Optimising Irrigated Grains

GRDC GRAINS RESEARCH & DEVELOPMENT CORPORATION

2019/20 INTERIM GRAIN MAIZE RESULTS

KEY POINTS

Yields achieved over the five sites ranged from 16 to 20 t/ha

Nitrogen fertiliser applications greater than 250kg N/ha (up to over 500-550kg N/ha) were uneconomic

Mineralisation played an important role in maize nitrogen (N) uptake, providing 165 kg N/ha towards crop offtake of 400-450kg N/ha at Peechelba and 207kg N/ha towards the offtake of 310 kg N/ha

BACKGROUND

Twelve irrigated grain maize trials were established at five locations in northern Victoria and southern NSW as part of the GRDC investment into Optimising Irrigated Grains.

The primary focus of the field research was to examine nutrition, looking specifically at the influence of higher levels of nitrogen (N) input on harvest dry matter, grain yield, harvest index and nitrogen offtake.

In addition, the research programme also examined the influence of plant population, row spacing and disease management. At the main research sites Peechelba East and Kerang Irrigation was provided by overhead pivot and flood (border check) respectively. Irrigation quantities were as follows, Peechelba East (Pivot 6.08 Mega L/ha applied), Boort (Sub surface drip n/a), Hopefield (Pivot 6.88 ML/ha applied), Kerang (Flood border check 9.8 ML/ha) and Yenda (Flood, beds in bays 9.1 ML/ha). Research was conducted using the Pioneer Hybrid 1756.

GRAIN YIELDS AND HARVEST DRY MATTER PRODUCTION

At Peechelba East in North East Victoria the highest grain yields (machine harvested plots) were 18 – 19t/ha produced on crop canopies with a final harvest dry matter of between 30 – 35t/ha. At Kerang (machine harvested plots), the highest grain yields were typically between 16-17t/ha, again produced on crop canopies of approximately 30t/ha. Grain yields of 20t/ha were observed at Boort and Yenda from hand harvested quadrats, however it should be noted that smaller quadrats harvested from plots are generally more variable and higher yielding than machine harvested yields.

PLEASE NOTE: THESE RESULTS ARE INTERIM RESULTS AND AS SUCH MAY BE SUBJECT TO CHANGE AS A RESULT OF FURTHER STATISTICAL TESTING.

FAR AUSTRALIA

Irrigated Cropping Council
Promoting irrigated agriculture

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NUTRITION

At Peechelba East on a red loam over clay grain yields of 18.12-18.80 t/ha were produced with applied fertiliser input no greater than 207-252kg N/ha (207 kg N/ha of which was applied as fertigation between V4 and pre – tasselling). At this site following oaten hay (33kg N/ha was available at sowing (0-60cm)) there was no significant yield difference between applying 0 – 315kg N/ha applied pre-drill (as urea - 46% N solid prill) indicating that N application exceeding 250kg N/ha was uneconomic. At Kerang on a self-mulching grey clay the optimum fertiliser N input was 240kg N/ha with a yield of 16.43t/ha. At Peechelba East and Kerang fertiliser N applications greater than 250kg N/ha (up to over 500-550kg N/ha) were uneconomic.

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At both research sites N provided by the soil through mineralisation appeared to have a large effect on the results, since at Peechelba East N offtake at harvest revealed between 400 – 450kg N/ha in crop canopy, whilst at the same time there was no response to N fertiliser above 207-252kg N/ha. Typically, two thirds of the N present in the crop at harvest at Peechelba East was found in the grain with the remainder in the stover. Allowing for N available at sowing the results indicated that 165kg N/ha of the N in the crop at harvest was provided by mineralisation. In Kerang where the maize was grown following a three-year grass pasture phase the optimum level of applied N fertiliser was 240kg N/ha with a nitrogen offtake at harvest of 310kg N/ha at harvest, of which approximately 73% was present in the grain. Evidence from the zero N plots at this site indicated that up to 207kg N/ha in the final crop canopy came from soil mineralisation.

Additional Potassium (K) applications (20-80kg K/ha) at Kerang and Yenda on soils with levels of K at 500-600ppm gave no indications of luxury K uptake into leaf tissue or grain and no economic return in terms of yield.

PLANT POPULATION & ROW SPACING

At Boort decreasing row spacing from 750mm (approx. 30 inch) to 500mm (approx. 20inch) significantly increased grain yield with a 3.21 t/ha yield increase (trials hand harvested). In the same trial there were no significant effects of plant population when 90,000 plants/ha, 105,000 and 120,000 plant populations were compared. At Peechelba East the lowest plant population 79,287 plants/ha resulted in the lowest yields with no grain yield difference between 91,864 and 103,620 plants/ha. At Kerang in a variable trial there was no yield differences between 750 and 500mm row spacing or target plant populations of 85,000 plants/ha or 120,000 plants/ha. Although no grain yield differences were recorded it was noted that narrower row spacing produced more overall harvest biomass at the lower plant population of 85,000 plants/ha.

DISEASE MANAGEMENT

Three trials looking at experimental treatments based on triazole (Group 3 DMIs) and strobilurin (Group 11 QoI) fungicides produced no economic response to application and no evidence of increased green leaf retention in the maize canopy. No disease was observed in these three trials.

Research conducted by FAR Australia and Irrigated Cropping Council

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