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Exploring Medfly reproduction: a multidisciplinary approach for pest control

ABSTRACT

The Mediterranean fruit fly (medfly), *Ceratitis capitata*, is a worldwide pest of agriculture with an extremely high reproductive potential. Wild females are polyandrous and display sperm precedence. Understanding the mechanisms controlling sperm dynamics and use is important not only from an evolutionary perspective, but also for their impact on medfly control strategies. Our research aims at unravelling medfly ejaculate composition, function and regulation and its impact on female physiology and behaviour, using an interdisciplinary approach. Ejaculate is a complex cocktail of sperm and non-sperm components and we approached their characterization integrating the use of transgenic medfly lines with fluorescent sperm, genomics and transcriptomics of male reproductive organs to identify genes involved in the production of seminal fluid proteins. As in-depth analyses of ejaculate could help manipulate male fertility, our results have the potential to benefit the design of novel and/or improved medfly control strategies, also in light of increasing the mating competitiveness of mass-reared *C. capitata* used in Sterile Insect Technique programs. In this respect, and considering the high polyphagy of the medfly, our studies also focused on investigating pheromone blending in relation to the diet experienced during the larval stage. Our findings highlight the plasticity of dietary responses in this species, which may play a key role in determining the interactions of this pest with conspecifics and the environment.



BIOGRAPHY

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Dr Francesca Scolari, PhD, is a Researcher at the Institute of Molecular Genetics of the Italian National Research Council in Pavia, Italy. She obtained her PhD in 2009 (University of Pavia - Georg-August-University of Göttingen, Germany), where she did most of her postdoctoral work (2009-2017). She participated in several collaborative projects between Italy and the Yale School of Medicine, where she was visiting research scientist from 2012-2017. Her research activity focuses on the functional genomics of insect reproduction, with special emphasis on fruit flies of the family Tephritidae, tsetse fly species (genus *Glossina*), and *Aedes* mosquitoes. A substantial part of her recent research regards the study of the co-evolution between insects and endosymbionts integrating genomics, transcriptomics and metabolomics, as well as of insect-plant interactions at the functional genomics, physiological and behavioural level.

Dr Scolari has published 44 papers in high impact international peer-reviewed scientific journals (e.g. Science, BMC Biology, Genome Biology, Proceedings of the Royal Society of London) and her papers have received more than 1300 citations, with an H-index=22. She has communicated more than 80 papers in national and international workshop and conferences. She has been participating in more than 20 national and international research projects funded by the EU, the NIH and the FAO/IAEA. She is currently the Italian PI of a recently funded EU Horizon Europe grant focused on developing new tools for the control of *Bactrocera* species.

She is member of the Steering Committee of TEAM (Tephritid workers of Europe, Africa and the Middle East) since 2010 and of the Scientific Society Unione Zoologica Italiana (UZI) since 2015. She was the co-supervisor of 11 MSc and BS theses. She is Guest Associate Editor and Review Editor in Invertebrate Physiology for the journal *Frontiers in Physiology*, and acts as a regular reviewer for more than 20 international peer-reviewed journals. She has been a reviewer of national and international research proposals (BELSPO, MIUR). She was member of the organizing and scientific committee of 6 international conferences. She acted as an expert consultant in international organizations such as Joint Division of FAO/IAEA (Food and Agriculture Organization and International Atomic Energy Agency).