

Can we extend the “haircut” window?

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Aim

The main aims of this trial are:

- To test if the ‘window’ is broadened due to seed coating,
- To test effect on yield due to timing of ‘haircut’.

Background

Dry autumns and a trend towards increased area of land being cropped have resulted in increased importance on dry sowing. This has led to a greater risk with weed control and little opportunity to apply knockdowns before seeding. Extra tools are needed to complement herbicides, with many growers reverting to alternative weed seed control methods such as mechanical methods, burning and crop competition. Whilst these tools all reduce the potential impact of weeds on crop yield, growers will still be forced to dry sow into potentially weedy paddocks in many years without a knockdown herbicide because of reduced autumn rainfall incidents. Seed coating to delay crop germination has been used in other parts of the world and has been tried in canola by DAFWA previously, and may provide an alternative weed control option for growers in this situation.

It is hypothesised that by applying an acrylic pavement sealer to the wheat seed coat, emergence will be delayed by greater than 48 hours. This will allow weed seed germination to occur before the crop emergence and facilitate a “haircut” using desiccant knockdown herbicides. **It should be noted that use of these spray products onto germinated crops is not a registered activity and contravenes the label use of those products. It should also be noted the seed coating product has no registration for such use.**

Trial Details

Property	Wenballa Farm, east of Dalwallinu
Plot size & replication	20m x 1.54m: 4 seed treatments x 4 spray treatments x 4 replicates (64 plots)
Soil type	Sandy loam
Soil pH (CaCl ₂)	0-10: 5.4 10-20: 6.7
EC	0.090 dS/m
Paddock rotation	2009 wheat, 2010 wheat, 2011 canola
Variety	Wyalkatchem
Seed Treatment Solution	Acrylic paving sealer + 5% surfactant per 3kg grain - Nil, 200mL, 400mL (2 x 200ml doses), 400mL (single dose)
Seeding date	22/5/12
Seeding rate	80 kg/ha
Fertiliser	22/5/12: 80 kg/ha Agstar Extra banded, 50 kg/ha Urea top dressed, 25 kg/ha Muriate/Potash top dressed
Insecticides	22/5/12: 0.2 L/ha Talstar and 0.1 L/ha Dominex IAS
Spray Treatments	15/6/12: 1 L/ha Sprayseed - Nil, ½ leaf 19/6/12: 1 L/ha Sprayseed - 1 leaf 25/6/12: 1 L/ha Sprayseed - 1½ to 2 leaf 23/7/12: 700 mL/ha Barracuda, 2.5 g/ha Ally
Growing Season Rainfall	133mm

Trials were first conducted in a laboratory to test a large number of seed treatments (seventeen). A subset of these (six) that showed the most promise were chosen for a pot trial in a controlled environment room. The results from those treatments subsequently selected for use in the field trial are displayed in Figures 1 and 2.

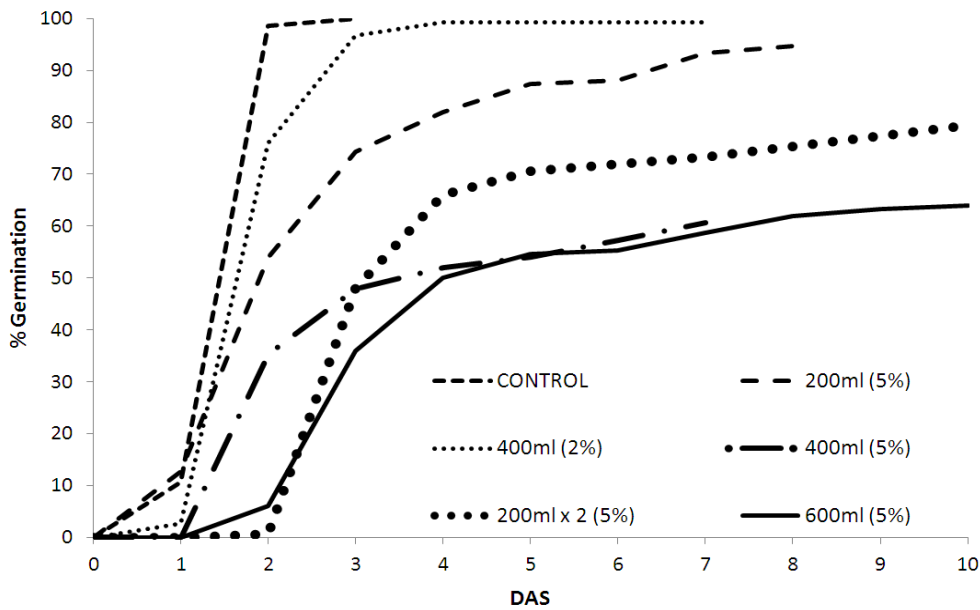


Figure 1. Germination rates in 20°C germination cabinet of wheat coated with different rates of acrylic pavement sealer.

