Novel approach in management of fall armyworm (*Spodoptera frugiperda* JE Smith) using virus extracts from larvae treated with baculovirus

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Introduction

- Fall armyworm (*Spodoptera frugiperda*) is a lepidopteran pest native in tropical Americas.
- First reported in Africa in 2016 and it has since been spreading across the continent
- Feeds on more than 350 plant species including maize, sorghum and rice
- Major contributor to food security in Africa

Introduction cont'

- Management relies heavily on use of synthetic pesticides= undesirable effects on users, the beneficial insects and the environment and are expensive
- Biopesticides provides a suitable alternative to use of pesticides.
- Baculoviruses are virus based biopesticides that are used in management of insect pests including FAW
- They are gut poison and the larvae must ingest the virus through feeding on treated plant materials
- Depending on the ingested quantity and timing of virus ingestion the larvae will die within a few days or during the next steps of their development.

Overall objective

- To evaluate potential of extracted from larvae treated with baculovirus in management of FAW

Specific objectives

- Evaluate efficacy of baculovirus extracts from 25, 50,75 and 100 larvae treated with baculovirus in control of FAW

- Compare efficacy of baculovirus against baculovirus extracts in control of FAW

Methodology-Insect Culture

FAW colony raised in lab using maize seedlings

FAW larvae (1^{st}-6^{th} instars) were used in bioassays

Bioassays were split into 2 (1^{st}-3^{rd} instars and 4^{th}-6^{th} instars)

20 FAW larvae used per replicate

Each treatment was replicated 3 times

Methodology cont'-Treatments

There were 5 treatments: suspensions extracted from-

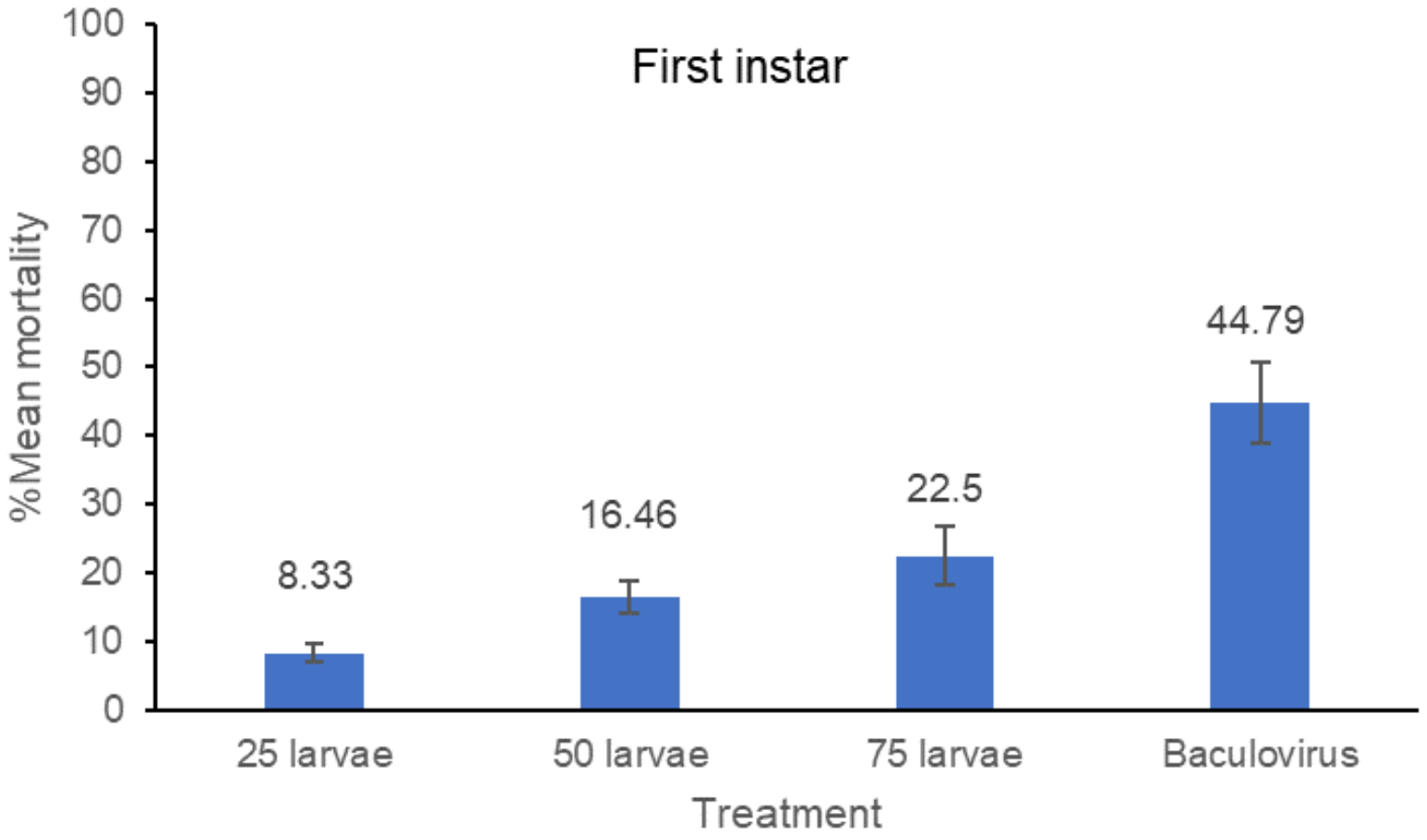
- 25 larvae
- 50 larvae
- 75 larvae
- 100 larvae
- Baculovirus (positive control)
- Untreated maize leaves (negative control)

