-harvest seed losses and consequently yield loss for lentil growers worldwide (Aslan & Kahraman, 2025). Advances in technology and plant breeding have allowed for trait selection to reduce pod losses, however unfavourable environmental conditions prior to and during harvest heavily influence these losses (Parker et al, 2021).

Alternative methods to reducing lentil losses are being explored, including the use of desiccants, pod protector products and trace elements for optimal harvest timing and improved pod strength and durability.

A small plot trial was conducted at Hart, SA in 2025 to evaluate the impact of harvest timing and the use of desiccants alone or in conjunction with pod protectants or trace elements as a management strategy to reduce lentil losses.

Methodology

Trial design and treatments

GIA Thunder is a mid-maturity, small, red lentil and was selected for its suitability to the Mid North. It has a lodging resistance of moderately resistant to moderately susceptible (MRMS), a pod drop rating of moderately resistant (MR) and a shattering rating of resistant to moderately resistant (RMR). It has a good disease package rating MRMS-MR for common legume diseases and yielded above the National Variety Trial average for the Mid North region from 2020-2024 (long-term yield data for 2025 not yet published) (GRDC, 2025).

The trial was established at the Hart Field-Site as a split-split block design with three replicates of each treatment (Table 1). Three variables were assessed: time of harvest (TOH), the presence or absence of a desiccant and the application of either Enviroshield® or iron sulphate (Table 2).

Aslan and Kahraman (2025) investigated and identified that lentils vegetative growth and yield was limited by Zinc (Zn) and Iron (Fe) uptake due to lentil producing soils being below critical levels of Fe and Zn. They suggested that pod shatter and consequently yield loss may be affected by limited solubility of Fe and Zn (Aslan and Kahraman, 2025). Iron deficiency issues may be observed, even when abundant due to poor availability, often in alkaline, high pH soils typically associated with water

logging (GRDC, 2017; Incitec Pivot Fertilisers, 2022). At Hart, soil is slightly alkaline with a pH ($CaCl_2$) ranging from 7.75 (0-15cm) to 8.45 (75-135cm) with Fe levels ranging from 3.7-9.7 mg/kg (SAGIT, 2024). Iron sulphate was applied as a foliar application at 1 kg/ha on September 22 at pod set stage (Incitec Pivot Fertilisers, 2022).

EnviroShield®, developed by Agspec, applies a polymer film to the pod acting as a pod protectant to repel moisture and consequently reducing pod shatter (Agspec, 2022). EnviroShield® was applied as a foliar application at 1 L/ha on the October 14 at 'green pod' stage where pods were pliable without splitting and releasing the seed.

Table 1. Trial details for 2025 lentil pod and seed loss management at Hart, SA.

Harvested plot size	1.75 x 10 m	**Previous crop**	Bale awnless wheat
Location	Hart, SA	**Soil N**	120.4 kg N/ha
Seeding date	June 20, 2025	**Fertiliser**	Seeding: MAP (10:22) Zn 1% @ 80 kg/ha
Time of Harvest 1 date	November 5, 2025		
Time of Harvest 2 date	November 18, 2025		
GSR*	Decile 3 (223 mm)		

**GSR = Growing season rainfall*

Table 2. Treatment list for 2025 lentil pod and seed loss management trial at Hart, SA.

Treatment	Time of Harvest (TOH)	Desiccation	Pod Treatment
1	1	Nil desiccation	Nil
2			Enviroshield® @ 1 L/ha
3			Iron sulphate @ 1 kg/ha
4			Enviroshield® @ 1 L/ha
5		+ Desiccation	Iron sulphate @ 1 kg/ha
6			Nil
7	2	+ Desiccation	Nil
8			Iron sulphate @ 1 kg/ha
9			Enviroshield® @ 1 L/ha
10			Enviroshield® @ 1 L/ha
11		Nil desiccation	Iron sulphate @ 1 kg/ha
12			Nil

Site management and environmental conditions

The trial was managed through the application of pesticides to ensure an insect, weed and disease-free canopy. The 2025 growing season was characterised by below average rainfall (Decile 3; 223 mm). This should be considered when interpreting these results.

