| *Office Use Only* | |
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| Project Code | |
| Project Type | |

# FINAL REPORT 2016

| **PROJECT CODE** : **S1113** |
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| **PROJECT TITLE** |
|---|
| Improving Canola Establishment |

## PROJECT DURATION

| | | | | | | |
|---|---|---|---|---|---|---|
| **Project Start date** | 1 July 2013 | | | | | |
| **Project End date** | 30 June 2016 | | | | | |
| **SAGIT Funding Request** | 2013/14 | | 2014/15 | | 2015/16 | |

## PROJECT SUPERVISOR CONTACT DETAILS

| **Title:** | **First Name:** | **Surname:** |
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## ADMINISTRATION CONTACT DETAILS

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## PROJECT REPORT


**Executive Summary**

This project aimed to develop management packages that will significantly improve canola establishment across a range of soil types on Eyre Peninsula and also to develop best management practices for dry sowing of canola. Three years of field trials were conducted on two contrasting soil types in the high-medium rainfall zone of Lower Eyre Peninsula as well as another two soil types in the low rainfall zone of the Upper Eyre Peninsula. Pot experiments were also conducted to determine the relative ability of over 20 soil types to establish canola.

The project concluded the following:

- Early sowing canola (from mid-late April) provides growers with the best chance of maximizing yields.
- The risk of dry sowing canola can be estimated by using historical rainfall records and soil texture information to determine the chances of failure from early or dry sowing.
- Sowing canola just prior to a rainfall event achieved higher yields than sowing just after.
- Re-sowing a poorly established canola crop will rarely achieve a higher yield than taking the poorly established crop to harvest (provided at least 15pl/m2 have established)
- Higher seeding rates consistently improved yields across a range of soil types.
- Yield penalties for soil too deep (to 4cm) were found on the sandy soils evaluated.


**Project Objectives**

- To develop management packages that will significantly improve canola establishment on a range of soil types on Eyre Peninsula.
- To develop best management practices for dry sowing of canola

**Overall Performance**

**Extent to which the project objectives were achieved**

The project managed to achieve all of the planned outcomes, however all seasons where field activities were conducted either received a break to the season in mid-late April or had considerable soil moisture reserved from summer rains that didn't allow for dry sowing to be fully evaluated. Sowing even earlier than mid-April was considered but it was thought that the considerably warmer seasonal conditions may confound results so this was not tried.

**Personnel participating in the project:**

Andrew Ware (5%) Research Scientist, Pt Lincoln,
Brian Purdie (30%) Senior Agricultural Officer, Pt Lincoln
Brenton Spriggs (20%) Agricultural Officer, Minnipa Agricultural Centre

**Farmer Co-operators**

The generous contribution of land made available for field trials conducted as part of this project is gratefully acknowledged.

- Mark Modra, Yeelanna, Lower Eyre Peninsula. 2013-2015
- Rob McFarlane, Wanilla, Lower Eyre Peninsula. 2013-14
- Dion Trezona, Piednippie, Upper Eyre Peninsula, 2013-15
- Shane Nelligan, Edillilie, Lower Eyre Peninsula. 2015.
- Minnipa Agricultural Centre, Upper Eyre Peninsula. 2013-15.

Also acknowledged for providing soil for the pot experiments are all of the Eyre Peninsula NVT co-operators.

**Difficulties Encountered**

- Each of the three years of field trials conducted as part of this project experienced significant rainfall from mid-late April (very unusual in a historical context). This didn't allow for dry sowing to be fully explored.
- Developing a technique to evaluate the establishment potential of canola on different soil types took several attempts, but appears to have been successful with results repeated over two years.

