

Mackie lime sources trial

Trial Hosts: Mackie Family

Key Learnings

- There were no significant differences in wheat yields between the different lime treatments in 2020.
- Grain yields measured in 2017 (canola) and 2018 (barley) were also not significantly different between the lime treatments.
- Soil pH data collected in 2019 show an increase in soil pH for all lime treatments in the topsoil (0-10cm) and 10-20cm layers compared to data collected in 2015 at the beginning of the trial.
- Soil pH changes in the 20-30cm layer have been negligible compared to the untreated control over the six years.
- This trial shows that the addition of lime has improved soil pH to a depth of 20cm. The improvement in grain yield shows soil pH levels at this site were not low enough to be a constrain grain yields.

Background & Trial Aims:

The lime sources trial at Kendenup was established in 2015 to address the lack of long-term lime trials in the southern High Rainfall Zone (HRZ). John Blake (SCF) set up the original trial with funding from South Coast Natural Resource Management (SCNRM). The aim was to evaluate five different sources of lime from the southwest to determine if there were changes in soil pH or grain yields over time. SCF received funding in 2020 from the National Landcare Program (NLP) to continue monitoring and reporting on the trial results to benefit members and the agricultural industry.

Treatments:

A two-replicate broad-scale trial was set up in 2015 with plot dimensions of 130m by 30m. The lime sources were:

1. Bornholm
2. Denmark
3. Lancelin
4. Redgate
5. WALCO
6. Nil control
7. 3 times 2(t/ha) lime equivalent or 6t/ha lime

Each lime source had the product rate adjusted to ensure each plot received the same amount of neutralising value (NV). For example, the reference liming rate was 2t/ha with a NV of 80%. Lime with a slightly lower NV, say 74%, had a higher rate of lime applied to make the NV's even between treatments. Soil-sampling contractors carried out a comprehensive soil testing regime to determine the baseline levels of soil acidity in each plot from three different soil depths; 0-10cm, 10-20cm and 20-30cm in 2015. The soil sampling locations were geo-referenced, so re-testing years later can be carried out from the same position within the plot.



Results & Discussion:

Wheat yields collected in 2020 from the harvester yield maps showed no significant yield differences between any of the lime treatments compared to the untreated control. Figure one also displays the grain yields measured in 2017 and 2018, showing no significant yield differences between the treatments.

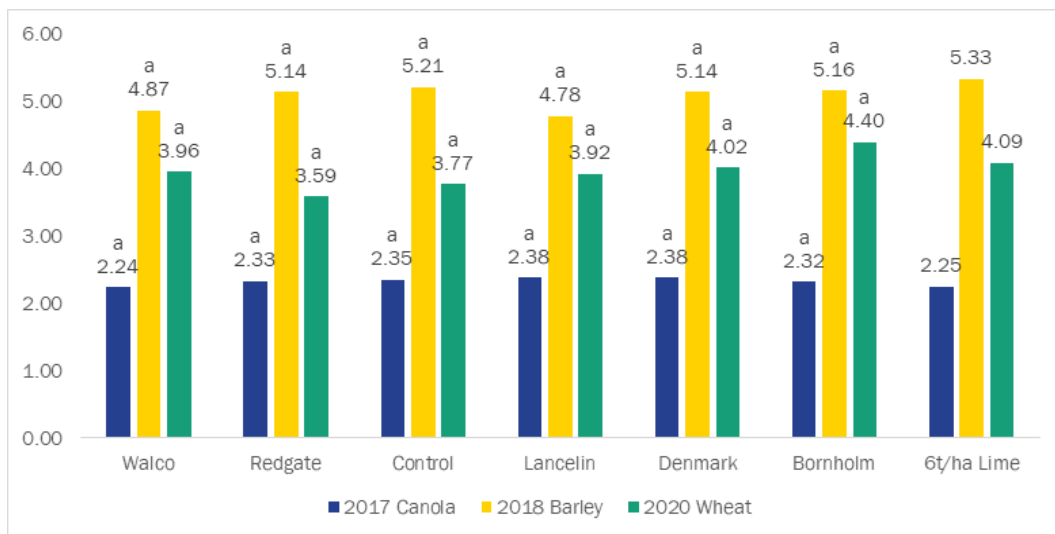


Figure 1: Grain yields (t/ha) from the Kendenup Lime sources trial in 2017, 2018 and 2020. Means followed by the same letter or symbol do not significantly differ ($P=0.05$, LSD).
NB: There is only one replicate of the high rate (6t/ha lime treatment), which means we cannot complete statistical analysis on this treatment.

Soil pH data from 2019, displayed in table one, show the 2t/ha lime treatments have changed soil pH in the topsoil (0-10cm) and a small amount in the 10-20cm subsoil layer. Soil pH changes in the 20-30cm layers have been negligible from 2015-19.

The stand-out treatment was applying 6t/ha of lime, which was tested in only one plot. This treatment has clearly improved soil pH levels faster than any of the 2t/ha lime treatments. This is reassuring for farmers that have been investing in high lime rates.

Final Comment:

The lack of grain yield differences in 2017, 2018 and 2020 reflects the adequate starting soil pH levels and the 'soft' seasonal finishes, which tend to mask the effects of soil constraints. Despite no yield differences, 2t/ha of lime has lifted the soil pH levels, and the un-replicated 6t/ha lime treatment raised soil pH by even more (>1 pH unit). After four years, the subtle soil pH changes deeper than 0-10cm show how slowly lime moves in the profile. At the end of this 2021 growing season, we will conduct more soil testing to determine the pH levels in the different soil layers. We will also continue to monitor the grain yields in upcoming years.

Table 1: The soil pH levels (CaCl_2) measured in April 2019 for the Mackie lime sources trial in Kendenup.

Changes in soil pH over and above the control			
Treatment	pH 0-10cm	pH 10-20cm	pH 20-30cm
Control	5.43	5.09	5.58
Bornholm	5.94	5.18	5.60
Denmark	5.77	5.14	5.44
Lancelin	5.64	5.34	5.63
Redgate	5.99	5.40	5.46
Walco	5.89	5.49	5.60
High rate 6t/ha lime	6.44	5.47	5.53