Global assessment of seasonal potential distribution of Mediterranean fruit fly, *Ceratitis capitata* (Diptera: Tephritidae)

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Abstract

The Mediterranean fruit fly (Medfly) is one of the world's most economically damaging pests. It displays highly seasonal population dynamics, and the environmental conditions suitable for its abundance are not constant throughout the year in most places. An extensive literature search was performed to obtain the most comprehensive data on the historical and contemporary spatio-temporal occurrence of the pest globally. The database constructed contained 2328 unique geo-located entries on Medfly detection sites from 43 countries and nearly 500 unique localities, as well as information on hosts, life stages and capture method. Of these, 125 localities had information on the month when Medfly was recorded and these data were complemented by additional material found in comprehensive databases available online. Records from 1980 until present were used for medfly environmental niche modeling. Maximum Entropy Algorithm (MaxEnt) and a set of seasonally varying environmental covariates were used to predict the fundamental niche of the Medfly on a global scale. Three seasonal maps were also produced: January-April, May-August and September-December. Models performed significantly better than random achieving high accuracy scores, indicating a good discrimination of suitable versus unsuitable areas for the presence of the species.

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Estimation of populations and sterility induction in *Anastrepha ludens* (Diptera: Tephritidae) fruit flies

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Abstract

The relationship between different release densities of sterile flies and fly trap captures, expressed as flies per trap per day, in the monitoring of *Anastrepha ludens* (Loew) populations was evaluated in mango orchards. The induction of sterility in fertile females was evaluated using different ratios of sterile: fertile males under field cage conditions. A direct relationship between recaptured flies and densities of release sterile flies was found. However, trap efficiency, expressed as percentage of recaptured flies, decreased as the density of released flies increased. Sterility induction was positively correlated to the ratio of sterile: fertile flies. A significant difference in egg fertility among treatments was observed. The trajectory of sterility induction slowed down after a sterile: wild ratio of 30:1, which suggests that this ratio could be appropriate in an sterile insect technique program with *A. ludens*. Sterility induction was greater when only sterile males were released than when releasing both sterile males and females, but the differences were not significant. Our findings contribute to a better interpretation of fly captures obtained from the field trapping networks, and to an improvement in the efficiency of sterile insect technique against *A. ludens* fruit flies, through the implementation of more rational sterile fly release densities.

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