Methodology-Inoculum preparation

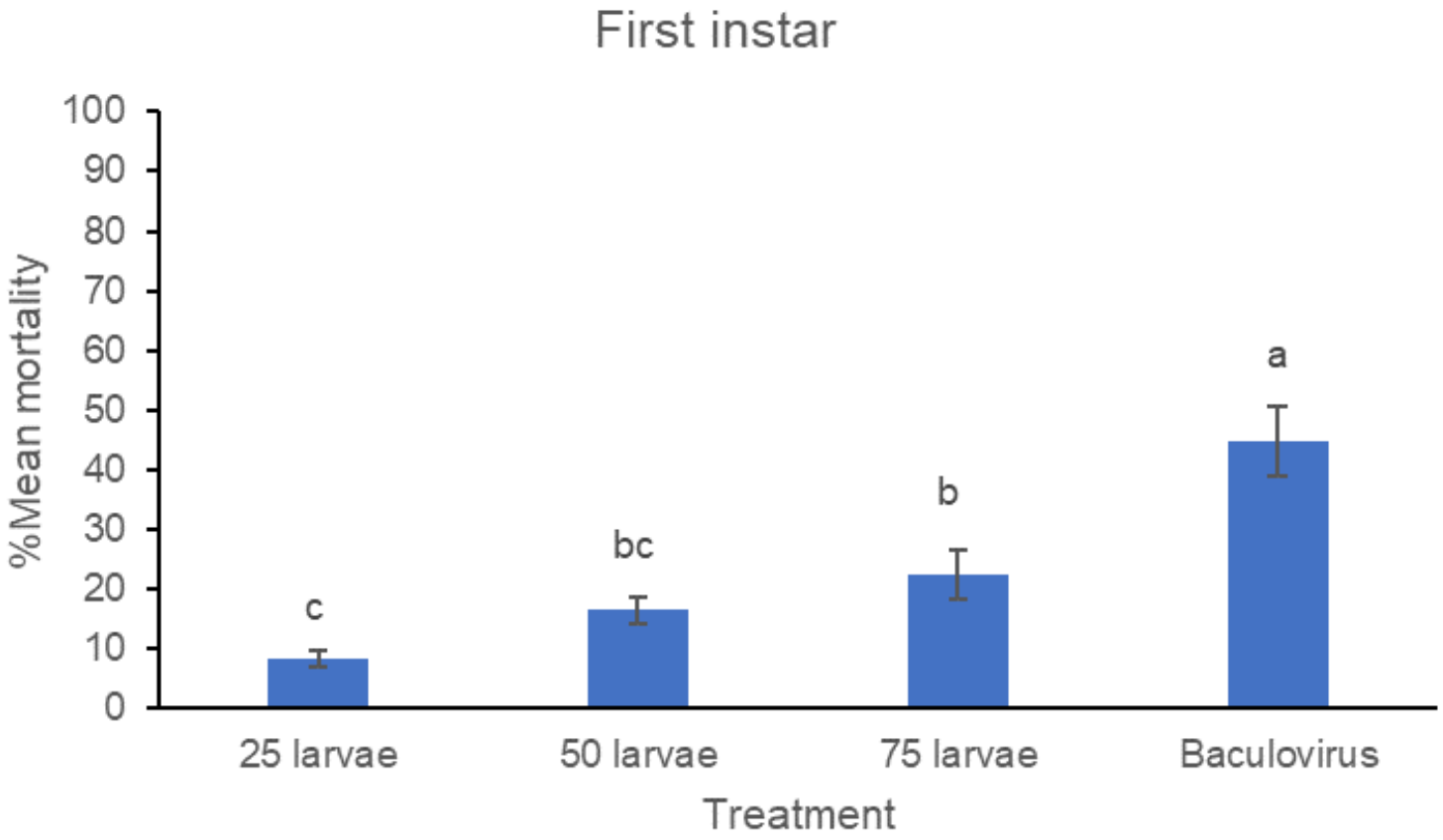
- Prior to bioassay FAW larvae were treated with baculovirus by suspending 6µl of baculovirus in 200ml of water
- Maize seedlings cut from the base were immersed in the solution and left for 10 minutes
- The seedlings were then air dried to remove excess moisture
- Transferred to aerated containers
- Mortality was recorded for 7 days