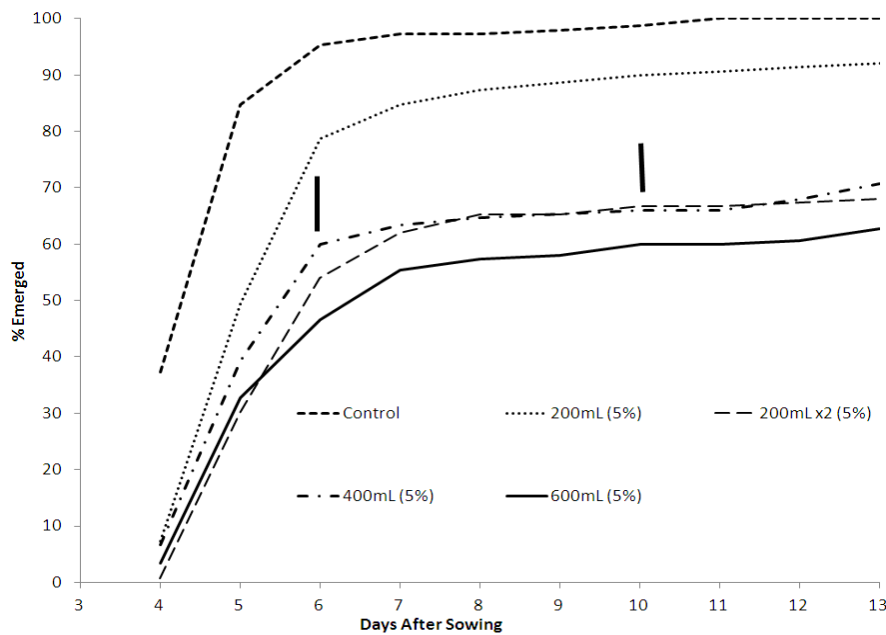


Figure 2. Emergence rates of pot trial in controlled environment of wheat coated with different rates of acrylic pavement sealer (vertical lines show error at 95% confidence at days 5 and 10).

From these experiments 4 seed treatments were selected as the most likely to succeed in a field experiment. The layout for this experiment is displayed below. Another similar experiment was also conducted on the Greenough flats near Geraldton.

Results

Emergence

The field trial (Figure 3) showed similar trends in terms of plant emergence as those seen in the laboratory. This result indicates that the delayed germination of 36 – 48 hours in a controlled environment and as much as five days in the field is achievable by using off the shelf acrylic pavement sealer products. It also demonstrates overall germination percentage of treated seed is reduced when using the products trialed in these experiments. Other potential products may not have the same problem but have not yet been identified or trialed.

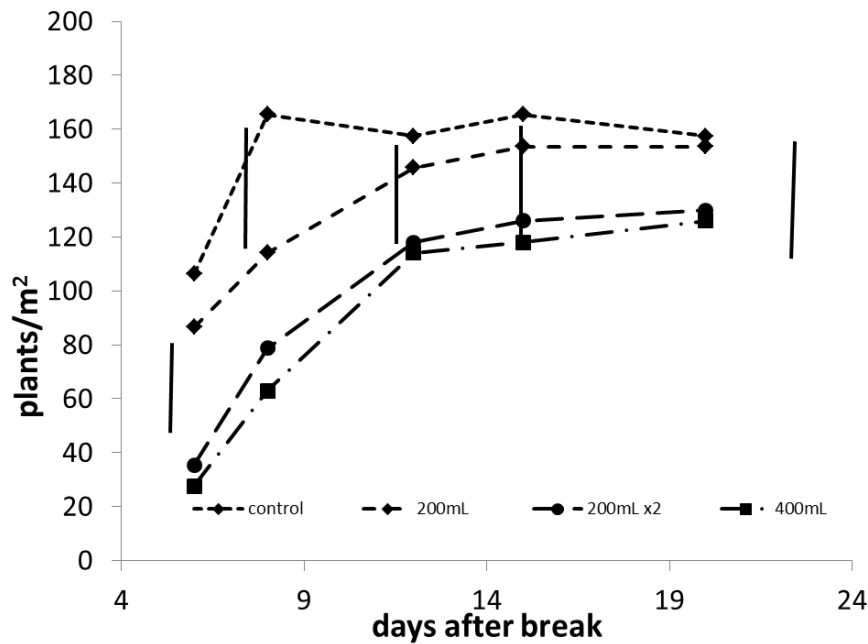


Figure 3. Plant counts per metre row after seed was coated with different rates of acrylic paving sealer east of Dalwallinu in 2012 (vertical lines show error at 95% confidence at days 5 and 10).

