Removing small conical snails from canola

Using rotary grain cleaners and/or a snail crushing grain roller to remove small conical snails from canola

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KEY POINTS

- Stirlings to Coast Farmers (SCF) cleaned 150t of canola using a rotary grain cleaner and snail crushing grain roller.
- Cleaning small conical snails out of canola using a rotary grain cleaner fitted with 2.5mm slotted screens reduced the number of small conical snails in canola by 19% with <1% grain losses.
- Using 2.2 mm screens removed 95% of snails but canola losses were 5.5%.
- The snail roller reduced snail numbers in canola by up to 91% when the gap between the rollers was tightest.
- Neither cleaning or rolling the grain affected oil, moisture or protein content.
- However, tightening the gap between the rollers can increase admixture and damage seeds.
- Stirlings to Coast Farmers (SCF) also reported growers experiences cleaning canola during the 2019-20 harvest.

BACKGROUND

Small conical snails are an emerging pest in southern WA. They can damage crops at germination, reduce pasture biomass and potentially downgrade harvested grain if not managed carefully.

Snail management requires a strategic approach that can include removing the green bridge, burning windrows and timely baiting early in the season to prevent snails from breeding. However, even with a good program of control, snails can be a problem at harvest.

The 2019/20 grain harvest in WA saw the tightening standards for snail numbers in both canola and barley, causing concern among growers about how to achieve these new limits.

Grain-cleaning snail rollers have been used for >10 years in the Yorke Peninsula to remove snails from grains such as canola, wheat, barley, lentils and beans.

Prior to the 2019-20 harvest, Stirling to Coast Farmers (SCF) processed 150 t of canola to determine the optimal method for removing small conical snails with minimal grain loss or damage. The canola used for the trial was classified CANS and had on average 30 small conical snails per 500g sample. The trial used a rotary grain cleaner and a grain crushing snail roller to remove snails from the grain.

Before and after cleaning or rolling we took 500g samples of canola and measured:

- snail numbers and mortality, shell size and shell damage.
- admixture, damaged seeds, protein, oil and moisture.

Following the trial SCF monitored their members who were cleaning and rolling canola during the 2019-20 harvest to learn from their experiences.

Photo 1. A pile of small conical snails removed from canola using a 4-barrel rotary grain cleaner with 2.5mm slotted screens.

ROTARY GRAIN CLEANER RESULTS

We tested a DE Engineers 4-barrel rotary grain cleaner with: 2.5mm or 2.2 mm slotted screens. Using the rotary grain cleaner with 2.5mm slotted screens resulted in a 19% reduction in snails ($p<0.001$) with snail numbers dropping from 30 to 24 per 500g (Figure 1). This reduction was less than predicted from grower experience in the 2018-19 harvest where the 2.5mm screens were seen to remove large numbers of small conical snails (see Figure 1). Cleaning with the 2.2mm slotted screens resulted in a 95% reduction in snail numbers ($p<0.001$) or from 30 to 2 snails per 500g. While this was a great result for snail reduction, the grain losses were 5.5%.

The CANS used in the trail was a mix of varieties with an average seed size of 1.85mm.

Rotary grain cleaners rely on the difference in size between the snail and the grain to remove snails and there is often a trade-off between removing more snails and minimising grain loss. For this reason, rotary grain cleaners may not be able to clean grain to specification without unacceptable losses. In the 2019-20 harvest a number of growers used rotary grain cleaners prior to rolling their grain, normally with round hole screens. Cleaners reduced snail numbers by 80% on average while grain losses were generally 2% or less. Some growers successfully re-cleaned their seconds grain and delivered it. seen by the very small number of snails there were to measure.

Photo 2. Snails on the left were removed from the canola (centre) using a rotary grain cleaner with 2.5mm slotted screens. The snails on the right could not be removed using the same screens.

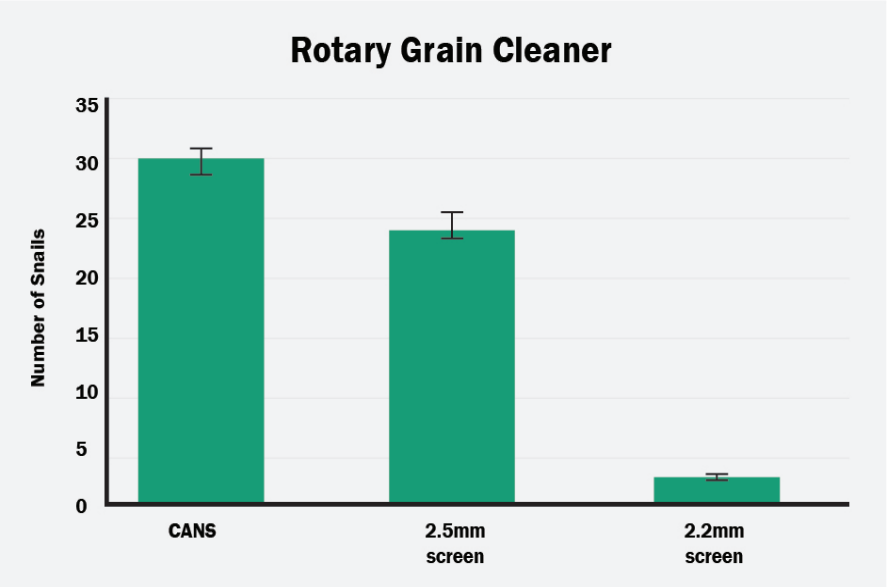

Figure 1. Number of small conical snails per 500g sample in canola after cleaning with a rotary grain cleaner using 2.5 mm or 2.2 mm slotted screens. Number of samples: CANS = 51, 2.5mm = 52, 2.2mm = 14.

