Chickpea Harvest Losses – High Crop Biomass

Trial ID: **LB2015** **Location:** **Condamine** **Trial Year:** **2020**
Investigator: **Linda Bailey**

High levels of grain loss are common when harvesting chickpeas. Combined with relatively high grain prices, harvest losses of more than $100/ha can easily occur. Losses can occur at a number of points in the harvest process but this project was mainly focussed on those that occur at the front of the header rather than losses within the header 'processing'. The front of header losses may be due to pods falling off at harvest, pods shattering at harvest or plant and pod material feeding poorly into the elevator. In addition, yield losses due to low harvest height are common, particularly in undulating country or where crops are deep planted without levelling.

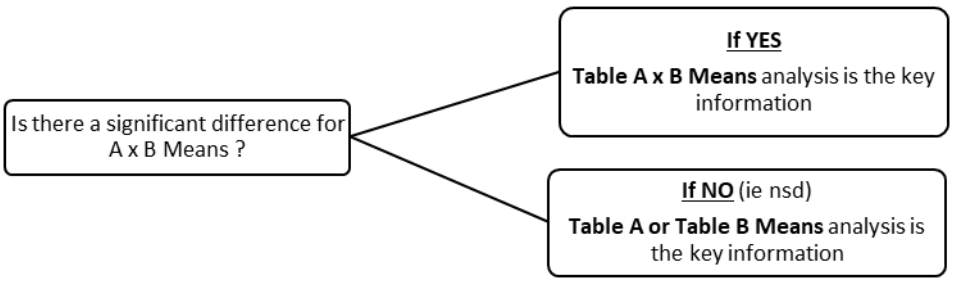
This project aimed to quantify the level of grain loss under commercial conditions and also the impact of management changes to reduce those losses. This trial compared the impact of a John Deere 640D draper front with a JD 640FD flexi draper front. Both fronts were set up with AWA air bars. This also allowed a comparison of the impact of the air assist on grain losses.

Objective:	**To evaluate the impact of header adaptations on front of header chickpea grain losses**	
Crop & Variety:	**Chickpea cv. PBA Seamer**	
Planting Date:	**27/05/2020**	
Row Spacing:	**66cm**	
Sowing Rate and Depth:	**60 kg seed/ha at ~10cm depth**	
Trial Design:	**Split plot with header as main factor, airbar as sub factor, 4 replicates**	
Plot Size:	**80 m x 12 m**	
Harvest Date:	**17/10/2020 (11 days after desiccation with Roundup Ultra Max 1.7 L/ha + Ally 5 g/ha))**	
Crop Yield:	**1.8 t/ha**	
Headers:	**John Deere 640D Hydrafloat draper (Rigid)**	**John Deere 640 FD Hydraflex draper (Flexi Front)**
Airbars:	**AWS**	**AWS**
Ground Speed:	**9 km/hr**	
Keywords:	**Harvest, chickpea**	

Trial designed and analysed as a Split plot

	In Simple Terms
Table of A Means:	Mean of 'Front' performance with **ALL** 'Airbag' treatments
Table of B Means:	Mean of 'Airbag' performance with **ALL** 'Front 'treatments
Table of A x B Means:	'Front' performance with **EACH** 'Airbag' treatment

How to interpret?



Two separate trials were conducted at this site. This trial was conducted in a high biomass section of crop, LB2014 was conducted in a low biomass area to evaluate impact of crop biomass on header losses.

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NB: Assessment of pod and grain loss conducted on 6.6 m²/ plot

Header losses assessed 2 days after harvest

Crop Name / Crop Variety / Description / Assessment Date / Assessment Type / Assessment Unit / Plant-Evaluation Interval		Chickpea PBA Seamer				
		Harvest Height 19/10/2020 HEIGHT cm 145 DAP	Pods Attached 19/10/2020 GRAIN WEIGHT kg/ha 145 DAP	Pods on Ground 19/10/2020 GRAIN WEIGHT kg/ha 145 DAP	Grain on Ground 19/10/2020 GRAIN WEIGHT kg/ha 145 DAP	Total Grain Loss 19/10/2020 GRAIN WEIGHT kg/ha 145 DAP
Trt No.	Treatment					
TABLE OF A MEANS (Front)						
1	Rigid	14.0a	14.6-	71.8 -	13.2-	99.6-
2	Flexi	11.3b	4.3-	71.3 -	11.2-	86.8-
TABLE OF B MEANS (Air Bar)						
1	No Air	12.5-	10.8-	76.8 -	14.5-	102.0-
2	Air	12.8-	8.2-	66.3 -	9.9-	84.4-
TABLE OF A x B MEANS (Front x Air Bar)						
1a	Rigid, No Air	13.5-	15.3-	76.8 -	17.1-	109.2-
1b	Rigid, Air	14.5-	13.9-	66.9 -	9.2-	90.0-
2a	Flexi, No Air	11.5-	6.2-	76.8 -	11.9-	94.8-
2b	Flexi, Air	11.0-	2.4-	65.8 -	10.6-	78.9-

Means followed by same letter do not significantly differ (P=.05, LSD)

NB: 50 pods assessed: mean 1.4 seeds/ pod, seed weight ~0.24 g

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COMPLETE SPLIT-PLOT AOV
Chickpea cv. PBA Seamer
Harvest Height
19/10/2020
HEIGHT cm 145 DAP

