

On the occurrence of *Drosophila suzukii* (Matsumura, 1931) in the vineyard ecosystem from Douro Demarcated Region

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INTRODUCTION *Drosophila suzukii* was detected for the first time in Portugal in 2012. This insect causes significant losses mainly in small fruits such as blueberries, raspberries and cherries, but also in other cultivated crops, including grapevine, and wild and ornamental plants. Although its occurrence in Douro Demarcated Region (DDR) have already been reported, till our knowledge there is no information about its importance as grapevine pest (Figure 1). Thus, this study aimed at: (i) evaluate the occurrence of drosophilids in DDR vineyards and in particular that of *D. suzukii*; (ii) characterize *D. suzukii* population spatio-temporal dynamics in the DDR vineyard ecosystem (including vineyard plots and neighbouring non-crop habitats).



Figure 1 Adults of *Drosophila suzukii* on grapes



Figure 2 Trap type DROSOSAN used in the assays

METHODOLOGY Field work was carried out in two wine farms from DDR: Vallado (in Baixo Corgo sub-region) and S. Luiz (in Cima Corgo sub-region). In Vallado, experiments took place in one vineyard, sprayed once to control *Scaphoideus titanus*. In S. Luiz experiments were carried out in two different crop management systems (one vineyard sprayed against *Lobesia botrana* (traps 8, 9, 10) and another one vineyard without insecticide treatments) and a neighbouring scrubland (traps 1, 2 and 3). Drosophilidae adults were collected with food traps (Figure 2) installed in mid-May of 2019. In each trial, ten traps, separated from each other by approximately 50 m, were used. Traps were filled with a water-alcoholic solution consisting of 50% red wine, and were checked at each 3-4 days until the end of September of 2019. Adults were grouped by morphospecies, counted and separated by sex. At the harvest, *D. suzukii* infestation was assessed by inspecting 25 bunches per vineyard.

A full spatial distribution based on total captures of both sexes in traps was performed through geostatistical method Inverse Distance Weighting (IDW) in order to obtain a general frame of pest presence at a spatial level. Analysis was performed in ArcGIS 10x., using Spatial Analyst Extension, with Geostatistical Analyst Wizard.

The land-use types in buffers (50, 100, 150, 200 and 250 m) around each trap were mapped, categorized and accounted for (area in ha and %) using ArcGIS 10x. For the analysis, four categories were considered: (i) vineyards; (ii) woodlands and scrublands combined; (iii) olive groves; (iv) perennial and temporary crops combined and hereafter named other crops. Spearman's rank correlations were used to examine correlations between the captures (total, females and males) and land-use types, at different buffers. For greater robustness, data from the two farms were analyzed together.

RESULTS A total of 2,929 Drosophilidae adults were collected. Seven morphospecies of both males and females were found (Figure 3). *D. suzukii* represented 62,3% of the total Drosophilidae collected. In both farms, the number of females obtained was higher than that of males (Table 1). Trap captures peaked between mid-July, in Vallado, and the end of July, in S. Luiz, to grow again from early September (Figure 5).

In Vallado, the higher number of captures was obtained in the traps 5 (located near a boundary of cherry trees and wild blackberries) and 8 (located near a small garden with cherry and fig trees) (figure 6). In S. Luiz, traps 5 and 7, where the higher number of adults were found, were located near a water line stream (Figure 6). Negative correlations between *D. suzukii* captures (total, females and males) and percentage of "other crops" ($-0.669 < r < -0.500$, $p < 0.05$) were found in all buffers. On the other hand, captures (total and females) were positively correlated with the percentage of woodlands and scrublands ($0.481 < r < 0.651$, $p < 0.05$). No *D. suzukii* infestations in grapes were found in any of the farms.

