

Detection Of Low-Density Populations Of The Mediterranean Fruit Fly

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ABSTRACT

Early detection of invasive pests is considered of utmost importance for implementing successful eradication or containment campaigns. Several biological, technical and strategic aspects may affect early detection of invasive fruit flies (Diptera: Tephritidae). These include propagule pressure, population growth rates in a "hostile" environment, performance of the trapping system considered as well as deployment of trapping networks and strategic execution of sampling schemes. In the framework of the Horizon 2020-funded project FF-IPM, and using *Ceratitis capitata* as model pest we performed novel release recapture studies to understand some of the biological and environmental factors that determine detection success. Both wildish males and females, subjected to different thermal acclimation treatments were used. As detection tool in all trials, we considered a trapping point with a combination of two trapping systems a plastic McPhail trap baited with ammonium acetate, putrescine and trimethylamine, and a Jackson trap with trimedlure. Our data highlight the complexity of factors involved in detecting low populations of *C. capitata*. Under a random invasion event scenario and considering a trapping network of five trapping stations/km² the detection efficacy was <1%. The probability of detecting a male was by far higher than female. However, females seem to remain for longer periods of time in a specific area. Thermal history of released adults, ambient temperature, the trapping system used and the existence of host trees are all related with detection efficacy.

The importance of our findings towards developing novel detection approaches for *C. capitata* and other tephritids is discussed.

KEYWORDS: medfly, alle effect, propagule pressure, establishment, Tephritidae.