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Chickpea Harvest Losses - Low Crop Biomass

Trial ID: **LB2014** **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.

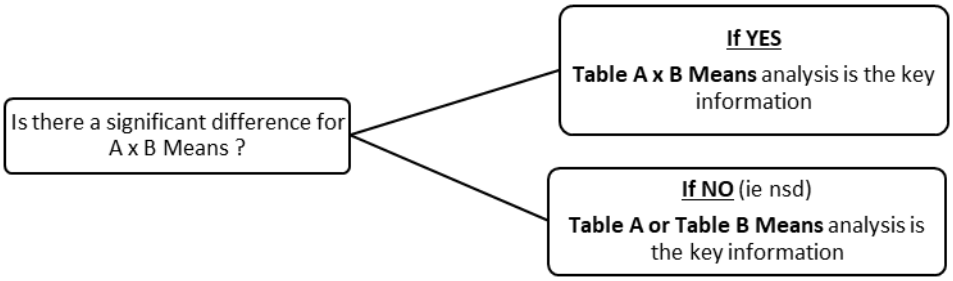
This project aimed to quantify the level of grain loss under commercial conditions and also the impact of management changes to reduce those losses. This trial compared the impact of a John Deere 640D draper front with a JD 640FD flexi draper front. Both fronts were set up with AWA air bars. This also 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:	**1.2 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 **BOTH** 'Airbar' treatments
Table of B Means:	Mean of 'Airbar' performance with **BOTH** 'Front 'treatments
Table of A x B Means:	'Front' performance with **EACH** 'Airbar' treatment

How to interpret?



Two separate trials were conducted at this site. This trial was conducted in a low biomass section of crop, LB2015 was conducted in a high 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	14.3a	22.2 -	79.8 -	18.0-	120.0-
2	Flexi	10.3b	6.6 -	76.5 -	18.1-	101.2-
TABLE OF B MEANS (Airbar)						
1	No Air	11.9-	15.0 -	85.4 a	18.8-	119.2a
2	Air	12.6-	13.7 -	70.9 b	17.3-	102.0b
TABLE OF A x B MEANS (Front x Airbar)						
1a	Rigid, No Air	13.8-	23.8 -	86.8 -	18.9-	129.5-
1b	Rigid, Air	14.8-	20.5 -	72.8 -	17.2-	110.5-
2a	Flexi, No Air	10.0-	6.2 -	84.0 -	18.8-	108.9-
2b	Flexi, Air	10.5-	7.0 -	69.0 -	17.5-	93.5-

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

Chickpea Harvest Losses - Low Crop Biomass

Trial ID: LB2014 **Location:** Condamine **Trial Year:** 2020

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	81.000000				
R	3	3.500000	1.166667	1.077	0.4270	
A	1	64.000000	64.000000	42.667	0.0073	1.9
ERROR A	3	4.500000	1.500000			
B	1	2.250000	2.250000	2.077	0.1996	1.3
AB	1	0.250000	0.250000	0.231	0.6480	1.8
ERROR B	6	6.500000	1.083333			

COMPLETE SPLIT-PLOT AOV
Chickpea 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	1774.366899				
R	3	124.972241	41.657414	1.161	0.3991	
A	1	971.703975	971.703975	6.644	0.0820	19.2
ERROR A	3	438.763403	146.254468			
B	1	6.636869	6.636869	0.185	0.6822	7.3
AB	1	16.990384	16.990384	0.473	0.5171	10.4
ERROR B	6	215.300027	35.883338			

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	2388.592523				
R	3	377.422142	125.807381	2.461	0.1603	
A	1	43.156240	43.156240	0.158	0.7178	26.3
ERROR A	3	820.499509	273.499836			
B	1	839.978719	839.978719	16.431	0.0067	8.7
AB	1	0.813016	0.813016	0.016	0.9038	12.4
ERROR B	6	306.722896	51.120483			

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	614.621466				
R	3	167.784109	55.928036	4.164	0.0649	
A	1	0.033862	0.033862	0.000	0.9876	17.4
ERROR A	3	357.408935	119.136312			
B	1	8.668563	8.668563	0.645	0.4524	4.5
AB	1	0.135446	0.135446	0.010	0.9233	6.3
ERROR B	6	80.590551	13.431758			

Chickpea Harvest Losses - Low Crop Biomass

Trial ID: LB2014 **Location:** Condamine **Trial Year:** 2020

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	8045.499280				
R	3	912.822419	304.274140	2.859	0.1267	
A	1	1410.565237	1410.565237	1.091	0.3731	57.2
ERROR A	3	3880.147539	1293.382513			
B	1	1190.446031	1190.446031	11.184	0.0155	12.6
AB	1	12.875864	12.875864	0.121	0.7399	17.9
ERROR B	6	638.642191	106.440365			

DAP = Days after Planting

Conclusions:

This trial was designed to evaluate the impact of header front adaptations on chickpea grain loss at harvest. This trial was conducted in a crop of PBA Seamer chickpeas (on 66cm rows) in an area with reduced crop biomass (yield ~1.2t/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/pod and individual grain weight.

Harvest height, number of pods attached to stem, pods and individual grain on the ground were all assessed. As expected, the flexible front allowed significantly lower harvest height, leaving the stubble ~4 cm shorter. There was a clear trend (p=0.08) to fewer pods remaining unharvested where the flexible front was used with grain loss reduced by ~16 kg/ha.

Use of the air assist resulted in significantly fewer pods on the ground with grain loss reduced by ~15 kg/ha. No setup had any significant effect on the grain loss as individual grains. Total grain loss was low (~100-120 kg/ha) but with a significant reduction in losses when air assist was used. Use of air assist reduced total grain loss by ~17 kg/ha. This only amounted to a saving of ~$10/ha (Chickpeas @ $600/t).

In this trial grain losses were low regardless of the treatments imposed. The flexible front, as expected, 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. The air assist treatment reduced the grain loss as pods on the ground and the total grain loss but did not impact on unharvested pod numbers.

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)**