Table 1 Abundance and richness of Drosophilidae, and abundance, relative percentage and sexual ratio (F/M) of *Drosophila suzukii*

		Quinta do Vallado		Quinta de S. Luiz	
		Females	Males	Females	Males
Drosophilidae	N	813	494	927	695
	S	7	7	7	7
<i>Drosophila suzukii</i>	N	416	262	682	466
	%	61,4	38,6	59,4	40,6
SR (F/M)		1,6		1,5	



Figure 4 *Drosophila suzukii* adults

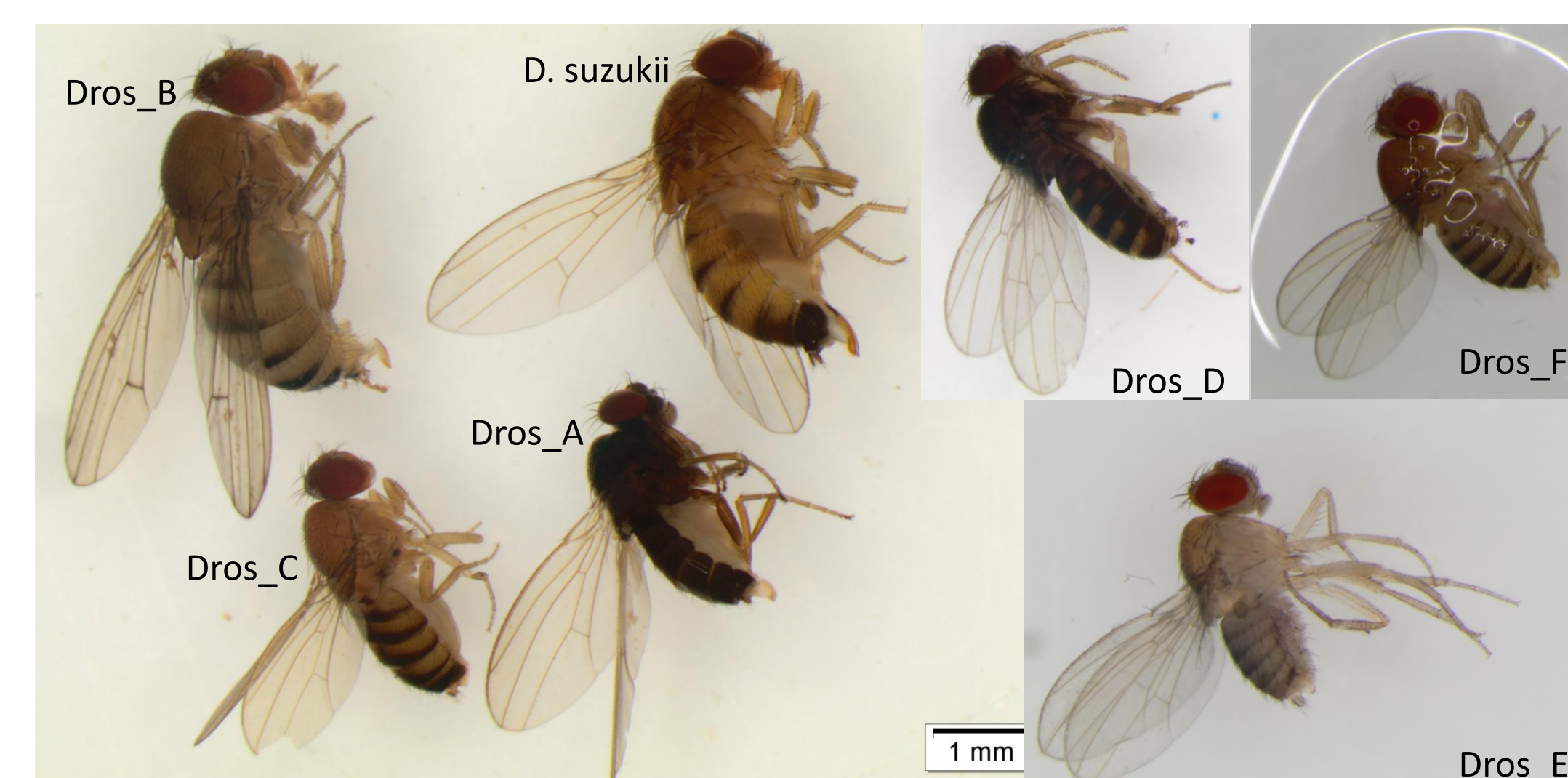


Figure 3 Morphospecies of Drosophilidae females collected. Note the strong and sclerotized ovipositor of *D. suzukii* females compared to other females in the same family

CONCLUSION This study shows that *D. suzukii* is already present in the vineyard agroecosystem of DDR, although no damage in grapes was observed. This is the first occurrence report of this invasive species in this ecosystem, and should motivate further surveys since, although initially had been indicated as a minor problem to grapes, in some wine regions, depending on the climatic conditions, important levels of infestation has been observed.