Assessments

Normalised difference vegetation index (NDVI) was assessed prior to treatment application utilising a handheld Greenseeker. Time of harvest one (TOH1) was completed at the optimal time when the lentils were ripe and ready to be harvested. Time of harvest two (TOH2) was late, approximately 14 days after the ideal time. Grain yield (t/ha) was obtained from both times of harvest. Post-harvest ground pod and grain counts were conducted via quadrats per plot, with data being converted to m^2 to assess pod shatter (seeds) and pod drop (whole pods).

Trial data was analysed utilising REML spatial model (Regular Grid) in GenStat 24th Edition. Bonferroni critical difference values (Bonferroni CD) were calculated using average standard error of difference (SED) from the GenStat output and the relevant t critical value calculated in Excel. This number can be used to determine the difference required for a significant effect between treatments.

Results and discussion

Time of Harvest

Time of harvest (TOH) influenced pod drop in 2025, with late harvest treatments showing significant pod losses (Table 3). Unfavourable conditions occurred between TOH1 and TOH2; wind gusts exceeding 50 km/hr occurred on eight days throughout this period and on two occasions wind gusts exceeded 60 km/hr, including two days prior to harvest. There was a yield penalty of 0.1 t/ha comparing treatments harvested on time, to treatments harvested late.

A similar trial conducted at Hart in 2022 observed significant pod shatter effects between TOH1 and TOH2 due to unfavourable weather conditions, however no yield penalty was observed. Alternatively, in 2023, because of mild conditions between TOH1 and TOH2, no difference was observed in pod shatter, however a yield penalty of 0.4 t/ha was still observed.

Table 3. Yield, pod shatter (grain/m2) and pod loss (pod/m^2) from time of harvest (TOH) in 2025. Shaded values indicate significant best performing treatments. Any difference between two means greater than the Bonferroni critical difference value is significant at α = 0.05 after Bonferroni correction.

TOH	Yield (t/ha)	Grain/m^2	Pods/m^2
1	1.19	27	297
2	1.09	41	517
P-value (<0.05)	**0.007**	**NS**	**<0.001**
Bonferroni CD	**0.06**	**-**	**94**

Desiccation

Desiccation influenced grain loss in 2025 with nil desiccant plots exhibiting significant seed loss when compared to non-desiccant treatments (Table 4). Although not significant, pod shatter increased and yield decreased when no desiccant was utilised. The warm, dry conditions leading into harvest may have influenced these results.

Table 4. Yield, pod shatter (grain/m^2) and pod loss (pod/m^2) from the use of desiccants in 2025. Shaded values indicate significant best performing treatments. Any difference between two means greater than the Bonferroni critical difference value is significant at α = 0.05 after Bonferroni correction.

	Yield (t/ha)	Grain/m^2	Pods/m^2
Desiccation	1.16	28	402
Nil desiccation	1.13	40	412
P-value (<0.05)	**NS**	**0.037**	**NS**
Bonferroni CD	**-**	**11**	**-**

Pod treatment

Enviroshield® applications at 1 L/ha had no effect on yield, pod drop or pod shatter when applied at 'green pod'. The same results were observed in the 2022 and 2023 pod loss trial at Hart, observing that Enviroshield did not minimise pre-harvest losses.

Iron sulphate applications at 1 kg/ha had no effect on yield or lentil losses when applied at pod set stage.

Further investigation into application timings and rates, over varying seasonal conditions would provide additional information to make informed management decisions.

Table 5. Yield, pod shatter (grain/m^2) and pod loss (pod/m^2) from pod treatment in 2025.

Treatment	Yield (t/ha)	Grain/m^2	Pods/m^2
Enviroshield® @ 1 L/ha	1.14	27	404
Iron sulphate @ 1 kg/ha	1.14	38	406
Nil	1.14	38	410
P-value (<0.05)	**NS**	**NS**	**NS**

Summary

Time of harvest (TOH) influenced pod shatter in 2025, with late harvest treatments showing significant pod losses as a result of unfavourable conditions between TOH1 and TOH2.

Desiccation influenced grain loss in 2025 with nil desiccant plots exhibiting significant seed loss when compared to non-desiccant treatments.

No effect on yield, pod shatter or grain loss was observed when Enviroshield® or iron sulphate were applied. Further investigation into application timings and rates, over varying seasonal conditions would provide additional information to make informed management decisions.

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Photo. View of the lentil pod loss trial at Hart in 2025.