Source	DF	Sum of Squares	Mean Square	F	Prob.(F)	LSD (.05)
Total	15	49.750000				
R	3	4.250000	1.416667	1.545	0.2970	
A	1	30.250000	30.250000	12.517	0.0384	2.5
ERROR A	3	7.250000	2.416667			
B	1	0.250000	0.250000	0.273	0.6202	1.2
AB	1	2.250000	2.250000	2.455	0.1682	1.7
ERROR B	6	5.500000	0.916667			

COMPLETE SPLIT-PLOT AOV
Chickpea cv. PBA Seamer
Pods Attached
19/10/2020
GRAIN WEIGHT kg/ha 145 DAP

Source	DF	Sum of Squares	Mean Square	F	Prob.(F)	LSD (.05)
Total	15	926.971478				
R	3	120.326433	40.108811	1.090	0.4226	
A	1	424.759609	424.759609	9.866	0.0516	10.4
ERROR A	3	129.153469	43.051156			
B	1	26.547476	26.547476	0.721	0.4283	7.4
AB	1	5.375864	5.375864	0.146	0.7155	10.5
ERROR B	6	220.808628	36.801438			

COMPLETE SPLIT-PLOT AOV
Chickpea cv. PBA Seamer
Pods on Ground
19/10/2020
GRAIN WEIGHT kg/ha 145 DAP

Source	DF	Sum of Squares	Mean Square	F	Prob.(F)	LSD (.05)
Total	15	2814.496992				
R	3	428.011675	142.670558	0.542	0.6713	
A	1	1.061899	1.061899	0.009	0.9318	17.6
ERROR A	3	368.611698	122.870566			
B	1	435.444968	435.444968	1.653	0.2459	19.9
AB	1	1.061899	1.061899	0.004	0.9514	28.1
ERROR B	6	1580.304852	263.384142			

COMPLETE SPLIT-PLOT AOV
Chickpea cv. PBA Seamer
Grain on ground
19/10/2020
GRAIN WEIGHT kg/ha 145 DAP

Source	DF	Sum of Squares	Mean Square	F	Prob.(F)	LSD (.05)
Total	15	1064.844980				
R	3	141.168910	47.056303	0.522	0.6829	
A	1	14.932955	14.932955	0.187	0.6943	14.2
ERROR A	3	239.096588	79.698863			
B	1	84.653940	84.653940	0.939	0.3700	11.6
AB	1	43.884602	43.884602	0.487	0.5116	16.4
ERROR B	6	541.107984	90.184664			

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COMPLETE SPLIT-PLOT AOV Chickpea cv. PBA Seamer Total Grain Loss 19/10/2020 GRAIN WEIGHT kg/ha 145 DAP						
Source	**DF**	**Sum of Squares**	**Mean Square**	**F**	**Prob.(F)**	**LSD (.05)**
Total	15	8397.030184				
R	3	594.049881	198.016627	0.284	0.8354	
A	1	650.479520	650.479520	1.135	0.3649	38.1
ERROR A	3	1719.933738	573.311246			
B	1	1240.483620	1240.483620	1.780	0.2305	32.3
AB	1	10.728702	10.728702	0.015	0.9053	45.7
ERROR B	6	4181.354722	696.892454			

DAP = Days after Planting

Conclusions:

This trial was designed to evaluate the impact of header front modifications on chickpea grain loss at harvest. The trial was conducted in a crop of PBA Seamer (on 66 cm rows) in an area with high crop biomass (yield ~1.8t/ha). The crop was harvested 11 days after desiccation and assessed for losses two days later. Harvest was slightly delayed due to ~5mm rainfall at 7 days after desiccation.

A John Deere 640D HydraFloat Draper Platform (rigid) and a John Deere 640FD HydraFlex Draper Platform (flexible), both with AWS Airbars, harvested the trial at a ground speed of 9 km/h. A split plot design was used with headers as the main factor. 50 pods were assessed prior to harvest to calculate grains/pd and individual grain weight.

Harvest height, number of pods attached to stem, pods and individual ground on the ground were all assessed. The flexible front was able to significantly reduce harvest height, leaving the stubble ~3 cm shorter than the rigid front. There was a clear trend (p=0.052) to fewer pods remaining unharvested where the flexible front was used, with grain loss reduced by ~10kg/ha. This only amounted to a saving of ~$6/ha (Chickpeas @ $600/t).

Non-significant decreases in pods and grain on the ground were found where the airbars were used. Total grain loss was low (~80-110 kg/ha) with no significant difference in loss due to the treatments. Total grain left in the paddock averaged 18 kg/ha less where the AWS Airbar attachment was turned on however this difference was not statistically significant. 10kg/ha of this loss could be attributed to whole pods left on the ground.

In this trial grain losses were low regardless of the treatments imposed. The flexible front enabled a lower harvest height and reduced the grain loss due to unharvested pods but had no significant impact on grain loss at the front of the header. In this higher biomass situation, air assist did not significantly reduce pod or grain losses.

Crop Description	
Crop:	***Cicer arietinium*** **Chickpea**
Crop Variety:	**PBA Seamer**
Planting Date:	**27/05/2020**
Planting Rate, Unit:	**60 kg/ha**
Planting Method:	**Direct Drilled**
Planting Depth, Unit:	**10 cm**
Planting Equipment:	**Tyne Planter**
Row Spacing, Unit:	**66 cm**
Harvest Date:	**17/10/2020**
Harvested Width, Unit:	**12 m**
Harvested Length, Unit:	**80m**
Harvest Equipment:	**JD640D & JD640FD (plus AWS)**