

Irrigated Pulse Agronomy

Drainage was the key to a successful trial.
Irrigated lentils and chickpeas could be quite profitable, assuming that the current prices are maintained.
In 2017, pre-irrigation alone was sufficient moisture to grow the crop successfully. Spring irrigations did not improve either yield or grain quality.

Growing irrigated chickpeas and lentils has potential financial rewards but their reputation for susceptibility to waterlogging and disease potentially makes them a risky proposition. Advances in irrigation technology and infrastructure may have reduced some of the risk. The ICC is attempting to quantify the risk with trials that have a combination of irrigation technologies, irrigation and fungicide strategies and variety evaluation.

Trials consisting of 4 varieties of lentils and 4 varieties of chickpeas were sown at three locations – ICC Trial Block Kerang, (border Check), Appin (subsurface drip) and Dhuragoon (near Moulamein, NSW, overhead spray). All sites were grey clays (vertisols). Each site had a combination of irrigation strategies and fungicide strategies.

Table 1: Irrigated pulse trial irrigation infrastructure and strategy.

Layout	Irrigation Strategy		
	Pre-irrigation Only	Pre-irrigation + spring to flowering	Full Irrigation
Border check	✓	✓	✓
Subsurface drip		✓	✓
Overhead Sprays		✓	✓

Overlaid on each site are 2 fungicide strategies – strategic (applied only when disease pressure is high) and blanket (regular application every 3 weeks).

Varieties used, target population (plants/m²) and sowing rate (kg/ha) at each site:

	Variety	Target pop'n	Sowing Rate
Lentils	Bolt	120	66
	Jumbo2	120	82
	Giant	100	94
	HurricaneXT	120	53
Kabuli Chickpeas	Genesis 090	35	159
	Almaz	35	206
Desi Chickpeas	Boundary	45	135
	Slasher	45	194

Part 1: Border Check Trial

The trial was sown on May 16th following pre-irrigation on April 8th. Terbyne Xtreme (1.0 l/ha) + Glyphosate (1.5 l/ha) + Goal (75 ml/ha) was used as a pre-emergent treatment. 30 mm of rain fell shortly afterwards but did not affect establishment.

The fungicide program started on July 21st, with 1.5 kg/ha Mancozeb applied to all plots.

The “3 week” treatments then occurred on 11/8, 31/8, 13/9, 29/9 and 10/10 using Chlorothalonil at 1.5 l/ha – a total of 6 fungicide applications for the season.

The “strategic” treatment was sprayed on 21/7, 31/8 (rain), 13/9 (irrigation) and 10/10 (rain).

No disease was detected in any plots during the season.

The first spring irrigation occurred on September 13th, with the first flowers starting to appear. The second spring irrigation occurred on September 30th.

The pre-irrigation only treatment appeared quite dry in mid-September, with cracks starting to open up. However the plants remained quite green until well into October. After the first spring irrigation, which took 9 hours, there appeared to be little waterlogging damage to the plots.

The second spring irrigation treatment took 6 hours and created some areas of yellowing plants, but the overall impression was that little damage was caused.

Plots in the pre-irrigation only trial began to hay off in late October, while the irrigated trials remained green.

Harvest occurred on December 14th.

Results

Yields – Irrigation and Fungicide Strategy

Fully Irrigated		Mean		3.36 t/ha				
Fungicide	Almaz	Bolt	Boundary	Gen 090	Giant	Hurr XT	Jumbo2	Slasher
3 week	3.04	3.48	3.68	3.27	2.26	3.50	3.46	3.30
Faba	3.36	3.35	3.97	3.10	2.56	3.93	3.51	3.61
1 Spring		Mean		3.36 t/ha				
Fungicide	Almaz	Bolt	Boundary	Gen 090	Giant	Hurr XT	Jumbo2	Slasher
3 week	3.61	3.98	3.14	3.31	2.55	3.81	3.08	3.54
Faba	3.61	3.78	3.09	3.17	2.65	3.58	3.31	3.62
Pre-irrigation Only		Mean		3.271 t/ha				
Fungicide	Almaz	Bolt	Boundary	Gen 090	Giant	Hurr XT	Jumbo2	Slasher
3 week	3.43	3.63	2.87	3.43	3.05	4.39	3.42	2.91
Faba	3.07	3.15	2.80	3.49	2.46	3.45	3.13	3.68

Seed size

Fungicide strategy made no significant difference to seed size.

Seed size (g/100 seeds)

Chickpeas	Almaz	Boundary	Gen 090	Slasher
Pre only	41.4	18.2	30.2	29.4
1 Spring	38.4	18.1	30.3	30.6
2 Spring	36.0	17.5	29.0	29.8

Lentils	Bolt	Giant	HurricaneXT	Jumbo2
Pre only	4.3	6.5	3.2	4.4
1 Spring	4.2	6.5	3.3	4.3
2 Spring	4.2	6.3	3.3	4.3

Gross Margin

The table below summarises the gross margins for the irrigated pulses using the assumptions:

Prices: Kabuli \$800/t, Desi \$600/t, Red Lentils \$550/t, Greens \$650/t

Water cost \$100/MI

Autumn pre-irrigation used 1.8 MI/ha

4 fungicide applications

Pulse	Type	Spring Irrigation MI	Ave Yld t/ha	\$/ha	\$/MI
Chickpea	Kabuli	0	3.36	1957	1087
Chickpea	Kabuli	0.8	3.43	1933	743
Chickpea	Desi	0	3.07	1168	649
Chickpea	Desi	0.8	3.35	1258	484
Lentil	Red	0	3.53	1349	750
Lentil	Red	0.8	3.59	1304	501
Lentil	Green	0	2.76	1188	660
Lentil	Green	0.8	2.60	1004	386

An excel-based Gross Margin calculator is available from the ICC if you wish to calculate the gross margins of the irrigated pulses for your own scenario.

What does it mean?

2017 was a low disease season which saw little benefit from a more frequent fungicide strategy.

Irrigation did not seem to be detrimental, however yield was not significantly improved by any spring irrigation. Bear in mind the soil profile was almost full at the end of August 2017. If this reserve had not been in place, there may have been a response to spring irrigation.

Seed size was not negatively affected by lack of spring irrigation, and in many cases, lack of irrigation improved seed size.

Gross margins can rapidly change with variations in price and yield. A GM calculator, be it a simple spreadsheet or a more comprehensive example like the Correct Crop Sequencing Decision Support Tool

(<https://www.dpi.nsw.gov.au/agriculture/budgets/costs/cost-calculators/correct-crop->

sequencing-decision-support-tool which can “price in” commodity price or water cost fluctuations), can help irrigators test the viability of growing any irrigated crop.