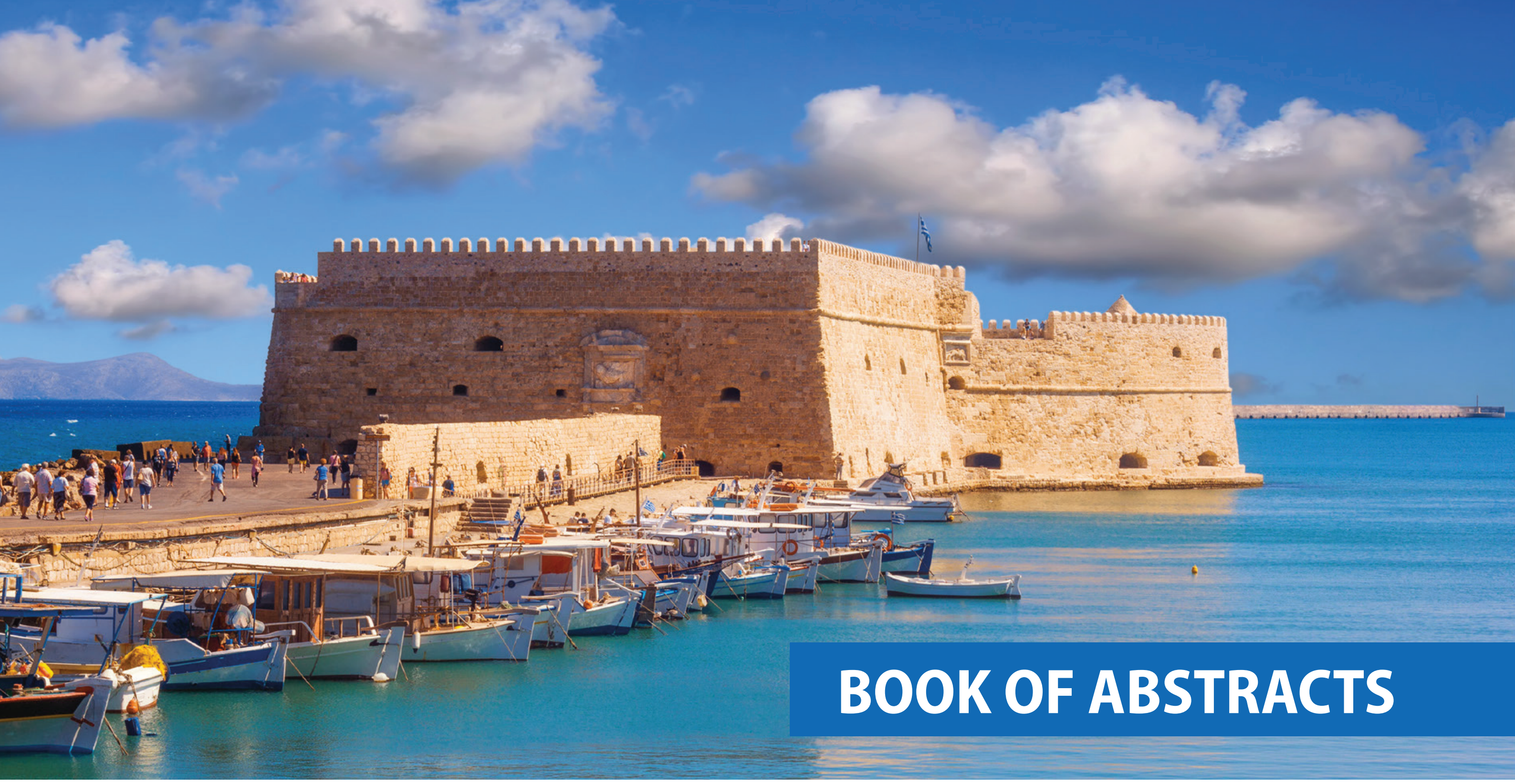

BOOK OF ABSTRACTS

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Chitin and its deacetylated derivative, chitosan, have various applications in biomedical and pharmaceutical fields. The market needs to have these two biopolymers readily available has led to the search for alternative sources to crustaceans, the commercial source. The bioconverter diptera *Hermetia illucens*, is one of the most exploited, thanks to the possibility of recovering waste materials from its breeding. Chitin can be extracted from different developmental stages and biomasses of *H. illucens* (larvae, pupal exuviae and dead adults) and converted into chitosan. Chitosan has some important properties such as biocompatibility, biodegradability, non-toxicity, antioxidant, humectant and antimicrobial activity. This chitosan quality makes it particularly versatile for pharmaceutical and medical applications, as well as innovative pesticide and insecticide. Some pathogens have acquired new mechanisms of drug resistance, leading to antimicrobial resistance, that makes the human body progressively weaker to fight and deal with common infections. New antibacterial molecules are needed to tackle this problem. Among them, natural ones can be a safe alternative solution. After protonation in acid conditions, chitosan can inhibit the proliferation of many bacteria, fungi and yeasts. The chitosan antimicrobial activity depends on its chemical-physical characteristics, mainly molecular weight and degree of deacetylation, and on some specific experimental conditions, such as temperature and pH. The evaluation of chitosan antimicrobial activity was carried out through agar diffusion test and microdilution assay. Bleached and unbleached chitosan from larvae, pupal exuviae and dead adults of *H. illucens* induced the formation of inhibition zones. This important property was also confirmed by microdilution assay.

Keywords: chitosan, antimicrobicity, black soldier fly

P118. Soil treatment with Botanigard®WP22 (*Beauveria bassiana* GHA): *ON and OFF-season biocontrol tool of Ceratitis capitata*

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Control of fruit flies (Diptera: Tephritidae) is mainly based on insecticide treatments targeting the adults. Targeting the soil-dwelling stages by soil treatment with an entomopathogenic fungus is a strategy to consider. Botanigard®WP22 is a commercially mycoinsecticide based on the *Beauveria bassiana* for use as a spray. The objective of this study was to examine the efficacy of Botanigard®WP22 as soil treatment in orchards, targeting the soil-living stages of *Ceratitis capitate.*
Two sets of experiments were carried out on late L3 larvae. The first consisted in testing a high dose of 10^7 conidia/g of soil of Botanigard®WP22 in apple orchards in Italy. The second was carried out to test in the laboratory doses (10^5, 10^6 and 10^7 conidia/g of soil) of Botanigard®WP22 and temperature (10, 15, 20, 25°C) effects. The fungus was able to maintain itself in the soils of apple orchards reducing significantly the emergence of flies for at least one year. Laboratory experiments demonstrated i/ that Botanigard WP22 soil treatments significantly reduced emergence and increased mortality of emerged