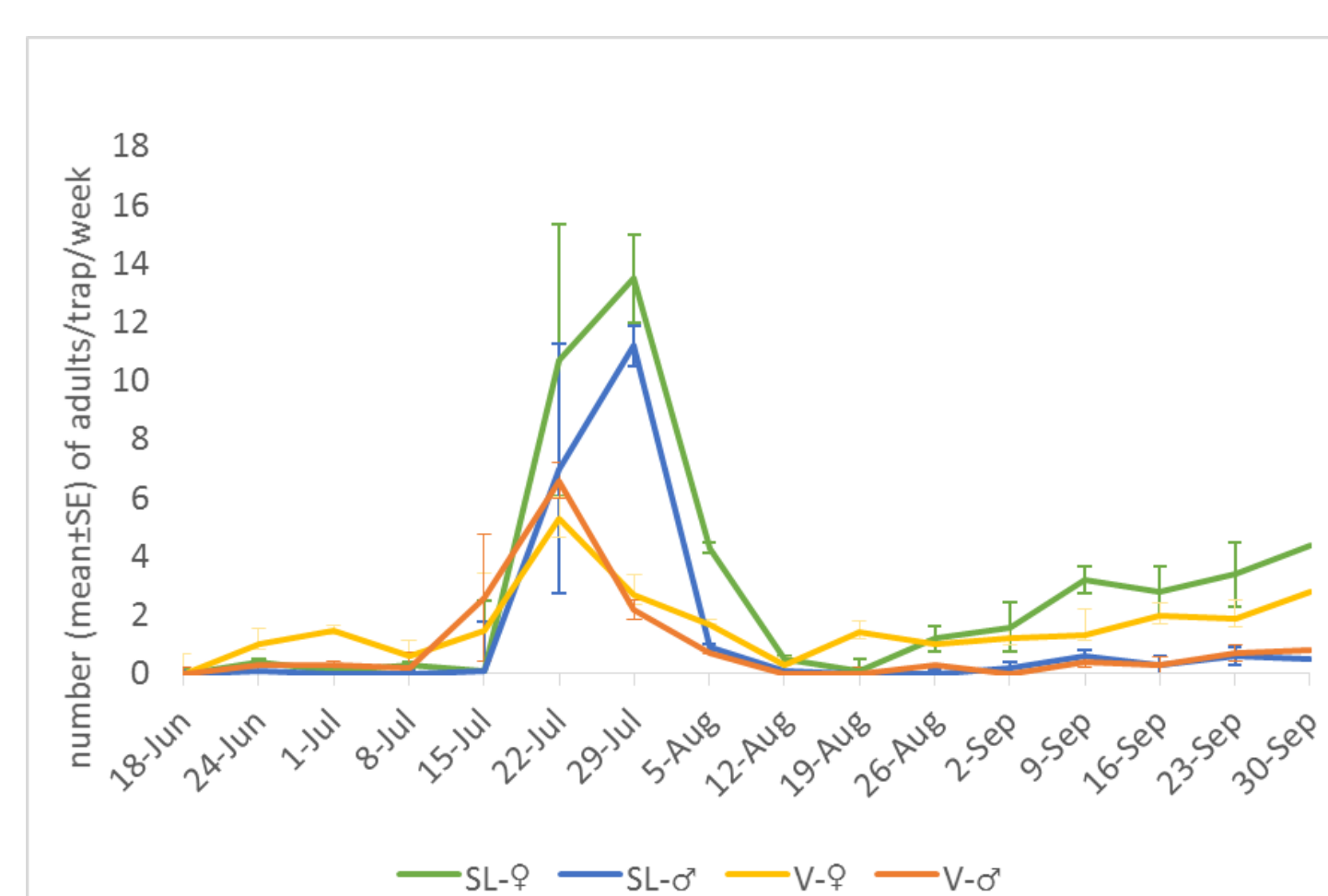


Figure 5 *Drosophila suzukii* flight curve in the studied vineyards

