Efficacy of contact insecticides on a suite of stored product insects on wood concrete and metal surfaces at low, medium and high temperatures.

Abhinash Boddepalli[1] | Kun Yan Zhu[1] | Tanja Mckay[2] | Deanna Scheff[3]
[1]Kansas State University, Manhattan, KS, [2]Arkansas State University,Jonesboro, AR
[3]USDA-ARS Center for Grain and Animal Health Manhattan, KS
boddepal@ksu
Department of Entomology

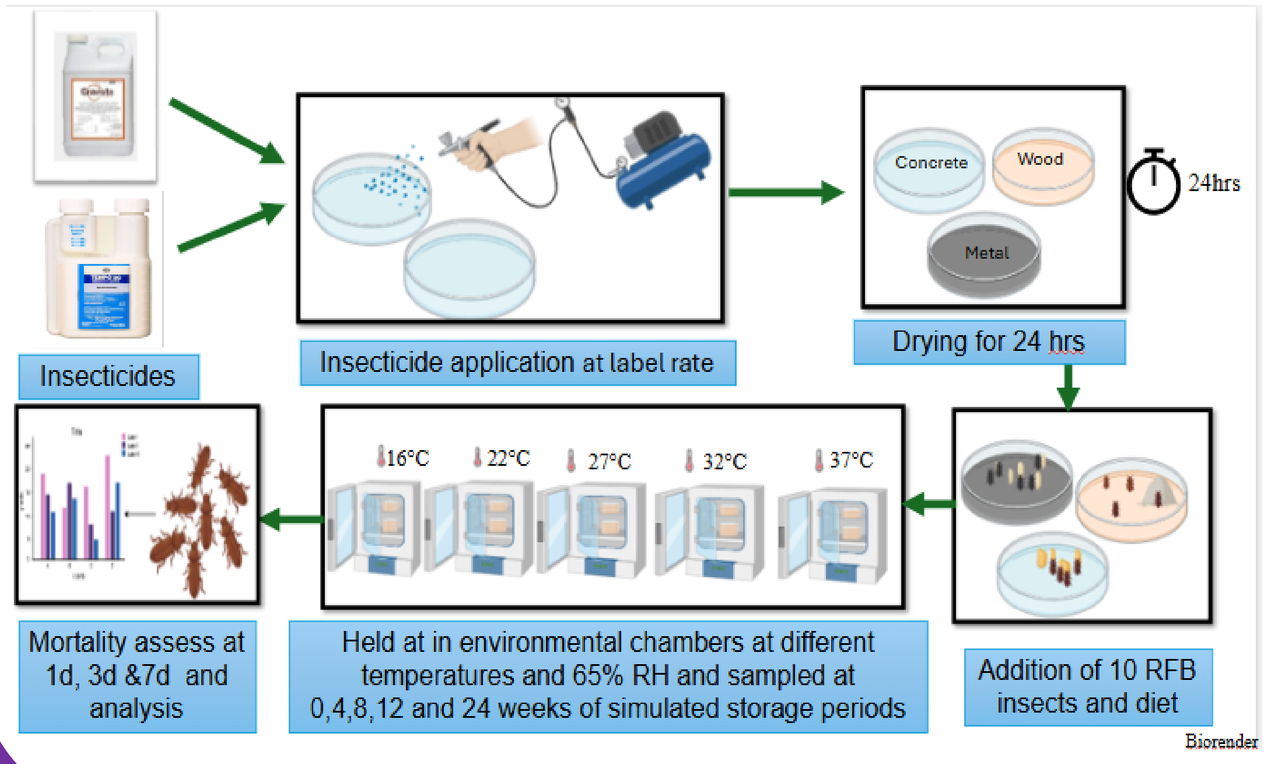
Abstract

- Stored product insect infestations are a persistent challenge in global trade resulting in commodity and economic losses (Arthur, 1996; Athanassiou et al., 2022)
- Insects like *Tribolium castaneum* (red flour beetle) and *Sitophilus oryzae* (rice weevil) are among the most economically important stored product pests worldwide (Athanassiou et al., 2011).
- Contact insecticide efficacy varies with formulation, surface type, insect species, temperature, and residual time.

Objectives

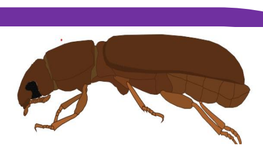
- Evaluate the effect of temperature on residual insecticide efficacy across multiple surfaces on stored product insects.
- This ongoing study evaluates the efficacy of two insecticides under controlled temperature conditions; this poster presents preliminary results for *T. castaneum*.