**Unforeseen benefits of the project**

- Greatly improved knowledge of the project leader and also the other staff members in general canola agronomy.
- Improved technical ability of the group to establish and manage canola field trials and pot experiments

| **Key Performance Indicators (KPI)** | | |
|---|---|---|
| ***KPI*** | ***Achieved (Y/N)*** | ***If not achieved, please state reason.*** |
| Field trials established at four sites, with results compiled.<br><br>*In 2013 field trials were established at Yeelanna, Wanilla, Minnipa, Poochera and Piednippie in a total of ten separate trials.*<br><br>*The trials at Minnipa, Yeelanna and Wanilla were visited by the Minnipa Agricultural Centre Field Day and the LEADA Spring Crop Walk.* | Yes | |
| Evaluation of three soil types in the growth chamber.<br><br>*Two growth room experiments were conducted in 2014. Both managed to replicate poor established conditions observed in the field but didn't meet the objectives. The methodology has been refined and new experiments have commenced in early 2015.* | Attempted but not successful. | Preliminary experiments in a growth chamber at Minnipa struggled to get any plants to emerge. |
| Dissemination of results from 2013 trials in LEADA and EPFS results booklets as well as LEADA expo and Upper EP post-harvest grower meetings.<br><br>*Articles were written for the EPFS and LEADA results booklets. Results were presented at the LEADA Expo, Upper EP post-harvest meetings and GRDC advisor update.* | Yes | |
| Field trials established at four sites, with results compiled.<br><br>*In 2014 field trials were established at Yeelanna, Wanilla, Minnipa, and Piednippie in a total of eleven separate trials.* | Yes | |
| Evaluation of four soil types in the growth camber.<br><br>*Canola establishment experiment conducted using 20 soils.* | Yes | |

| | | |
|---|---|---|
| Dissemination of results from 2014 trials in LEADA and EPFS results booklets as well as LEADA expo and Upper EP post-harvest grower meetings.<br><br>*Results disseminated through articles in the LEADA and EPFS booklets as well as at the GRDC advisor update, LEADA expo and Upper EP post-harvest meetings.* | Yes | |
| Field trials established at four sites, with results compiled<br><br>*In 2015 field trials were established at Yeelanna, Edillilie, Minnipa, and Piednippie in a total of ten separate trials.* | Yes | |
| Evaluation of three soil types in the growth camber.<br><br>*One controlled environment pot experiment was conducted in 2015. 15 soils from across Eyre Peninsula were evaluated for their ability to establish canola on minimal moisture.* | Yes | |
| *Dissemination of results from 2014 trials in LEADA and EPFS results booklets as well as LEADA expo and Upper EP post-harvest grower meetings.*<br><br>Results disseminated through articles in the LEADA and EPFS booklets as well as at the GRDC advisor update, LEADA expo and Upper EP post-harvest meetings. | Yes | More extension may be useful following analysis of all data and development of management package. |
| *Develop management packages for canola establishment and make available to the farming public* | Yes | Submitted with final report |
| *Final Report completed* | Yes | |

**Technical Information**

In the three years the Improving Canola Establishment project was conducted, it ran 33 field experiments, primarily at four locations:

- Wanilla/ Edillilie – Lower EP, Duplex Sandy Loam soil. 530mm annual rainfall.
- Yeelanna – Lower EP, Red Brown Earth soil. 410mm annual rainfall.
- Minnipa – Upper EP, Sandy Loam Calcasol soil. 325 annual rainfall
- Piednippie – Upper EP, Grey Calcareous Sandy Loam soil. 324mm rainfall.

In each year of the projects two core sets of field experiments were conducted.

1. Time of Sowing experiments (one each at Minnipa and Wanilla/ Edillilie)
   Aim: To evaluate the effect that four different sowing times (from mid-late April), in combination with two different seeding depths and two different seeding rates has on emergence and yield.
2. Emergence Trials (conducted at all four locations)
   Aim: To evaluate the effect that four different varieties (with differing seed size and vigour), sown at three different depths and three different seeding rates has on emergence and yield.
3. Other experiments examining retained vs commercial seed, and covering devices were also conducted when the opportunity arose.
   Three pot experiments were also conducted using a range of soil types from 20 Eyre Peninsula locations with the aim to extrapolate the results collected from the four trial sites to a wider set of soil types and environments.

