

THE FRAMEWORK PROGRAMME FOR RESEARCH AND INNOVATION

HORIZON 2020

**PROJECT DELIVERABLE REPORT**

**Deliverable 4.5: Reports on the compatibility of the different  
OFF-Season IPM tools**



**Fruit Flies In-silico  
Prevention & Management**

**FF•IPM**

**Project Title:**

**In-silico boosted, pest prevention and off-season focused IPM against  
new and emerging fruit flies ('OFF-Season' FF-IPM)**

SFS-2018-2

*"This project has received funding from the European Union's Horizon 2020 research and innovation program under grant agreement No 818184– H2020-SFS-2018-2"*



## 1 Summary

The main objective of the Task 4.5 was to address the compatibility of the ground-dwelling predator-based tool developed in Task 4.2 with the entomopathogenic nematode (EPN)-based tool and the entomopathogenic fungi (EPF)-based tool developed in Tasks 4.1 and 4.3, respectively. Separately, these tools proved effective to reduce the population density of *Ceratitis capitata* (Wiedemann) (Diptera: Tephritidae). However, the possible effect of the application of these entomopathogenic-based tools on the ground-dwelling predators has been poorly studied. The aim of Task 4.5 was double. On the one hand, larval mortality and adult emergence of *C. capitata* subjected to the three ground management techniques considered in Task 4.2 (i.e., bare soil (BS), a seeded cover of *Festuca arundinacea* (FA), and a mulch of straw (M)) in combination with either the EPN selected in Task 4.1 (*Steinernema feltiae* (Filipjev) (Rhabditida: Steinernematidae)) or the EPF selected in Task 4.3 (*Beauveria bassiana* (Bals.-Criv.) Vuill. (Hypocreales: Clavicipitaceae)) was evaluated under field conditions. On the other hand, the abundance of the main groups of the ground-dwelling predators identified in Task 4.2 (i.e., beetles, spiders, ants and earwigs) when subjected to the same soil treatments was monitored. Our results show that the effect of the different entomopathogenic-based tools on *C. capitata* depends on the soil management technique. The application of *B. bassiana* in FA was the only effective treatment with a 27.7 % reduction in adult emergence relative to FA control. Interestingly, the application of *S. feltiae* in the same cover resulted in a 34.5 % increase of *C. capitata* emergence. The other treatments had no effect on adult emergence. Neither *S. feltiae*, nor *B. bassiana* affected the abundance of spiders irrespective of the cover. However, they both decreased the abundance of beetles in FA and M, and that of ants in BS and M. Therefore, the additional effect on adult emergence observed in FA for *B. bassiana* could be attributed to the direct impact of the fungus on the soil-dwelling stages of the fly, whereas the decreased efficacy observed for *S. feltiae* in FA could be related to a retention of the nematode in the cover or to increased competition from soil microfauna and microflora compared to the other two covers. These results, though, deserve further studies to ascertain the causes for this differential effect of the cover. To sum up, results of Task 4.5 support the potential use of *B. bassiana* in FA only. Indeed, this was the only combination tested that resulted in enhanced efficacy to control *C. capitata* from those tested.