adults of *C. capitata* whatever the dose and temperature tested. *C. capitata* mortality was positively correlated with the dose of Botanigard®WP22 and that 2/ mortality was negatively correlated with the temperature, which demonstrated that it can provide an OFF-season control of *C. capitata*. At low temperature, the fungus remained active while the insect developed slowly or did not.
This biocontrol strategy could be suitable to target the first and the latest generations of *C. capitata* produced in spring and in autumn.

Keywords: biological control, Mediterranean fruit fly, *Beauveria*

P119. Toxicity of eight essential oils to *Trialeurodes vaporariorum*

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The resistance of the greenhouse whitefly *Trialeurodes vaporariorum* Westwood (Hemiptera: Aleyrodidae), caused by the overuse of synthetic chemicals and the associated side effects on the environment and non-target organisms, urgently promotes other efficient, environmentally friendly and sustainable strategies for its control in the Integrated Pest Management framework. Plant essential oils (EOs), having a safer toxicological profile, can fully or partially replace synthetic insecticides playing thus an important role as an alternative control tool for agricultural pests. On the other hand, incorporating EOs into controlled-release nanoformulations could help overcome practical application problems (e.g., phytotoxicity, stability and degradation processes) and potentially develop efficient bioinsecticides. In laboratory conditions, we evaluated the baseline toxicity of eight nanoformulated EOs on fourth-instar whitefly nymphs, following topical contact exposure. The results of the bioassays showed that all tested EOs caused significant mortality on *T. vaporariorum* fourth-instar nymphs, with 10-75 fold lower LC_{50s} (median Lethal Concentrations) compared to the maximum applied concentration. Rosemary EO was the most toxic compound (1.728 mg a.i./l), followed by peppermint, garlic, lavender and fennel EOs (2.039, 2.358, 2.680 and 3.185 mg a.i./l, respectively), while the least toxicity to fourth-instar whitefly nymphs was estimated for artemisia, anise and sage EOs (5.252, 8.781 and 14.978 mg a.i./l, respectively). However, the potential application of these new-generation bioinsecticides relies on their safety towards beneficial arthropods, besides their efficacy against *T. vaporariorum*. Therefore, further research should focus on the risk assessment of EOs on biological control agents used for the management of the greenhouse whitefly.

Keywords: biopecticide, essential oils, greenhouse whitefly, nanotechnology, toxicology

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P120. Effective irradiation and dormancy based mass rearing protocol for propagation of biological control of insect pests

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