**Time of Sowing**

In each experiment, four times of sowing (from mid-late April), two varieties, two sowing depths and two seeding rates were evaluated. Seeding depths ranged from 2-4 cm and rates from 40-60 plants/$m^2$.

Grain yields of the experiments are summarised below.

***Table 1. Average yields of Minnipa Time of Sowing (TOS) experiments conducted in 2013, 2014 & 2015.***

| TOS | Dates | Ave Yield (t/ha) |
|---|---|---|
| TOS1 | 15 - 25 April | 1.83 |
| TOS2 | 26 April - 8 May | 1.58 |
| TOS3 | 9 – 18 May | 1.26 |
| TOS4 | 19 – 29 May | 0.95 |

***Table 2. Average yields of Wanilla/Edillilie Time of Sowing (TOS) experiments conducted in 2013, 2014 & 2015.***

| TOS | Dates | Ave Yield (t/ha) |
|---|---|---|
| TOS1 | 20 – 30 April | 1.95 |
| TOS2 | 1 – 10 May | 1.86 |
| TOS3 | 11 – 20 May | 1.63 |
| TOS4 | 21 – 31 May | 1.29 |

Delaying sowing from mid-late April at each site had a major effect of reducing canola yield. The effects that variety, sowing depth and seeding rate had on yield were quite minor compared to the effect of sowing date.

This project had two instances where canola was planted before and after a rainfall event (only three days apart) as part of the time of sowing experiments. In both cases yield was significantly higher from planting before the rain than after, although plant establishment numbers were similar.

**Emergence Trials**

***Table 3. Average yields of Wanilla/Edillilie Canola Emergence experiments conducted in 2013, 2014 & 2015.***

| Wanilla/ Edillilie | | Large Seed | | Small Seed | |
|---|---|---|---|---|---|
| | | Yield (t/ha) | Emergance (pl/m2) | Yield (t/ha) | Emergance (pl/m2) |
| Depth | 1cm | 1.43 | 56 | 1.47 | 80 |
| | 2cm | 1.38 | 48 | 1.33 | 60 |
| | 4cm | 1.17 | 21 | 1.07 | 21 |
| Rate | 1.5kg/ha | 1.29 | 23 | 1.29 | 29 |
| | 3 kg/ha | 1.34 | 43 | 1.28 | 57 |
| | 4.5 kg/ha | 1.36 | 59 | 1.29 | 74 |

Highest grain yields from sowing shallow, regardless of seed size
Seeding rate not as important at this site.

***Table 4. Average yields of Yeelanna Canola Emergence experiments conducted in 2013, 2014 & 2015.***

| Yeelanna | | Large Seed | | Small Seed | |
|---|---|---|---|---|---|
| | | Yield (t/ha) | Emergance (pl/m2) | Yield (t/ha) | Emergance (pl/m2) |
| Depth | 1cm | 2.12 | 51 | 2.14 | 58 |
| | 2cm | 2.13 | 43 | 2.13 | 55 |
| | 4cm | 2.11 | 37 | 2.05 | 48 |
| Rate | 1.5kg/ha | 2.03 | 26 | 2.01 | 28 |
| | 3 kg/ha | 2.16 | 43 | 2.13 | 55 |
| | 4.5 kg/ha | 2.17 | 61 | 2.17 | 77 |

No difference in canola yields from sowing depth of large seeds at this site, smaller seeds benefited from being planted closer to the surface.
Higher sowing rates improved grain yields consistently at this site.