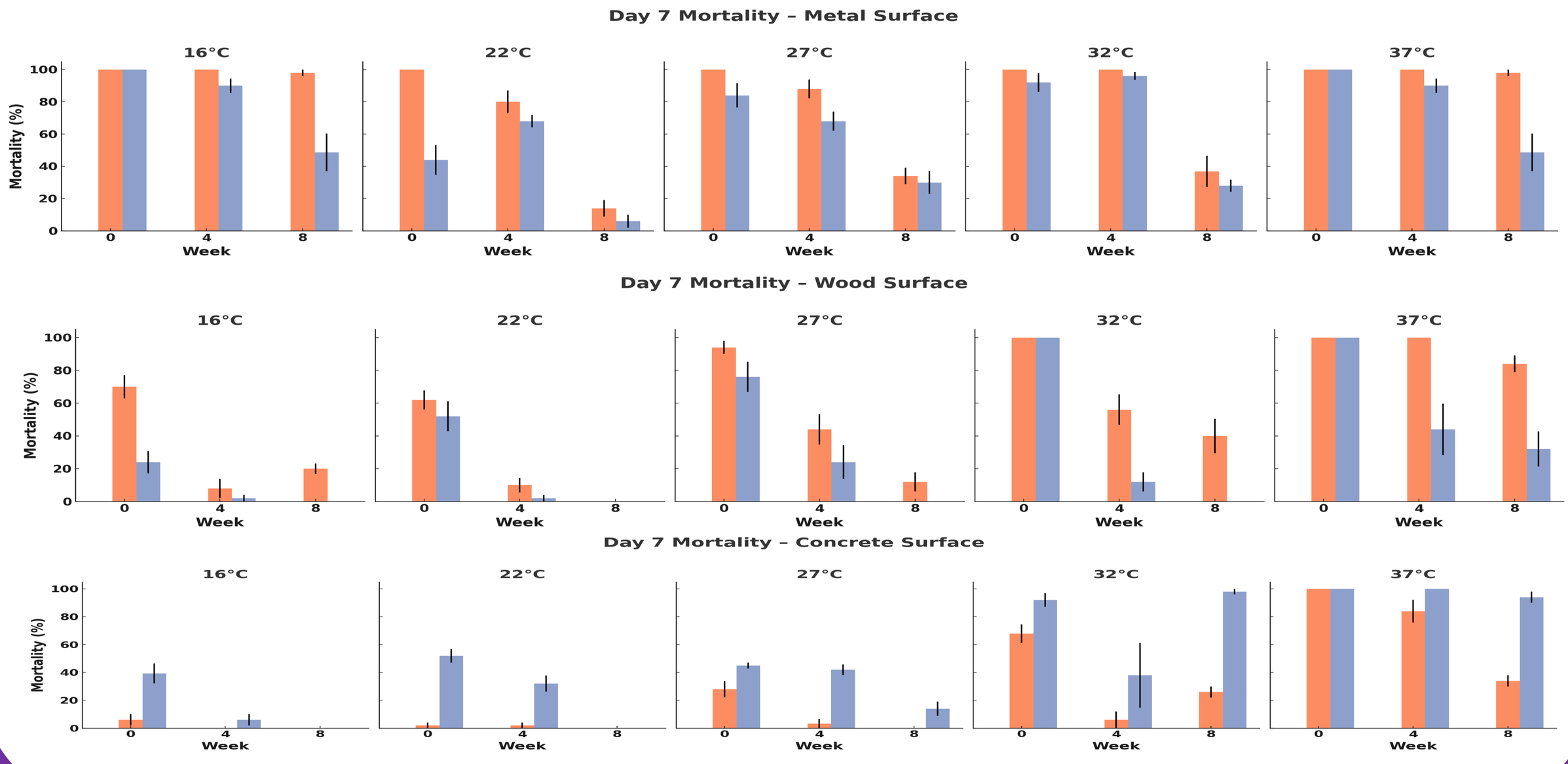
Methods



Results

β-cyfluthrin **Deltamethrin+methoprene+PBO**





❑ **Data Analysis by using Python** ❑ **Control mortality <5%**

Key findings

- Insecticide efficacy was highest on **metal** and lowest on **concrete**.
- **Gravista (deltamethrin + methoprene + piperonyl butoxide)** performed better than **Tempo (β-cyfluthrin)** across all surfaces.
- Effectiveness declined over time, especially by **Week 8**.
- Mortality dropped significantly at **lower temperatures (16°C)**.
- Surface type, insecticide formulation, exposure duration, and temperature significantly affected mortality.

Future Directions

Expand trials to additional insect species and life stages, incorporating humidity and grain residues to better simulate real-world warehouse conditions.

Acknowledgement

We thank collaborators at Arkansas State University, Kansas State University, and USDA-ARS. Mention of trade names does not imply endorsement. This work was supported by USDA NIFA MBT Grant #2023-51102-40783.

References