SNAIL ROLLER

A Kingsway Welding snail crushing grain roller with a combination of four rubber and metal rollers was used in the trial. The settings adjusted on the roller were the hopper opening, which controls grain flow into rollers, and the gap width between the rollers.

Photo 3. The snail roller processing canola during the trial.

The PTO speed driving the rollers can also influence the number of snails removed from the grain. Running the roller faster does not necessarily crush more snails and can cause the rollers to heat up and be damaged. Unfortunately, the PTO speed in this trial had to remain fixed at 450 rpm which is higher than the 400-430rpm recommended for canola. This highlights the importance of using a modern tractor to drive the snail roller so that PTO can more easily be adjusted.

SNAIL ROLLER RESULTS

Using the snail roller with a roller gap less than or equal to 0.7mm significantly reduced the number of small conical snails in the canola by 43 - 91% ($p<0.001$, see Figure 3). The lowest snail numbers (2 per 500g sample) were achieved where the gap between the rollers was tightest, estimated to be 0.1mm although it is impossible to measure the gap when it is this tight.

Tightening the gap between rollers increased admixture and seed damage (see Figure 3). The admixture increased from 1.3% for the unrolled grain to 3% for that rolled with a 0.1mm gap. This level is still within the 5% limit for CAN1/CAG1 grades but any increase in admixture incurs a price discount.

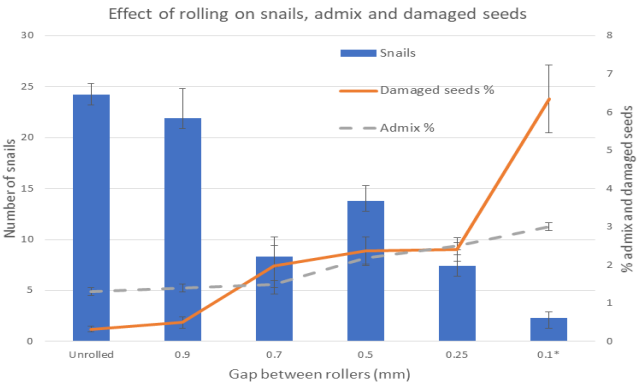

*Figure 3. The blue columns in this figure represent the number of small conical snails per 500g sample of unrolled and rolled canola with a decreasing gap width between the rollers. The lines show the percentage of admix (dashed grey line) and damaged seeds (orange line) with tightening of the rollers. Number of samples: Unrolled = 52, 0.9 = 7, 0.7 = 12, 0.5 = 17, 0.25 = 33, 0.1 = 11). *Gap width is estimated to be 0.1mm but it is impossible to measure gap when it is this tight.*

The number of damaged seeds also increased from 0.32% for the unrolled canola to 6.35% in the grain rolled with the tightest gap, more than double the 3% limit for CAN1/CAG1.

We found that with >25 snails per 500g it was harder to remove all the small conical snails in canola than anticipated. We had to run the roller slow and tight to get snail numbers down which caused increased grain damage. Anecdotal information from growers in SA suggests that snails stored for a long time (as was the case here) will have much harder shells.

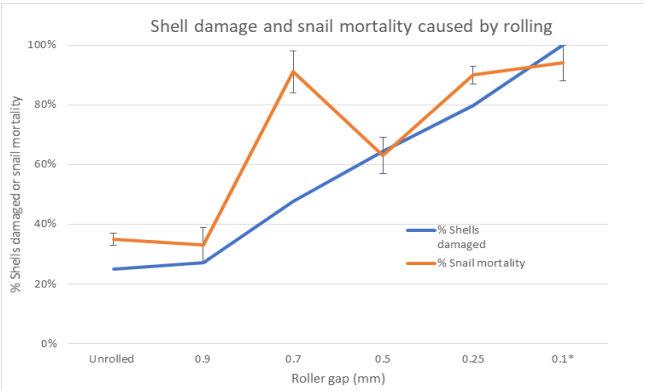

*Figure 4. The percentage of shell damage (blue line) and snail mortality (orange line) in unrolled and rolled canola with a decreasing gap width (mm) between the rollers. Results are not presented for some samples because they had no snails or too few for a reasonable estimate of survival. Number of samples: Unrolled = 52, 0.9 = 7, 0.7 = 12, 0.5 = 14, 0.25 = 30, 0.1 = 9). *Gap width is estimated to be 0.1mm but it is impossible to measure gap when it is this tight.*

During the 2019-20 harvest a number of SCF growers either bought or hired a snail roller. Generally growers with higher numbers of snails used a combination of cleaning and rolling, or double rolling, to reduce snail numbers and meet GIWA standards. Increases in admix were less than measured here, on average between 1 - 2.2%.

Cleaning the grain with the 2.5mm slotted screens did not reduce snail survival and there were too few snails from the 2.2mm slotted screens to make an assessment. Rolling the grain significantly reduced the survival of the small conical snails (Figure 4) when the gap was 0.7mm or less. 65% of the small conical snails were still alive in the unrolled grain but this dropped to 6% with a 0.1mm gap.

The increase in snail mortality was mirrored by an increase in snail shell damage with the tightening of the gap (mm) on the snail roller (Figure 4). Shell damage increased from 25% in the unrolled grain to 100% in the canola rolled with a 0.1mm gap. This would have significantly contributed to the death of the small conical snails.

CONCLUSIONS

Our trials demonstrated that small conical snails can be successfully removed from canola using a combination of rotary grain cleaning and grain crushing snail rollers. However, if snail numbers are high, care needs to be taken to reduce damage to the canola. During the 2019-20 harvest, SCF members demonstrated that this could be achieved by either cleaning the grain hard prior to rolling and processing the seconds separately, or by rolling grain twice.

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