***Table 5. Average yields of Piednippie Canola Emergence experiments conducted in 2014 & 2015.***

| Piednippie | | Large Seed | | Small Seed | |
|---|---|---|---|---|---|
| | | Yield (t/ha) | Emergance (pl/m2) | Yield (t/ha) | Emergance (pl/m2) |
| Depth | 1cm | 0.63 | 31 | 0.53 | 46 |
| | 2cm | 0.70 | 34 | 0.62 | 47 |
| | 4cm | 0.63 | 26 | 0.56 | 34 |
| Rate | 1.5kg/ha | 0.60 | 18 | 0.51 | 27 |
| | 3 kg/ha | 0.66 | 30 | 0.59 | 42 |
| | 4.5 kg/ha | 0.70 | 43 | 0.60 | 58 |

Seeding too shallow or too deep on this soil led to lower grain yields.
Grain yields improved by higher seeding rates

***Table 6. Average yields of Minnipa Canola Emergence experiments conducted in 2014 & 2015.***

| Minnipa | | Large Seed | | Small Seed | |
|---|---|---|---|---|---|
| | | Yield (t/ha) | Emergence (pl/m2) | Yield (t/ha) | Emergence (pl/m2) |
| Depth | 1cm | 1.41 | 32 | 1.45 | 47 |
| | 2cm | 1.42 | 34 | 1.47 | 49 |
| | 4cm | 1.44 | 29 | 1.50 | 43 |
| Rate | 1.5kg/ha | 1.33 | 17 | 1.38 | 28 |
| | 3 kg/ha | 1.44 | 31 | 1.51 | 49 |
| | 4.5 kg/ha | 1.50 | 46 | 1.54 | 62 |

Depth not a very large effect
Grain yields improved with increased sowing rates.

**Pot Experiments**

***Table 6. Average establishment percentage of canola planted on different soil types collected across Eyre Peninsula under differing water regimes in grown in pots in April 2015 and 2016.***

| | | **Rainfall applied (mm)** | | | | |
|---|---|---|---|---|---|---|
| **Site** | **Texture** | **5** | **7.5** | **10** | **15** | **20** |
| Cummins | LC | 0 | 10 | 20 | 55 | 75 |
| Yeelanna I | LC | 0 | 25 | 50 | 65 | 88 |
| Yeelanna II | LC | 0 | 25 | 35 | 65 | 95 |
| Minnipa I | L | 0 | 0 | 0 | 65 | 100 |
| Minnipa II | L | 0 | 0 | 0 | 95 | 85 |
| Cowell | LSCL | 13 | 30 | 73 | 85 | 50 |
| Nunjikompita | SL (cacl) | 0 | 0 | 0 | 70 | 80 |
| Penong | SL (cacl) | 0 | 0 | 0 | 50 | 100 |
| Piednippie I | SL (cacl) | 0 | 0 | 5 | 50 | 95 |
| Piednippie II | SL (cacl) | 0 | 0 | 0 | 30 | 65 |
| Kimba | SL | 3 | 45 | 88 | 83 | 93 |
| Lock | SL | 0 | 20 | 60 | 70 | 100 |
| Rudall | SL | 0 | 43 | 78 | 100 | 100 |
| Warramboo | SL | 0 | 23 | 43 | 98 | 100 |
| Brimpton Lake | S | 10 | 75 | 85 | 95 | 95 |
| Darke Peak | S | 15 | 68 | 95 | 88 | 100 |
| Elliston | S | 0 | 28 | 35 | 53 | 98 |
| Mt Hope | S | 5 | 48 | 65 | 75 | 95 |
| Murdinga | S | 15 | 43 | 80 | 73 | 85 |
| Tooligie | S | 5 | 65 | 80 | 100 | 95 |
| Ungarra | S | 18 | 73 | 90 | 98 | 100 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Wanilla | S | 5 | 0 | 45 | 65 | 75 |
| Wharminda | S | 28 | 65 | 68 | 88 | 93 |

Heavier soils and soils containing high levels of calcium carbonate showed much poorer canola establishment under lower simulated rainfall events.

## Conclusions Reached &/or Discoveries Made

After evaluating several drivers of canola yield in this project, the largest benefit on canola yield came through sowing early, particularly in mid-late April, regardless of whether it was planted in a low or medium-high rainfall environment. A yield loss of slightly over 1% was found for every day seeding was delayed after 20 April.

In each year of this project, good rainfall fell at each site in mid-late April, so did not allow for field experimentation to determine riskiness of planting into dry soils.