Methodology cont'-bioassay

Results-Mean mortality



Results-Mean mortality



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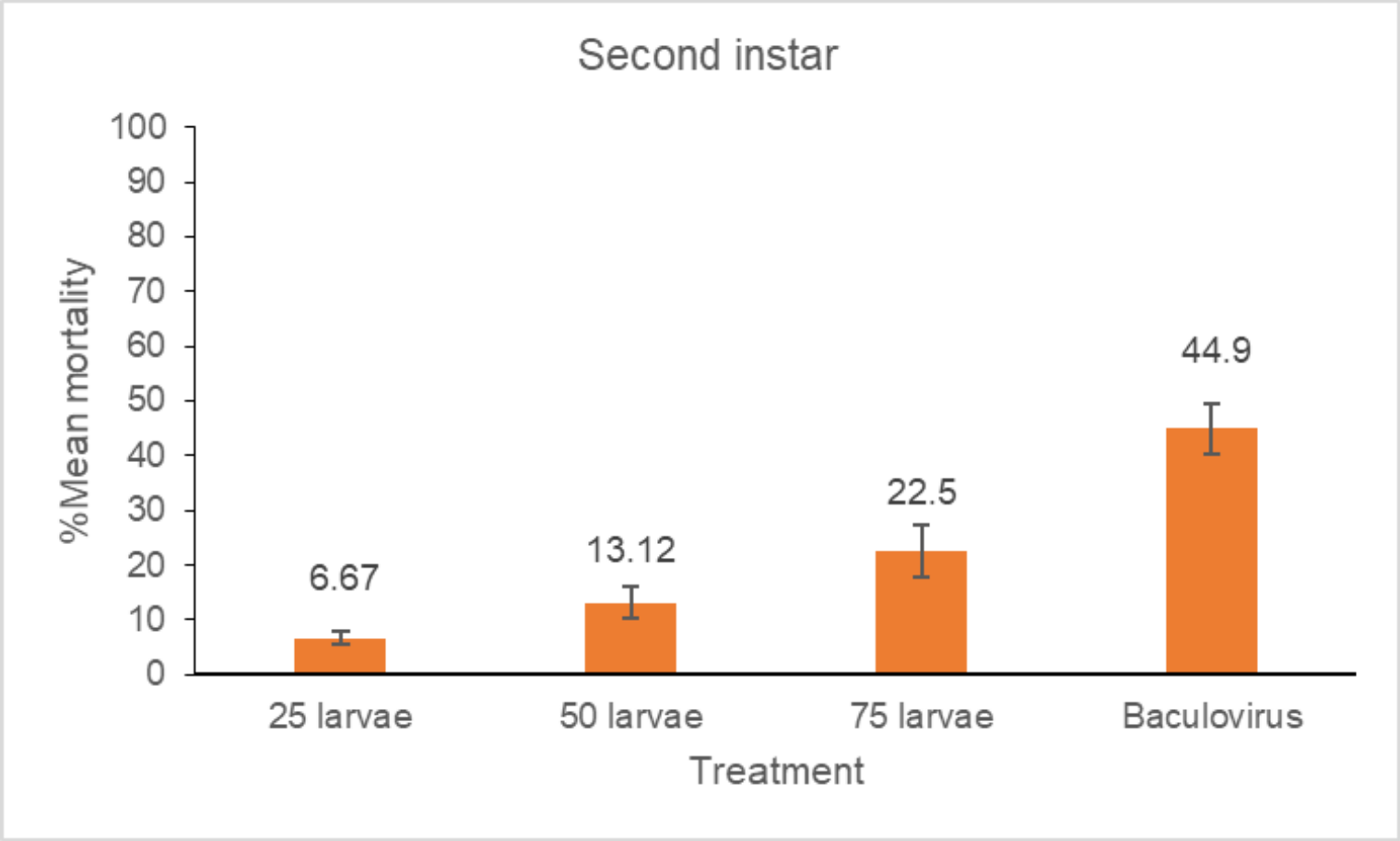

