

GETTING RID OF GUT MICROBES: Surface sterilization cleans symbionts from the insects' egg masses



Simone Prado¹, Antonio Panizzi² and Nabil Killiny³

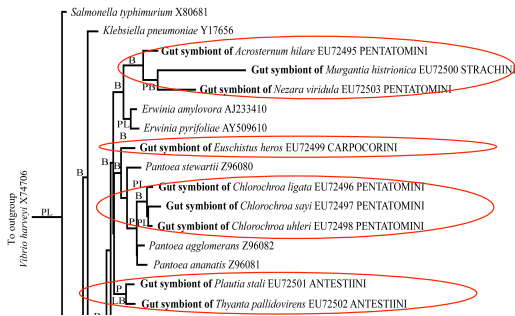
¹Vistor scientist – Embrapa Environment/Brazilian Agricultural Research Corporation;

²Researcher at Brazilian Agricultural Research Corporation;

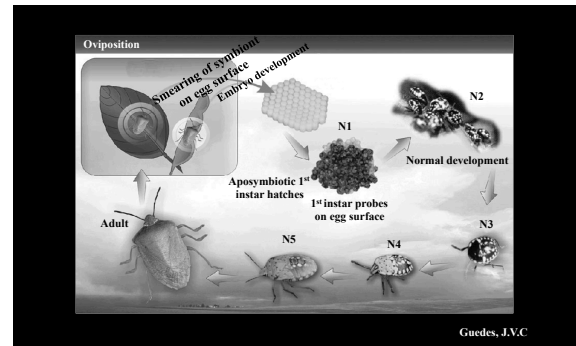
³Professor from the Department of Plant Pathology at Citrus Research and Education Center/University of Florida.

Introduction

Diverse heteropteran insects that feed on economic important crops, commonly known as stink bugs, are associated with specific gut symbiotic bacteria within their midgut cryptic spaces or the gastric caeca. Recent studies have revealed that the stink bugs *Nezara viridula*, *Acrosternum hilare*, *Murgantia histrionica*, *Euschistus heros*, *Chlorochroa ligata*, *Chlorochroa sayi*, *Chlorochroa uhleri*, *Plautia stali*, *Thyanta pallidivirens*, *Dichelops melacanthus*, *Edessa meditabunda*, *Loxa deducta*, *Pellaea stictica*, *Piezodorus guildinii*, *Thyanta perditor*, (all within Pentatomidae family) carried one major bacterium in their midgut. Phylogenetic tree generated using the 16S rRNA gene sequences obtained from the midgut of these previous species placed all symbionts in a clade with the plant-associated bacteria *Erwinia* and *Pantoea* species.



Symbiont Transmission Hypothesis



In this system, females of stink bug vertically transmit the symbionts by smearing them on the surface of the egg masses. When first instars of nymphs hatch, they probe the egg surface and orally acquire the symbionts. Once ingested, these microbial symbionts will reach the 4th section of the ventriculum (V4), also known as gastric caecum, where they establish. It was hypothesized that nymphs born from surface sterilized eggs do not carry the caeca-associated symbionts.

Experimental Design

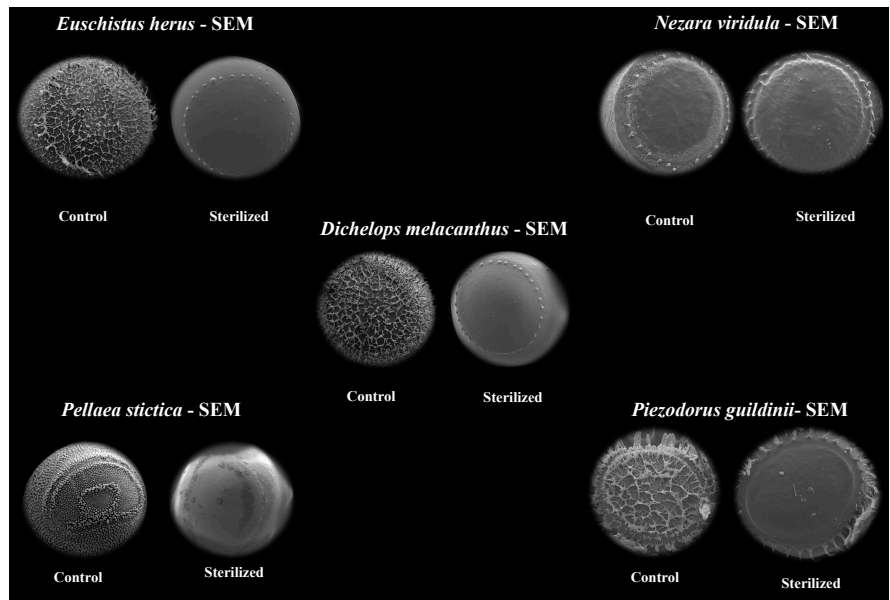


Herne, using scanning electron microscopy (SEM), we are showing that surface sterilized eggs do not carry the surface microbes while eggs from the field of *E. heros*, *D. melacanthus*, *N. viridula*, *P. stictica* and *Pi. Guildinii* carry them.

Conclusions

In this unique model of transmission where the symbionts located temporally on the surface of eggs, environment factors may have a great impact on bacterial survival. Additionally, climate change may impact the insect host ecology. This information may lead to design new strategies to control the stink bugs that could be used in the integrated pest management.

Results



Acknowledgments

Dr. Celia G. T. J. Andrade and Osvaldo Capello for microscopy and images assistance; Jovenil Silva for lab assistance.