Planting a small seed relatively close to the surface, in April when both soil and ambient temperatures are quite warm, and when rainfall events can be quite erratic, can raise the risk of failure considerably.

To provide some evidence of the riskiness of planting canola in different environments in mid-late April we can used meteorological data from a number of sites (Table 7) and then made comparisons with the data gained from the pot experiments (Table 6).

***Table 7. The chance of exceeding rainfall at six locations across South Australia (source CliMate app – Silo)***

| Location | Chance of > 15mm over three days in April | Chance of >10mm over three days in April | Chance of >5mm over three days in April |
|---|---|---|---|
| Cummins | 40% | 60% | 78% |
| Minnipa | 25% | 44% | 68% |
| Lock | 38% | 53% | 68% |
| Snowtown | 37% | 54% | 79% |
| Riverton | 54% | 65% | 84% |

This shows that for a loamy clay soil at Cummins to achieve at least 50% establishment, at least 15mm of rainfall are required. The chance of receiving this at Cummins in April is around 40% (four in ten years). This may be adequate even if 15mm doesn't fall as the seed may sit ungerminated in the soil until sufficient rain falls to germinate it. However table 7 also shows that the chance of receiving at least 10mm is possible 60% of years (so 20% of years between 10 and 15mm will fall in this environment). On a Cummins loamy clay soil 10mm of rainfall may create a partial germination or staggered germination which may lead to lower yields and make the timing of operations such as herbicide application and windrowing more difficult due to plants being at different growth stages.

Sandier type soils (particularly where non-wetting was not an issue) were found to be less risky in terms of being able to establish canola on lower rainfall amounts, as they were able germinate canola on low rainfall amounts and these smaller amounts fall frequently in all areas evaluated.

Given the yield benefit observed in this project of achieving higher canola yields by sowing before a rain event, rather than immediately after, a lower risk strategy, may be to plant canola in the few days prior to a rainfall event with high probability of significant rainfall.

This project also found that the benefit of early seeding was much greater than having a high plant population and concluded that even with establishment rates as low as 15 plants/ $m^2$ the benefit of early sowing with poor establishment would achieve higher yields than re-sowing a poorly established paddock.

Beyond early sowing this project found that further fine tuning of yield can be achieved through refining sowing depth and rate and possibly seed size to suit the soil type and environment. This project did not find a situation where having a high plant population (in the order of 70 plants/$m^2$) had a negative effect on grain yield and typically the higher plant populations gave the highest yields.

Similar work recently conducted in Western Australia (French, R 2016) also confirmed that high seeding rates for open pollinated triazine tolerant varieties gave the most profitable yields. They also found that the cost benefit of higher seeding rates was eroded when higher prices of hybrid seed was factored in.

This project found that the sandier environments at Piednippie and Wanilla/Edillilie both showed lower yields when canola was planted deeper (to 4cm) indicating that some soil types are more sensitive to the accurate placement of seed and the setup of seeders is more critical to ensure maximum yields are achieved.

**Intellectual Property**

N/A

**Application / Communication of Results**

**Main findings**

- Early sowing canola (from mid-late April) provides growers with the best chance of maximizing yields.
- The risk of dry sowing canola can be estimated by using historical rainfall records and soil texture information to determine the chances of failure from early or dry sowing.
- Sowing canola just prior to a rainfall event achieved higher yields than sowing just after.
- Re-sowing a poorly established canola crop will rarely achieve a higher yield than taking the poorly established crop to harvest (provided at least 15pl/m2 have established)
- Higher seeding rates consistently improved yields across a range of soil types.

**Industry Impact**

This project has demonstrated the benefit that sowing canola early can provide. This is a practise that many growers have adopted, separate to the findings of this project.

Moving the sowing date of canola forward from a traditional early May sowing date by 10 days into late April has the potential to increase canola yields by over 10%.

This project will allow growers to assess the risk of this practise on their soil type and in their environment so the benefits through early sowing can be achieved more often.

