

Establishing a Baseline Susceptibility of *Eldana saccharina* to Coragen® SC (Chlorantraniliprole) for Resistance Monitoring

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Background

- Sugarcane is a vital crop for South Africa's economy and rural employment.
- The stalk borer *Eldana saccharina* is a major indigenous pest, causing significant yield losses through larval boring^{1,3}.
- Over-reliance on chemical insecticides has increased the risk of pest resistance².
- Chlorantraniliprole (Coragen® SC) is a modern insecticide with a novel mode of action (ryanodine receptor modulator), but resistance has been documented in other lepidopteran pests^{2,3}.
- Aim:** To determine the baseline susceptibility of two-day-old *E. saccharina* larvae to Coragen® SC under controlled laboratory conditions.

Results

Larval Mortality was Dose-Dependent

Mortality increased significantly with concentration ($F=8.413$, $p<0.001$). Corrected mortality ranged from 15% at 0.005 µg/ml to 79% at 0.049 µg/ml. The calculated LC_{50} was 0.0298 µg/ml (95% CI: 0.0252 - 0.0353).

Table 1: Lethal concentrations and 95% confidence intervals on larval mortality against Coragen® SC insecticide.

n	LC_{50} (95%CI) (µg/ml)	LC_{95} (95%CI) (µg/ml)
480	0.0298 (0.0252 - 0.0353)	0.292 (0.161 - 0.530)

Significant Growth Inhibition Observed

Larval weight decreased dramatically with increasing concentration ($F=1976.15$, $p<0.001$). Control larvae weighed 8.0 ± 0.2 mg, while larvae at the highest concentrations averaged only 0.2 ± 0.1 mg. Growth inhibition reached over 97% at 0.041 µg/ml, indicating potent sublethal effects.

Methods

- E. Saccharina* larvae (2-day-old) reared at SASRI Insect Rearing Unit
- Expose individually to artificial diet
- Six concentration of Coragen®
- 20 Larvae per replicate
4 replicates per concentration
Total $n = 480$ larvae
- 7 days at 27°C, 70% RH
- Larval Mortality
Recorded daily
Corrected using Abbott's formula
- Larval Weight
Measured after 7 days for sublethal effects
- Probit analysis for LC values
One Way Anova + Tukey's test for mortality and weight (IBM SPSS v27)

