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BOOK OF ABSTRACTS

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Drosophila suzukii oviposition behavior on wine clusters

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Highlights

- *Drosophila suzukii* females significantly lay higher number of eggs on more mature grape berries
- Organoleptic parameters that more correlate with the number of laid eggs are sugar contents and acidity
- Female choosiness is particularly evident at early stages of vineyard infestation, 20 days before harvest, and gradually decreases while the cluster ripens

Introduction

The Spotted Wing Drosophila (SWD), *Drosophila suzukii*, is an invasive pest of soft fruits and cherries in several Western Palearctic areas. It is not yet clear whether the fly can be considered a commercial pest of grapes. Despite slower larval development and higher mortality rate compared to other host plants (Ioriatti et al., 2015), SWD can elicit indirect damage to grape clusters by favouring sour rot derived from oviposition. In Trentino (Northern Italy) the cv. Schiava is highly susceptible to oviposition primarily because of the berry skin penetration force that is comparatively lower than in other regional varieties (Ioriatti et al., 2015). This indicates that females tend to select the oviposition sites by testing the clusters that they visit. Here we investigated the SWD female accuracy in selecting berries suitable for oviposition once confined on a Schiava grape cluster by analysing organoleptic parameters of berries and comparing between those with and without laid eggs.

Material and methods

We studied the role of seven organoleptic parameters (i.e. sugar contents, relative density, potassium, pH, total, malic and tartaric acidity) associated to the berry maturity. We randomly selected 45 plants from three vineyards (Rotaliana Plain, Trento, Italy), and from each plant we chose three grape clusters. We artificially infested the grape clusters with SWD individuals for 4 days (cv Schiava) in three different decades of September 2016 (the last one coincided with the harvest time) and then afterwards we collected and separated berries with (g+) and without (g-) eggs with stereomicroscope. We quantified the organoleptic parameters and then we run a principal component analysis (PCA) to provide a relative value of their contribution in terms of susceptibility to SWD oviposition. The factor coordinates of PCA cases were used to form two datasets (g+ and g-) that were compared with the Wilcoxon signed-rank test to assess significant different positions of the centroids given by g+ and g-, respectively. A significant difference of centroids would have indicated a significant difference of the studied parameters along any of the principal components. A Wilcoxon

signed-rank test followed to assess significant differences in the contents of each organoleptic parameter between g+ and g-.

Results and discussion

Our results indicate that SWD females once landed on a cluster explore and probably test the berries to choose those more suitable (i.e. more ripe) for oviposition. The PCA accounted for the 83.6 % of variance. The analysis of factor coordinate cases showed that the centroid g+ has significant higher value than the centroid g- at the first ($p < 0.01$) and second ($p < 0.05$) sampling date, while they do not differ ($p > 0.05$) at the third sampling period. This indicates first of all a significant contribution of the investigated parameters in determining a significant difference between g+ and g- berries. In addition, we found a progressive reduction of difference between the two classes of berries during the maturation. Taken each sampling period separately, we measured a significant difference in all organoleptic parameters (except for tartaric acid) at the first period; grapes sampled at the second period showed significant difference only in terms of sugar content ($p < 0.01$) and relative density ($p < 0.01$), which were higher in g+, while malic acid was significantly higher ($p < 0.01$) in g-. Finally, grapes collected in the third sampling ($n = 19$) period differed between g+ and g- for total acidity and acid tartaric values, which were higher (respectively, $p < 0.01$ and $p < 0.05$) in g- and pH, which was higher in g+ ($p < 0.05$). Taken together these data show that SWD females are rather choosy at early infestation (20 days before harvest) when the clusters are still maturing and there is still high variability of organoleptic parameters between berries of the same cluster. Instead, at the harvest time the cluster is more homogeneous and thus we did not find any difference between berries with and without eggs. Therefore we assume that, even if SWD females lay eggs on cv Schiava because it has skin softer than other grapevine varieties, however also the berry organoleptic components play an important role. Females showed remarkable accuracy in choosing the proper oviposition sites which could be driven by inputs arising from labellum and tarsi where are likely located most of the gustatory sensilla able to identify the preferred sucrose rich substrate (Montell, 2009). On the contrary, there is not yet evidence of the use of the ovipositor for explorative piercing however it is known that each valva of the SWD ovipositor presents 5 putative gustatory sensilla (Biolchini, 2015). Further research is warranted to understand how the females acquire the information of fruit maturity (i.e. sugar contents and acidity) that means to clear further up about the reproductive behaviour and biology of this important fruit pest.

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