**Extension articles**

Articles have been submitted to the Eyre Peninsula Farming Systems book in each year of the project

Ware, A., Davis, L., Purdie, B., Flint, A., and Spriggs, B. (2014) Maximising canola yield by getting establishment right – upper EP experience in 2013. In Eyre Peninsula Farming Systems Summary 2013 p64-67.

Ware, A., Davis, L., Purdie, B., Flint, A., and Spriggs, B. (2015) Maximising canola yield by getting establishment right – upper EP experience in 2014. In Eyre Peninsula Farming Systems Summary 2014 p64-68.

Ware, A., Davis, L., and Spriggs, B. (2016) Maximising canola yield by getting establishment right. In Eyre Peninsula Farming Systems Summary 2015 p63-65.

Articles have also been supplied for the LEADA Expo booklet which is not formally published.

Elements of this project have also been included as part of GRDC update papers 2014-16.

**Suggested path to market**

While some extension has occurred during the project, the benefit of having three years of field data, coupled with some pot experiments has only just allowed for conclusions to be made.

Management packages summarizing the work conducted in this project will be developed and delivered to SAGIT, Eyre Peninsula Farming Systems book and LEADA for publication.

## POSSIBLE FUTURE WORK

The benefits of early sowing canola have been clearly demonstrated as part of this project. However early sowing has been shown to raise the risk of Beet Western Yellows Virus, Sclerotinia in some areas, and aerial forms of blackleg. Better cultivar selection to match early sowing time will help refine the messages being delivered by this project. All of these issues are currently being addressed as part of GRDC projects (UM00051 National Canola Pathology Project, CSP00187 Optimised Canola Profitability).

Work is also currently being conducted in Western Australia on the benefits of precision seeders in establishing canola. This may provide further ideas on how improving canola establishment may improve yields (DAW00227 Tactical Break Crop Agronomy).

| AUTHORISATION | |
|---|---|
| Name: | Professor Jim Cox |
| Position: | Acting Research Chief, Sustainable Systems |
| Signature: | |
| Date: | 30 August 2016 |

## Improving Canola Emergence

From 2013-15 the South Australian Grains Industry Trust funded a project examining the importance of canola establishment has on yield, particularly in regard to improving canola establishment when it is sown early into possibly dry soils from mid-late April.

The project aimed to maximise canola productivity through creating soil specific management strategies that improve canola yields, profitability and establishment in field trials and pot experiment conducted on Lower and Upper Eyre Peninsula.

The establishment of canola is crucial in achieving maximum potential yield. Timeliness of sowing is the most important factor followed by even establishment with adequate plant numbers and early plant vigour through good nutrition.

Successful establishment is linked to crop profitability through:

- higher yields, from quick and uniformly emerging seedlings;
- maximum yields are achieved from crops which have at least 90 per cent ground cover prior to bud appearance;
- improving the ability of canola to withstand insect attack and compete with weeds in the first six weeks;
- even growth and maturity, allowing timely in-crop management decisions such as weed control, fertiliser applications and insect control; and
- more even ripening improving the timing of windrowing and harvest.

### Why the need for early sowing

In each year of the project, trials were conducted at Minnipa on Upper Eyre Peninusla and Wanilla/ Edillilie on Lower Eyre Peninsula. Where varieties suited to the environment (early maturing at Minnipa and mid maturing at Wanilla/ Edillilie) were planted at four times from mid-early April at a range of sowing depths and rates.

The core discovery of this research was that time of sowing was the most critical driver of yield of all of the elements evaluated, leading to around 1% per day yield decline for every day seeding was delayed from 20 April at both Minnipa and Wanilla/ Edillilie sites. The effects that variety, sowing depth and seeding rate had on canola yield were quite minor compared to the effect that sowing date had on grain yield.

