

TOWARD LOW ENVIRONMENTAL IMPACT CONTROL STRATEGIES: EFFECTS OF COPPER AND PROPOLIS ON THE *BACTROCERA OLEAE* ENDOSYMBIONT, *CANDIDATUS ERWINIA DACICOLA*

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Up to recent years, synthetic chemical products, such as organophosphates and pyrethroids, have been considered the most useful insecticides against *Bactrocera oleae* (Rossi), the key-pest of olive crops all over Mediterranean countries. After the discovering of alternative antimicrobial compounds and the movement toward low environmental impact control strategies, other products have been recently lab-and-field-tested against this Tephritid. An important current issue regarding *B. oleae* is the relationship with its endosymbiont *Candidatus Erwinia dacicola*. It has been demonstrated that this bacterium plays a very relevant role in the entire *B. oleae*'s life, being necessary for its fitness. Thus, in the absence of the endosymbiont, *B. oleae* wild populations in field would considerably decrease. Copper is one of the most used antimicrobial for tree crops all over the world; its efficacy against *Ca. E. dacicola* has been already demonstrated, not only in impeding larval growth but also acting as a deterrent of oviposition. Propolis is another natural antimicrobial compound largely used for its antimicrobial activity, also on gram-negative bacteria. If propolis and copper were efficient against the endosymbiont, *B. oleae* wild population spread in field could be biologically restrained, using different control strategies and improving a sustainable agriculture.

Providing that, we evaluated the effect on *Ca. E. dacicola*'s content in adults' oesophageal bulbs of these active ingredients, as copper and propolis. Flies were exposed for six weeks to two different concentrations of copper (5% and 20%), propolis, and water as control. Oesophageal bulbs were extracted after the second and the sixth week of exposure, in order to have comparable results at two different times; also adult mortality was noticed. Real time PCR on samples showed a reduction from the first to the second extraction in *Ca. E. dacicola* content, both in propolis (65%) and copper (40,5% for copper at 5% and 61% for copper at 20%) treatments, comparing to the content in the control treatment, that did not show any change. Mortality in the adult population was higher in propolis comparing to other treatments. Thus, not only copper could be used as symbionticide/deterrent against the olive fly but also propolis, opening new perspectives for a sustainable agriculture and low environmental impact control strategies.