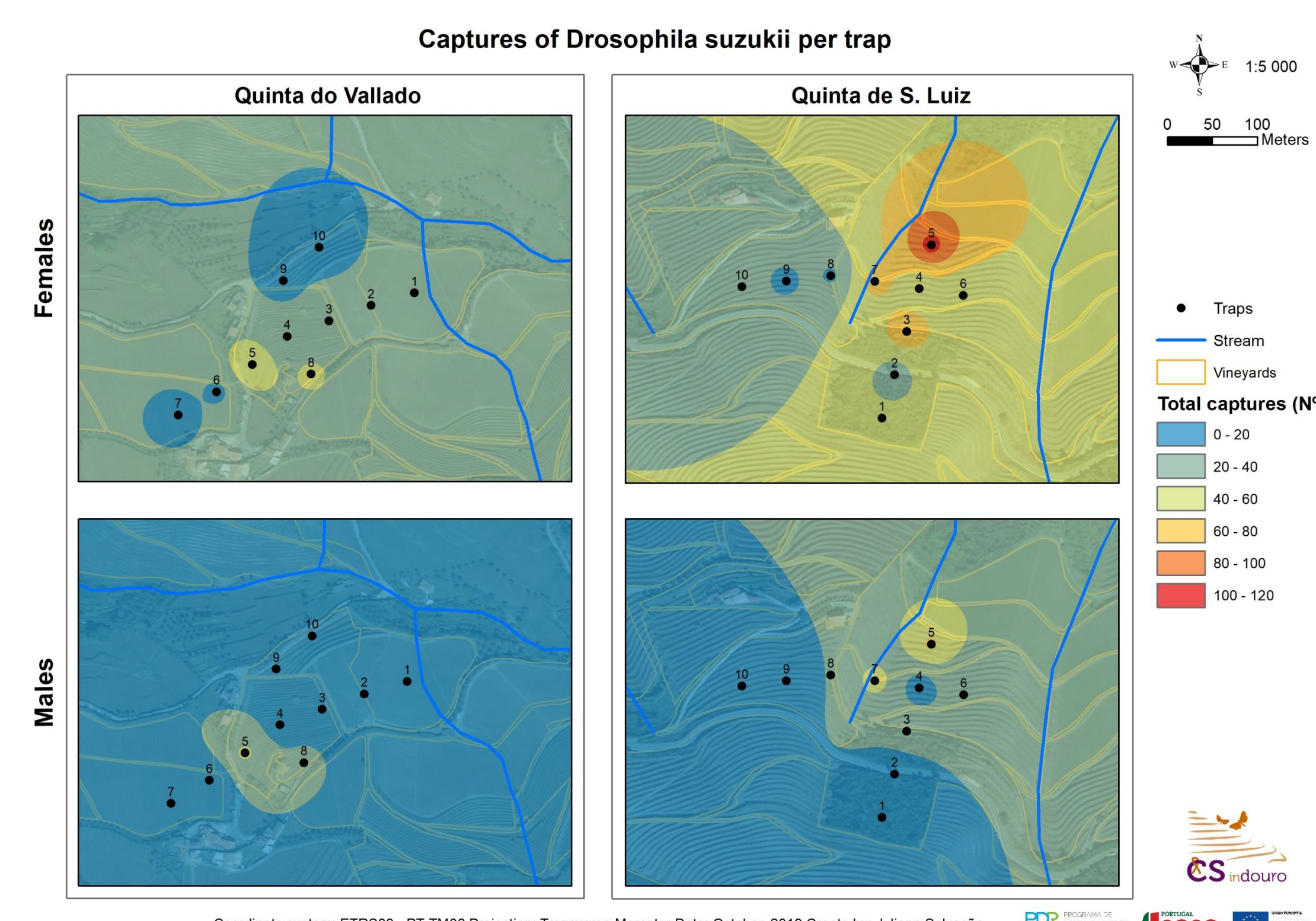


Figure 6 IDW results for the total number of *Drosophila suzukii* (males and females) collected