**Table 1. Average yields of Minnipa Time of Sowing (TOS) experiments conducted in 2013, 2014 & 2015.**

| TOS | Dates | Ave Yield (t/ha) |
|---|---|---|
| TOS1 | 15 - 25 April | 1.83 |
| TOS2 | 26 April - 8 May | 1.58 |
| TOS3 | 9 – 18 May | 1.26 |
| TOS4 | 19 – 29 May | 0.95 |

**Table 2. Average yields of Wanilla/Edillilie Time of Sowing (TOS) experiments conducted in 2013, 2014 & 2015.**

| TOS | Dates | Ave Yield (t/ha) |
|---|---|---|
| TOS1 | 20 – 30 April | 1.95 |
| TOS2 | 1 – 10 May | 1.86 |
| TOS3 | 11 – 20 May | 1.63 |
| TOS4 | 21 – 31 May | 1.29 |

In each year of this project good rainfall fell at each site in mid-late April, so did not allow for field experimentation to determine riskiness of planting into dry soils.

Planting a small seed relatively close to the surface, in April when both soil and ambient temperatures are quite warm, and rainfall events can be quite erratic can raise the risk of failure considerably.

### Pot Experiments

To help provide answers on the riskiness of planting canola in April pot experiments were conducted simulating how canola would establish in different soil types collected from across Eyre Peninsula under different water regimes when planted in mid-late April.

**Table 3. Average establishment percentage of canola planted on different soil types collected across Eyre Peninsula under differing water regimes in grown in pots in April 2015 and 2016 ordered on texture.**

| | Rainfall applied (mm) | | | | |
|---|---|---|---|---|---|
| **Texture** | **5** | **7.5** | **10** | **15** | **20** |
| **LC** | 0 | 20 | 35 | 62 | 86 |
| **L** | 0 | 0 | 0 | 80 | 93 |
| **SL (cacl)** | 0 | 0 | 1 | 50 | 85 |
| **SL** | 1 | 33 | 67 | 88 | 98 |
| **S** | 11 | 51 | 71 | 81 | 93 |

Heavier soils and soils containing high levels of calcium carbonate showed much poorer canola establishment under lower simulated rainfall events.

**Risk of early sowing**

To provide some evidence of the riskiness of planting canola in different environments in mid-late April we can use meteorological data from a number of sites (Table 4) and then compare to the data gained from the pot experiments (Table 3).

**Table 4. The chance of exceeding rainfall at six locations across South Australia (source CliMate app – Silo).**

| Location | Chance of > 15mm over three days in April | Chance of >10mm over three days in April | Chance of >5mm over three days in April |
|---|---|---|---|
| Cummins | 40% | 60% | 78% |
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This shows that for a loamy clay soil at Cummins to achieve at least 50% establishment at least 15mm of rainfall are required. The chance of receiving this at Cummins in April is around 40% (four in ten years). This may be fine even if 15mm doesn't fall as the seed may sit ungerminated in the soil until sufficient rain falls to germinate it. However table 7 also shows that the chance of receiving at least 10mm is possible 60% of years (so 20% of years between 10 and 15mm will fall in this environment). On a Cummins loamy clay soil 10mm of rainfall may create a partial germination or staggered germination which may lead to lower yields and make the timing of operations such as herbicide application and windrowing more difficult due to plants being at different growth stages.

**Conclusions (including results from other trial work conducted as part of this project).**

- Early sowing canola (from mid-late April) provides growers with the best chance of maximizing yields.
- The risk of dry sowing canola can be estimated by using historical rainfall records and soil texture information to determine the chances of failure from early or dry sowing.
- Sowing canola just prior to a rainfall event achieved higher yields than sowing just after.
- Resowing a poorly established canola crop will rarely achieve a higher yield than taking the poorly established crop to harvest (provided at least 15pl/m2 have established)
- Higher seeding rates consistently improved yields across a range of soil types.
- Yield penalties for soil too deep (to 4cm) were found on the sandy soils evaluated.


**Acknowledgements:** Thank you to SAGIT for providing the funding for this project, the SARDI New Variety Agronomy teams at Port Lincoln and Minnipa for conducting the work, and the farmers who graciously provided the land for the field experiments to be conducted.

**Prepared by:**

Andrew Ware, SARDI, Port Lincoln.