Fluid delivery systems in canola

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RESEARCH

Searching for answers

Location:
Coulta, Morgan family
Rainfall
Av. Annual: 525 mm
Av. GSR: 465 mm
2014 Total: 499 mm
2014 GSR: 421 mm
Yield
Potential: 4.8 t/ha (C)
Actual: 1.2 t/ha
Paddock History
2014: CL canola
2013: Justica wheat
2012: Medic pasture
Soil Type
Grey loamy clay
Plot Size
20m x 2m x 3 reps

Key messages

- **This season showed no trace element differences given different delivery methods of granular, fluid or foliar application.**
- **The type of fertiliser used, fluid or granular, showed no differences in yield this season.**
- **There was no difference in yield, dry matter or disease with the addition of trace elements with fungicide treatments.**
- **The fungicide treatments combined did increase yield over the nil control treatment at this site, however the difference in blackleg disease levels scored was not significant.**

Why do the trial?

A SAGIT Fluid delivery project was funded to update the benefits of fluid delivery systems from previous research and assess the potential of fluid nutrient delivery systems and disease control strategies compared to current systems. The fluid systems have the potential to increase production through delivery of micro and macro nutrients, reduce cost of trace element delivery, and increase control of cereal and canola root and leaf disease, resulting in possible increases in dry matter production and grain yield.

Blackleg continues to be a major issue facing canola growers especially on lower Eyre Peninsula and fluid delivery systems for product delivery may increase production and improve disease control. With the relatively recent development of processes to evenly coat fertiliser granules with fungicides and to deliver liquid products around the seed row during the seeding pass, there is now a range of application strategies available to growers to make use of these new products.

How was it done?

A replicated canola fluid delivery trial was established at Coulta, sown with Clearfield 45Y86CL (CL canola) at 3 kg/ha. PreDictaB disease inoculum levels (RDTS), plant establishment, dry matter, blackleg infection, grain yield and quality were measured during the season.

The control fertiliser treatment was 100 kg/ha of 18:20:0:0. A fluid fertiliser delivery system placed fluid fertiliser approximately 3 cm below the seed at an output rate of 100 L/ha. The fluid fertiliser treatments were equivalent to 100 kg/ha of 18:20:0:0 as phosphoric acid and granular urea banded below the seed.

Manganese (Mn) was selected as the focus trace element in the nutrition trial, with zinc (Zn) and copper (Cu) also included in the trace element mix. The rate of Mn was 1.5 kg/ha as the standard rate as manganese sulphate, 1 kg/ha Zn as zinc sulphate and 0.2 kg/ha Cu as copper sulphate. Trace elements were also delivered as foliar applications at 4-5 leaf stage, and also at a half rate. Fungicides Jockey and Intake were included for blackleg disease control.

Weed control was applied broad acre on 20 June with Intervix @ 500 ml/ha and Select @ 500 ml with 5% uptake. On 3 July 120 kg/ha of sulphate of ammonia was applied broad acre and 100 kg/ha of urea on 25 July. The trial was harvested on 11 November 2014.

Data were analysed using Analysis of Variance in GENSTAT version 16, and also with an unbalanced design used for the main effects.

What happened?

The soil was shallow with limestone below and due to the direction of seeding and the knife points used on the plot seeder, some rocks were pulled up which resulted in uneven plots. However there were no significant differences in plant establishment counts within the trial (data not shown) with the average plant establishment being 41 plants/m^2. There were no differences in early dry matter, yield or grain quality measurements recorded this season in the trial (Table 1). The reduction in phosphorus fertiliser with the urea only and half rate of phosphoric acid reduced yield by 0.5 t/ha (Table 1).

Plants were tested for Beet Western Yellows virus but the test was negative at this site. Plant tissue tests (youngest leaf) were analysed at late cabbage stage which showed no trace element deficiencies at this site.