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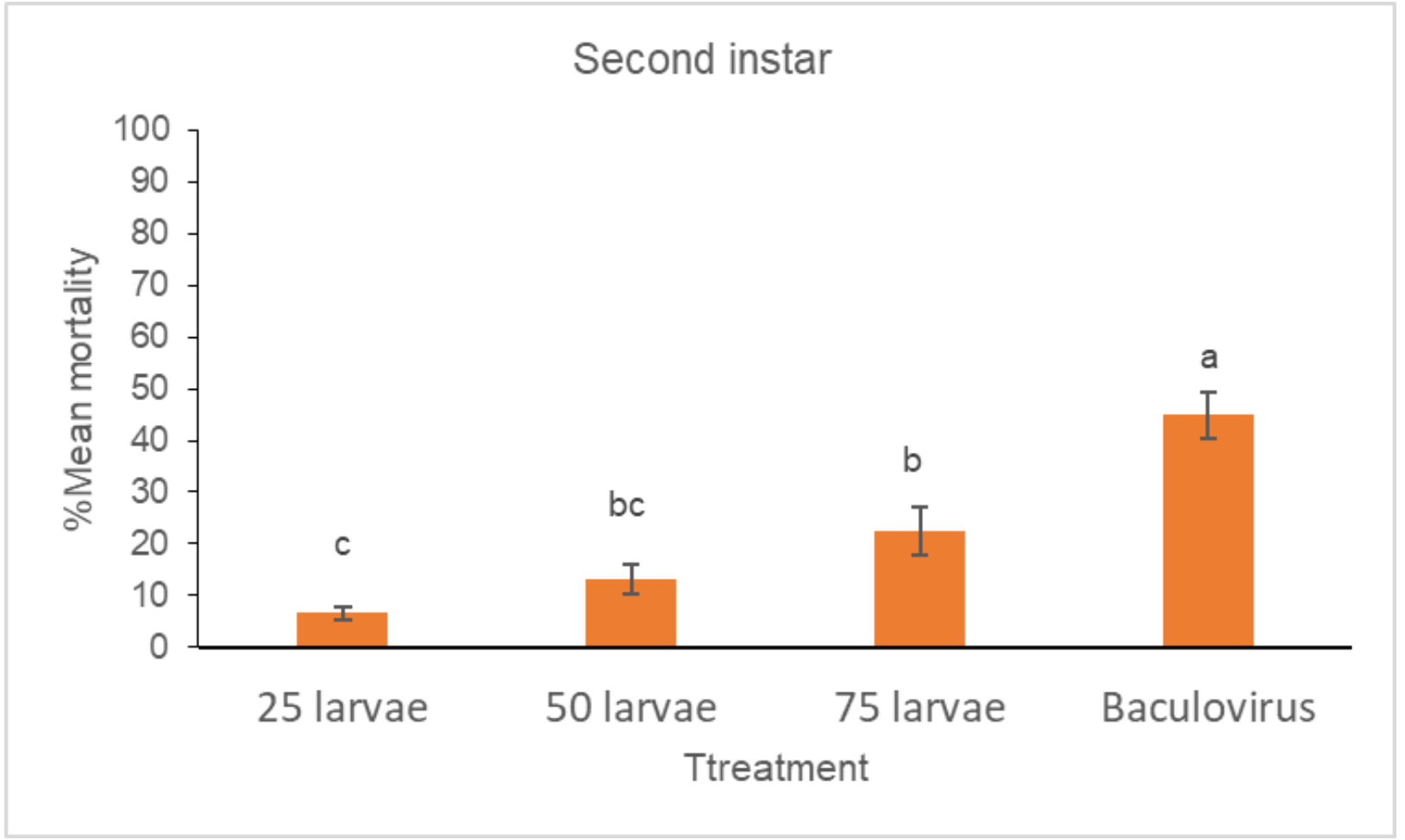
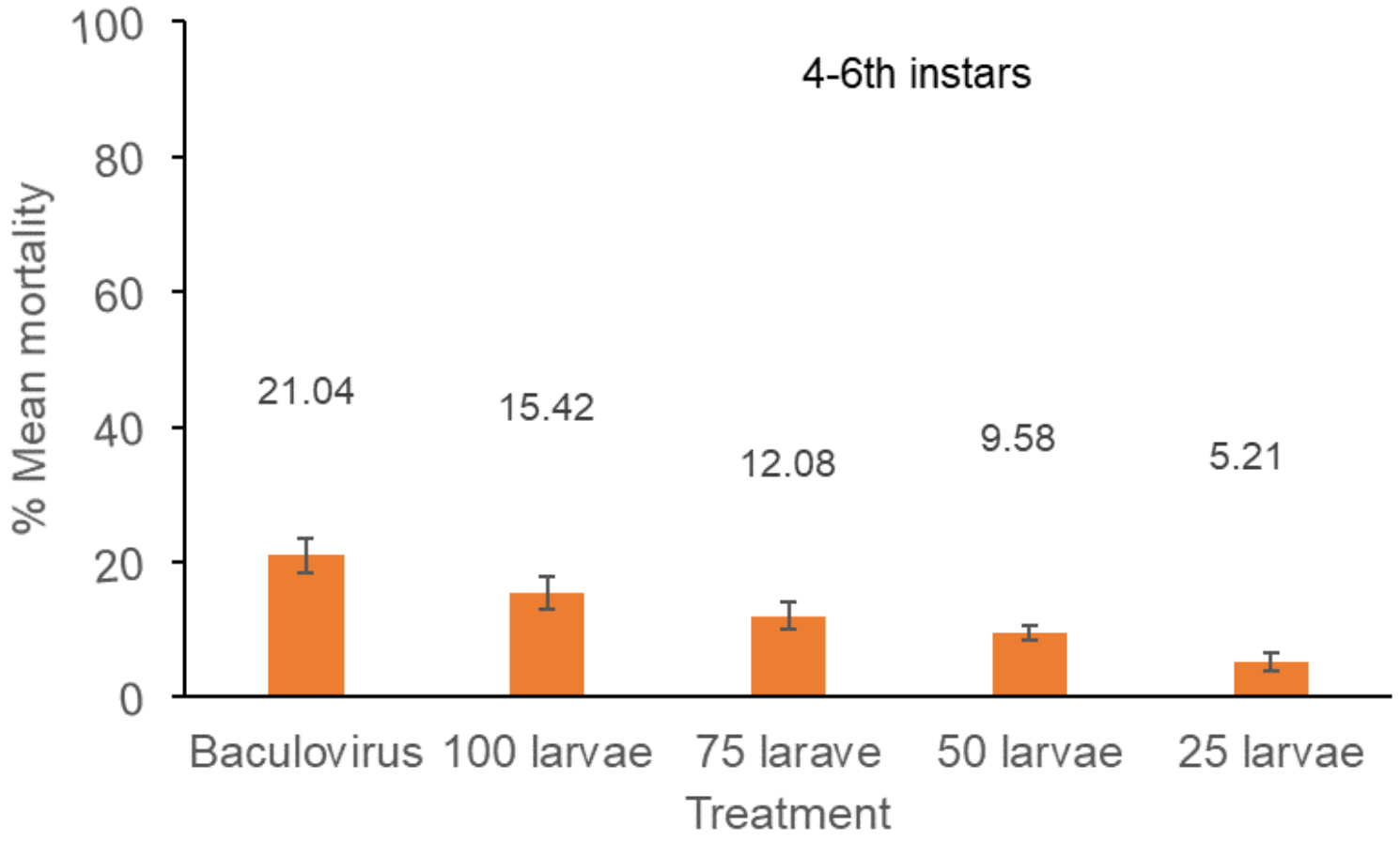
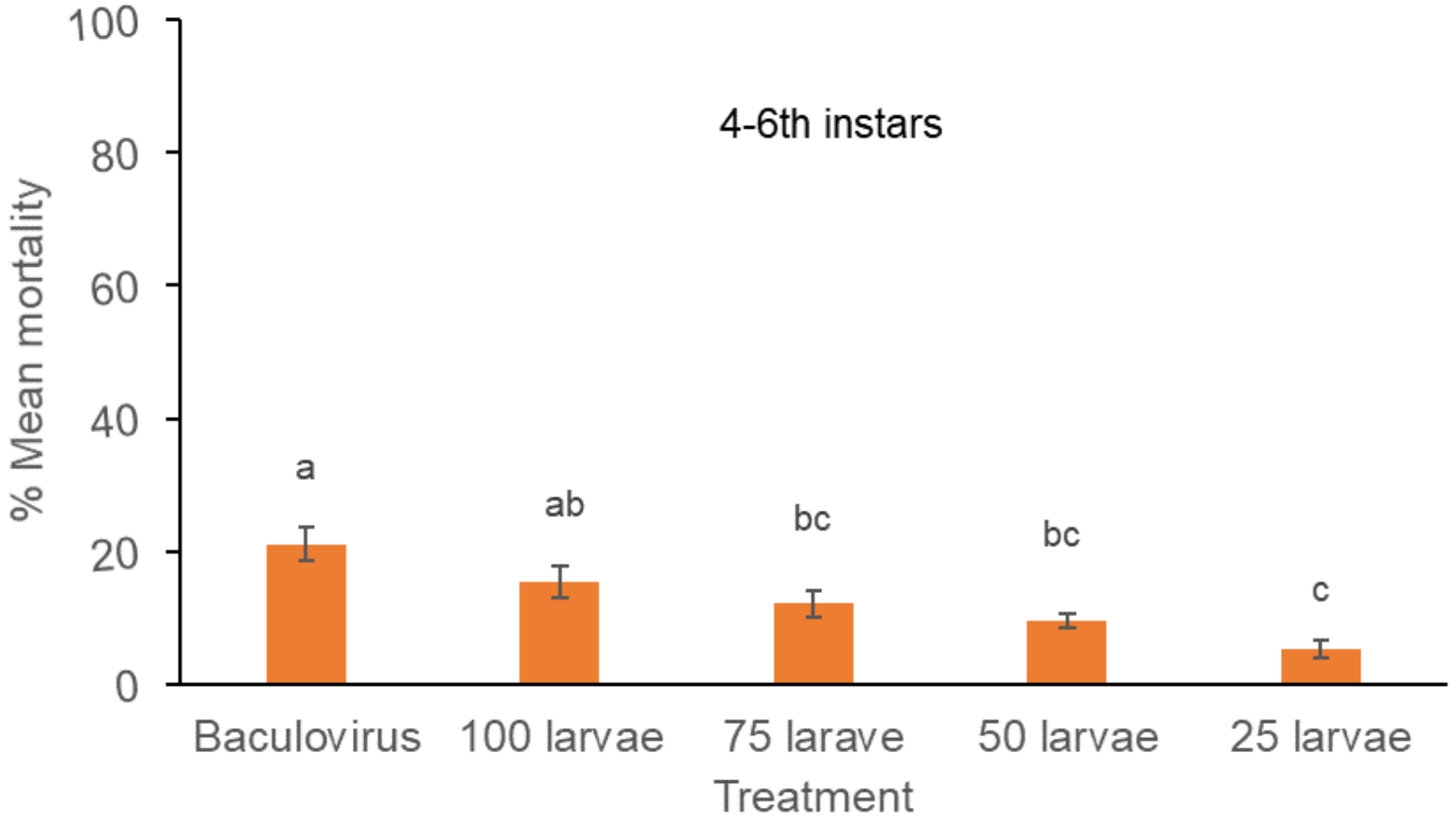


Results-Mean mortality



Results-Mean mortality



Key findings

- The treatments induced higher mortality on the first and second instars compared to 4-6th instars.

- Baculovirus induced higher mortalities on both 1st and 2nd instars compared to the other treatments though it is below 50% of the bioassayed insects.

- Targeting 1st -2nd instars could produce better FAW control using the baculovirus and the virus extracts

Conclusion

- The virus extracts from treated larvae have potential to control FAW
- Proper timing of the FAW developmental stages is key to successful management
- Use of the virus extracts from treated larvae could save farmers money since they need to buy the baculovirus once and use treated larvae extracts for subsequent treatments

Recommendations

- Need for evaluation of effect of storage time of virus extracts before application

- Need for evaluation of effect of baculovirus treatment on development and fecundity of FAW larvae

Thank you