# Effective control of insect pests' population in stored rice using LED attractants

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## Background & Objectives

- Stored grains are prone to insect infestations especially in traditional storage systems in the tropics causing losses in the range of 12-40%.

**Fig. 1** Grain storage set-up and insect species in the grains.

- We developed and evaluated insect traps with light emitting diodes (LEDs) as natural attractants to 'lure and trap' insect pests to reduce their populations in grain storage.

## Material & Methods

- A Completely Randomized Design (CRD) experiment was set-up with blue and red LEDs installed in a trap and a Control treatment to lure insects in rice storage heavily infested with insect pests (i.e., *R. dominica*, *S. oryzae* and *T. castaneum)* with densities (insect count/ton) of 101,444 (s.d.: 5,1776), 27,778 (s.d.: 16,947), and 11,667 (s.d.: 11,136), respectively.
- Daily observations of trapped insects were replicated three times in different storage systems; insects were counted and identified at species level.
- Capture rate was computed using the formula:

$$\frac{Number\ of\ insects\ trapped\ per\ day}{Insect\ density\ in\ storage}\ x\ 100\ \%$$

## Results & Discussion

- Blue LED attracted significantly high number of insects and highest capture rates for (*R. dominica, S. oryzae*, and *T. castaneum*). Red LED also lured and showed significantly higher capture rates (*R. dominica* and *S. oryzae*) than Control.
- Effective wavelengths of blue and red LEDs determined at 450±10nm and 630±10nm, respectively.

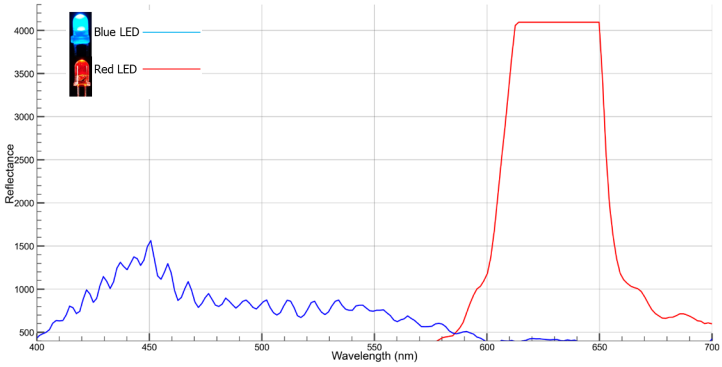


**Fig. 3** Measured wavelengths of blue and red LEDs using Lumo Scanner 2019 and image processing with Python 3.12.

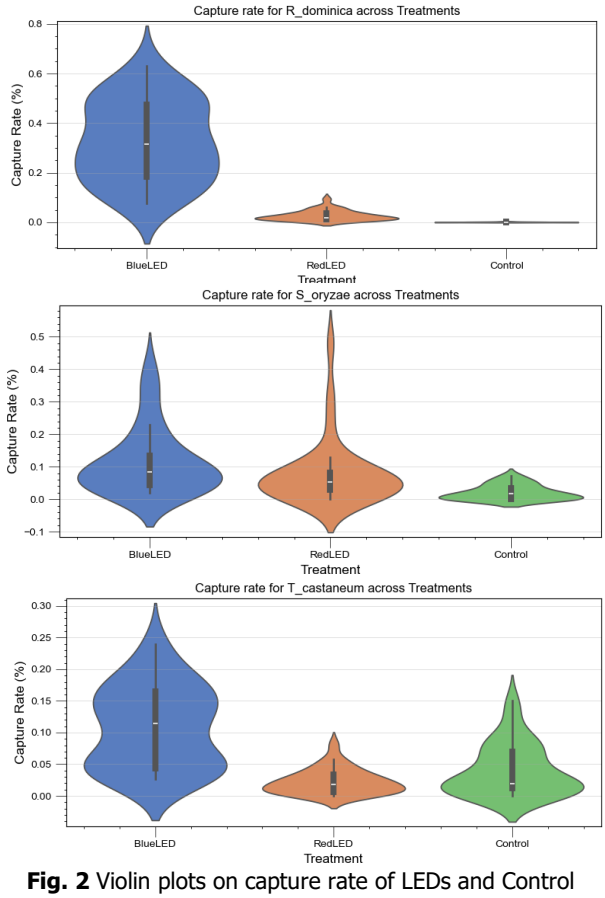


**Fig. 2** Violin plots on capture rate of LEDs and Control treatments for three insect species generated using Matplotlib and Scipy functions in Python 3.12.

## Conclusion

- By capturing more insects in the trap, blue and red LEDs are effective attractants that can help reduce insect pests' populations in grain storage.

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