Table 1 Growth measurements (dry matter), yield and grain quality for CL canola in Coulta trial, 2014

Treatment	Early dry matter (g/plant)	Yield (t/ha)	Oil (%)	Protein (%)
Phos acid and 0.8 kg/ha $MnSO_4$ liquid and Gran Urea	0.12	1.49	42.5	21.0
DAP and half rate Foliar Trace elements (4-5 leaf stage) Mn @ 0.8 kg/ha, Zn @ 0.5 kg/ha, Cu @0.1 kg/ha	0.10	1.33	42.8	20.9
APP and UAN	0.10	1.33	43	21.0
APP, UAN and liquid TE Mn @ 1.5 kg/ha, Zn @ 1 kg/ha, Cu @0.2 kg/ha	0.07	1.31	43.4	21.3
Control	0.07	1.27	43.1	20.6
DAP and Liquid Trace elements Mn @ 1.5 kg/ha, Zn @ 1 kg/ha, Cu @0.2 kg/ha	0.10	1.25	43.3	20.7
Phos acid and 1.5 kg/ha $MnSO_4$ liquid and Gran Urea	0.10	1.24	42.8	21.2
Control	0.10	1.22	42.7	20.8
Phos acid and 3 kg/ha $MnSO_4$ liquid and Gran Urea	0.08	1.22	43	20.9
DAP and Foliar Trace elements (4-5 leaf stage) Mn @ 1.5 kg/ha, Zn @ 1 kg/ha, Cu @0.2 kg/ha	0.06	1.20	42.7	21.0
Phos acid and urea (equivalent 100 kg/ha DAP)	0.08	1.17	43	20.8
DAP and Foliar Mn @ 1.5 kg/ha	0.07	1.14	42.6	20.7
DAP with Mn coated fertiliser 1.5 kg/ha	0.08	1.09	42.1	21.3
Urea only	0.05	0.99	42.8	20.8
Half rate Phos acid (equivalent 50 kg/ha DAP) and urea	0.10	0.94	42.4	21.1
LSD (P=0.05)	*ns*	*ns*	*ns*	*ns*

Table 2 Yield of CL canola with different nutrition treatments at Coulta trial, 2014

Fertiliser source	Yield (t/ha)
APP and UAN	1.32
Control	1.24
Phosphoric acid	1.21
Granular fertiliser	1.20
Urea only	0.99
LSD (P=0.05)	*ns*

Table 3 Disease scores, growth measurements and yield for CL canola with fungicides and nutrition treatments at Coulta trial, 2014

Nutrition treatment	Late dry matter (kg/plant)	Blackleg score (% infection)	Yield (t/ha)
Zn, Cu, Mn with fungicide	0.68	25	1.22
Mn with fungicide	0.92	27	1.16
No TE with fungicide	0.79	34	1.14
Control	0.72	33	0.99
LSD (P=0.05)	*ns*	*ns*	*ns*

Table 4 Disease scores, growth measurements and yield for CL canola with fungicide treatments at Coulta trial, 2014

Fungicide treatment	Late dry matter (kg/plant)	Blackleg score (% infection)	Yield (t/ha)
Intake and Jockey	0.82	12	1.63 a
Intake	0.67	28	1.30 ab
Jockey	0.75	29	1.05 b
Control	0.72	33	0.99 b
LSD (P=0.05)	*ns*	*ns*	*0.35*

There were no significant differences at this site using different fertilisers types, granular or fluid; APP and UAN, phosphoric acid, granular DAP or urea only (Table 2). There were no differences recorded in early dry matter or grain quality given the different fertiliser treatments and applications.

In the trial this season there were no differences in plant growth, disease or yield given nil or different trace elements mixes applied this season (Table 3). The treatment with both fungicides applied did increase yield over the nil treatment at this site (Table 4), which is supported by previous research in this region but there were no significant differences in the blackleg disease scores in the trial. There were no differences in plant establishment or grain quality depending on the fungicide and nutrition treatment applied (data not shown; protein (average 20.9%), oil (average 42.8%)).

What does this mean?

The initial season at this site has showed no response to trace elements using different delivery methods, of granular, fluid or foliar application on canola. The type of fertiliser used, fluid or granular showed no differences in yield this season, however the lower phosphorus and urea only treatments had lower yields indicating a phosphorus response at the site. This is the first year of this research and it will be repeated over another two seasons.

There was no difference in dry matter or disease with the addition of trace elements or fungicide treatments. The fungicide treatments when combined did significantly increase yield over the nil fungicide control treatment at this site, however the difference in blackleg disease levels scored was not significant. The combined effect of fungicides giving additional protection has been reported in other research in this area, and the early protection of plants is important to reduce blackleg infection early due to rain splash.

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