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Factors affecting the infestation due to *Bactrocera oleae* (Rossi) in several Sicilian olive cultivars

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Few studies were carried out on the susceptibility of olive cultivars to *Bactrocera oleae* (Rossi), olive fruit fly. The aim of this paper was to study the different susceptibility of different Sicilian olive cultivars widely cultivated in Sicily and factors influencing the infestation level. Differences among olive cultivars in the susceptibility to olive fruit fly could be usefully considered both in organic and conventional olive cultivation, to obtain quality productions and to reduce insecticides use.

The present study was carried out from 2002 to 2006 on 16 widely cultivated Sicilian olive cultivars contemporaneously present in the germplasm collection located at Castelvetrano (Trapani province, Sicily) realised by Ente di Sviluppo Agricolo of the Sicilian Region and Dipartimento di Colture Arboree of the University of Palermo. From 60 to 90 fruits per cultivar were sampled every 15-20 days, starting from the second half of August and ending in October. Collected drupes were examined at the stereomicroscope, counting sterile and fertile punctures, larvae of different instars, pupae, exit holes and empty galleries. Fruit size, pulp hardness and color were recorded for 30-90 olives of each cultivar in 26 samplings in the whole period of the research.

Data submitted to statistical analysis are the number of attacks expressed as total infestation (fertile punctures, alive larvae, pupae and exit holes) of each sampled drupe, recorded: together with six factors. Three factors are categorical: cultivar (16 Sicilian cvv.), sampling date (year from 2002 to 2006 and day), color (green, red, dark); other three are interval factors: volume, sphericity index (length/width), pulp hardness.

The response is a count variable and the assumption of normality resulted as not applicable, even after the usual root-square transformation. Therefore, an Ordinal Logistic Regression (OLR) has been performed. OLR allows to estimate the odd ratio (OR), that can be interpreted as the increment of risk when passing from a level of a factor to another one. Significance of a factor is assessed when its odd ratio is significantly different from one.

When all factors were included in the analysis, high significance of date, cultivar and colour has been registered, while volume, sphericity and hardness resulted as not significant. The analysis has been repeated detecting the influence of the interval factors on infestation, cultivar by cultivar, in order to avoid that different impact of such factors (different -or even -opposite slope from a cultivar to another) could lower the test power. Even in this case the three interval factors resulted as not significant.

On the other hand, if color or cultivar is removed from analysis, all interval factors became highly significant. Therefore, analyses assessing the influence of volume, sphericity and hardness, without considering other contributory factors, are misleading. This is a typical phenomenon of spurious relationship, in which two occurrences have no causal connection, but their concomitance is due to other unseen factors. In conclusion, date, cultivar and color (among the studied factors) are the only probable candidates to explain infestation level.