Yields

Yields for Dalwallinu trial are not available due to uncertainty regarding the application of the knockdown herbicide. However, results from a similar trial at the Greenough site from 2012 are reported here. These results indicate that:

- Using this product at 400 mL/3 kg seed batch (or 2 x 200 mL/3kg batch) reduced plant germination percentage significantly at 95% confidence levels ($P < 0.05$).
- All spray treatments sprayed at the 1.5 leaf stage were significantly lower yielding than the nil coat nil spray control ($P < 0.05$). Yields for all other spray timings were not reduced. However, other trial work and anecdotal field observations indicate a high degree of variability with respect to the allowable timing for this method. Significant caution is urged before applying this practice due to potential yield loss.
- When comparing seed coating treatments at the different spray timings, only when spraying at the 1.5 leaf stage was there any significant yield differences observed, with the nil spray reducing yield significantly compared to one other seed coat treatment ($P < 0.05$).
- Screenings for 2 treatments were significantly higher than the control, but were not above the 5% acceptable limit ($P < 0.05$).
- Weed numbers were highly variable across this site. Despite this, 2 plots showed significantly higher weed numbers than the control ($P < 0.10$). Both of these plots were where crop plant numbers were significantly reduced also. A lack of crop competition may be the cause for this.
- Grain weight has been significantly reduced for 3 treatments. Two of these are the 1.5 leaf spray timing ($P < 0.05$).
- There are no significant differences for all protein recordings ($P < 0.05$).

Table 1: Yield, quality and establishment of wheat, and grass weed establishment at the Greenough site.

Treatment	Yield (t/ha)	Protein (%)	Screenings (%)	Weight (g)	Plants /m ²	Ryegrass /m ²
No spray: No coating(Control)	3.21	12.7	3.42	79.94	189	88
No spray: 200ml	3.35	13.3	4.11	78.40	181	230
No spray: 200ml x 2	3.09	12.7	3.51	79.50	113	101
No spray: 400ml	3.34	12.3	3.88	79.97	88	341
1 L/ha Spspeed@ ½ leaf: No coating	2.95	12.6	3.75	79.9	167	118
1 L/ha Spspeed@ ½ leaf: 200ml	2.73	12.7	3.41	79.61	142	20
1 L/ha Spspeed@ ½ leaf: 200ml x 2	3.12	12.8	3.86	79.24	67	62

Treatment	Yield (t/ha)	Protein (%)	Screenings (%)	Weight (g)	Plants /m ²	Ryegrass /m ²
<i>1 L/ha Spseed@ ½ leaf: 400ml</i>	3.34	13.0	3.83	79.09	70	151
<i>1 L/ha Spseed@ 1 leaf: No coating</i>	2.76	12.9	3.79	79.85	154	55
<i>1 L/ha Spseed@ 1 leaf: 200ml</i>	2.96	13.1	3.85	79.04	101	33
<i>1 L/ha Spseed@ 1 leaf: 200ml x 2</i>	2.64	12.8	3.54	79.84	89	25
<i>1 L/ha Spseed@ 1 leaf: 400ml</i>	2.96	12.8	3.63	79.59	107	22
<i>1 L/ha Spseed@ 1½ leaf: No coating</i>	0.53	13.5	4.59	78.60	129	285
<i>1 L/ha Spseed@ 1½ leaf: 200ml</i>	1.68	13.5	4.33	78.69	152	204
<i>1 L/ha Spseed@ 1½ leaf: 200ml x 2</i>	1.89	13.2	3.67	79.79	96	105
<i>1 L/ha Spseed@ 1½ leaf: 400ml</i>	1.72	13.4	3.86	79.06	78	147
<i>LSD 95% probability</i>	0.63	0.82	0.92	1.20	59.9	231
LSD 90% probability	0.53	0.68	0.77	1.00	49.8	192

Diff at 90% probability are italics and compared to no spray, no coat control.

Diff at 95% probability are italics and bold and compared to no spray, no coat control.

Diff at 95% probability compared to no coat for same spray is shaded

Economic Analysis

No economic analysis has been performed on this data. The variable costs trialed included spray treatments, seed coating product and treatment process. Of these the seed coating process forms the major unknown cost because there is no practical way to determine the true on farm cost if this function were to be performed on farm with large grain volumes. As such at this stage economic analysis may provide inaccurate analysis.

Comments

This series of trials is deemed “blue sky” experimentation and not applied. Many factors restrict the use of these products in this manner for genuine farm businesses. Firstly, the haircut technique is not a registered use of any paraquat based products. Application of this product to growing crops would contravene label use. Secondly, there is no registration for the seed coat product trialed here. Thirdly, no analysis or experimentation has been conducted to assess how this seed coating may be applied to large volumes of seed grain, or its probable cost.

In these trials it appears using an acrylic pavement sealer product not designed for the purpose of coating wheat seed can result in delayed germination of at least 36 hours, and in some field observations up to 5 days. Seed establishment was reduced from the acrylic sealer; however, this did not impact on yield.

When applying desiccant knockdown herbicides post sowing, this trial indicates this should not be conducted after the 0.5 leaf stage. Significant yield penalties occurred after the 1 leaf stage in this trial but other trials have indicated spraying at earlier timings can cause yield loss. There are many factors that influence the impact of hair cutting including time of day, overcast or cloudy conditions, seed depth at sowing and the use of other products (e.g. diuron) pre-emergent. The seed used in this experiment was sieved over 2.5mm, probably resulting in greater seedling vigour.

Creating a larger hair cut window would allow growers to dry sow with more confidence into paddocks where weed control in previous years has not been achieved to an acceptable standard. However, issues relating to appropriate timing would need to be considered to ensure label guidelines are adhered to. Seed application techniques have also not been developed and could prove to be a barrier.

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