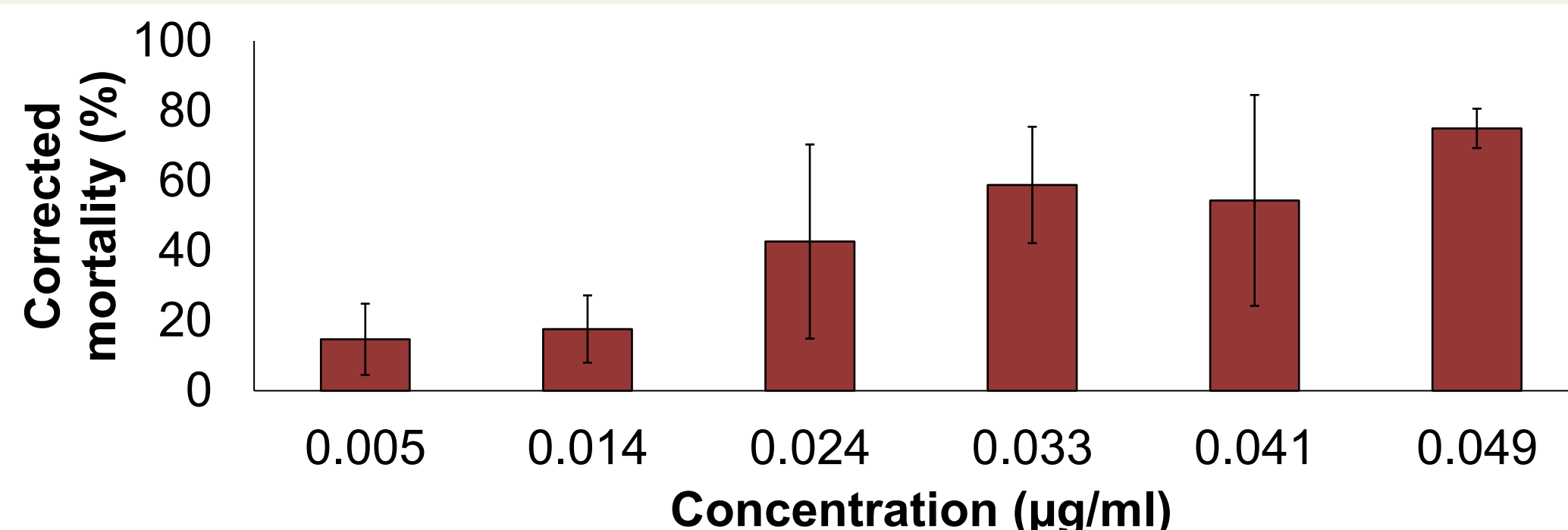


Figure 1: Percentage of corrected mortality of two-day-old *E. saccharina* larvae across increasing concentrations of Coragen® SC insecticide

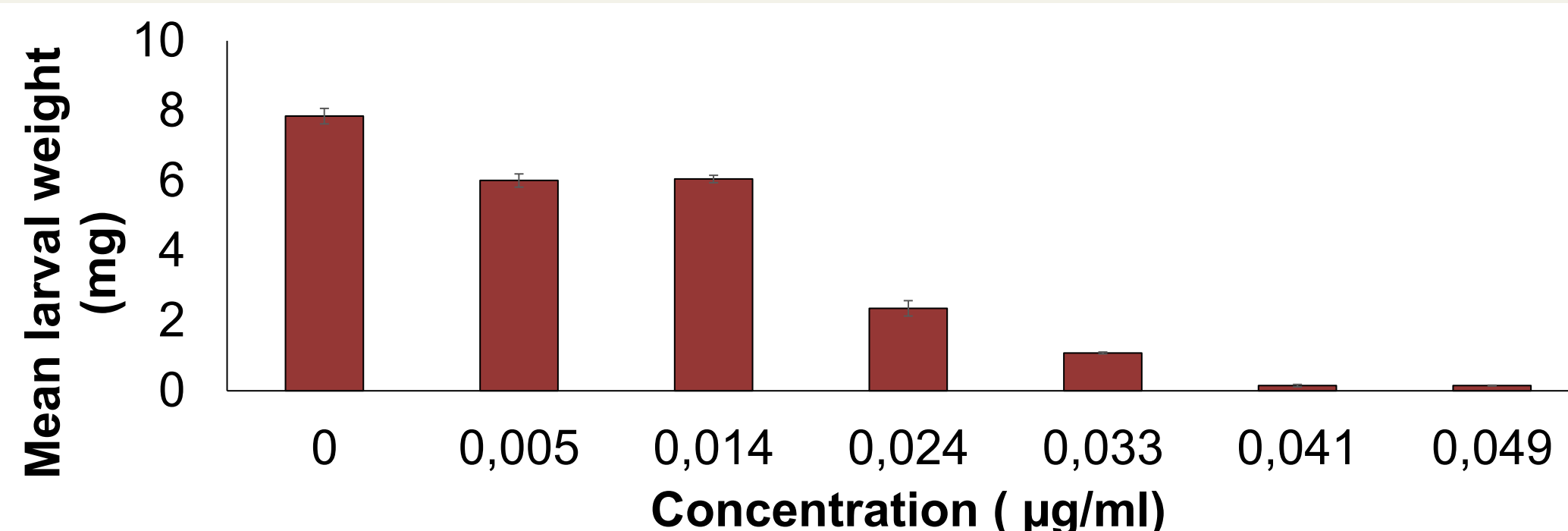


Figure 2: Mean larval weight of two-day-old *E. saccharina* across increasing concentrations of Coragen® SC insecticide

Discussion

- Coragen® SC effective against *E. saccharina*.
- Mortality + weight reduction confirm baseline susceptibility.
- Findings align with studies on *S. frugiperda*, *S. cosmioides*, *P. xylostella*².
- Sublethal effects (growth inhibition) critical in reducing pest population growth.
- Supports use of Coragen® SC as alternative to pyrethroids, where resistance is common^{2,3}.
- BUT: Overreliance on single mode of action → resistance risk.
- Integration with IPM strategies (biological control, crop management) is essential^{1,3}.

Conclusion

First baseline susceptibility data for *E. saccharina* to Coragen® SC in South Africa.
 $LC_{50} = 0.0298$ µg/ml is a benchmark for resistance monitoring.
 Findings support development of IRAC-aligned monitoring protocols.
 Sustained management requires IPM + resistance monitoring.

References

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