

The Asian tiger mosquito again in Sardinia

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Abstract

Aedes (Stegomyia) albopictus (Skuse, 1894) (Diptera Culicidae), the Asian tiger mosquito, was detected in Cagliari, in the South of Sardinia, in 1994-95, but the prompt intervention of the local public health agency achieved the eradication of the introduced population. In autumn 2006, the Asian tiger mosquito has been detected again on the island. It is present in two important port cities, Cagliari in the South and Olbia in the North-East. In the latter location, *Ae. albopictus* seems to have reached a high population density in contrast to the south of the region where the climatic conditions are not so favourable for this species.

Key words: *Aedes albopictus*, vector mosquitoes, invasive species, Italian distribution, Mediterranean.

Introduction

Aedes (Stegomyia) albopictus (Skuse, 1894) (Diptera Culicidae), commonly referred to as the Asian tiger mosquito, is a vector mosquito, which has spread from its original areas in Asia to the rest of the world through shipments of used tires. For information about the biology refer to Hawley (1988) and for the specific Italian situation to Toma *et al.* (2003) and Romi *et al.* (2006).

Australia is the only continent where it is still absent (updated to 2005). There, in fact, efficient quarantine and inspection measures have enabled them to detect and immediately eradicate any introductions. On the other hand, it is worth noting that many detection reports of *Ae. albopictus* have not been followed by its establishment. Therefore, even if the Asian tiger mosquito has been detected in Europe, in France, Belgium, Montenegro and maybe Hungary, it has certainly only established itself in Albania and Italy (Eritja *et al.*, 2005).

The first record of *Ae. albopictus* in Italy was in the city of Genoa (Sabatini *et al.*, 1990), followed a year later in Padua (Dalla Pozza and Majori, 1992). The colonization to Padua was caused by the arrival of one or more loads of infested tires from Atlanta, USA (Dalla Pozza *et al.*, 1994), and in fact all the Italian populations show a high genetic affinity to those from the United States and Japan. Probably the rapid spread of *Ae. albopictus* in Italy is also a result of several successive introductions, each with large numbers of individuals (Urbanelli *et al.*, 2000).

The Asian tiger mosquito in Italy spread first in the Po Valley (especially in the North-East sector), it then continued in the direction of Bologna and then Florence, to the centre of Italy, colonising the Tirrenian coast first (Knudsen *et al.*, 1996; Romi, 2001), then the Adriatic coast and finally entering Southern Italy and Sicily (Liotta and Matranga, 2004; Romi, 2005).

Presence in Sardinia: the past

Ae. albopictus was recorded for the first time in Sardinia in 1994 (Romi, 1995), so it was considered as a species present on the island in the 'Checklist of the Italian

fauna' (Boorman *et al.*, 1995). In particular, the Asian tiger mosquito was found between October 1994 and September 1995, always at the same tire dealers in the suburbs of Cagliari Elmas, in the South of Sardinia (Nuvoli and Pantaleoni, 2003).

The immediate action taken by the local public health agency to disinfest the area probably achieved the eradication of the population. Continuous screening of the region, carried out between 1995 and 2000, did not reveal the presence of any Asian tiger mosquito on the island (Nuvoli and Pantaleoni, 2003). So *Ae. albopictus* was thought to have been eradicated from Sardinia only a few years after its first record (Romi *et al.*, 1999).

Presence in Sardinia: news

At the beginning of October 2006, news appeared in local newspapers, which was confirmed by a press release from the local public health agency ASL 8 (online URL: [http://88.35.250.75/pdf/com_stamp/4 ottobre 2006 - Zanzara tigre.pdf]), of the presence of *Ae. albopictus* at the Botanic Gardens of the University of Cagliari. According to Carlo Contini (personal communication), the Asian tiger mosquito is diffuse in various locations in the south of Sardinia at a low population density, and that its presence probably dates from 2-3 years ago (Contini, in press).

During the summer of 2006, the first author detected the presence of the Asian tiger mosquito in Olbia, a port city in North-East Sardinia, notifying the local press before the end of October 2006. Some days before, between the 15th and the 19th of the same month, he had carried out a preliminary screening for adult female *Ae. albopictus* in the four quadrants of the city. The sampling method by human bait catch was extremely simple with the capture of all the females he attracted in the space of an hour in the public gardens just before sunset. The results (North quadrant 24 specimens, East 29, South 21, West 15), although absolutely preliminary, show a population density high enough to cause persistent disturbance to residents.

Conclusions

Nuvoli and Pantaleoni (2003) easily turned out to be prophets when concluding their report on five years of screening as follows: "There is always a possibility that the Asian tiger mosquito will return to this region in the future. This is a real danger which is difficult to face as far as prevention is concerned." Today *Ae. albopictus* has reappeared in Sardinia and it seems to have established itself permanently.

It is not surprising that the cities where this new invasion has taken place are Cagliari and Olbia. The regional capital, Cagliari, is the most important commercial port on the island, with some tens of millions of tons of cargo moved annually (source: Cagliari Port Authority - online URL: [http://www.porto.cagliari.it]; years 2004-05). Olbia, on the other hand, is one of the main passenger (and vehicle) ferry ports in the Mediterranean with several millions of passengers per year (source: Olbia and Golfo Aranci Port Authority - online URL: [http://www.porto.olbiagolfoaranci.it]; years 2004-05). It seems clear how such an intense traffic of cargo and vehicles can facilitate the arrival of a species which spread all over the world thanks precisely to the international trading.

However, the infestation of the two cities seems to be different. In Cagliari, *Ae. albopictus* has not reached a population density that can be clearly perceived by residents. Perhaps the climatic conditions are not suitable enough to allow a marked increase in the number of Asian tiger mosquitoes. It is likely that the species only stays in a limited number of habitats where favourable micro-climatic conditions are maintained by the action of humans. We must remember that Eritja *et al.* (2005) hypothesize that the suitable areas for *Ae. albopictus* must have: i) more than 500 mm mean rainfall per year; ii) more than 60 rainy days (0.1 mm rainfall minimum each) per year; iii) mean yearly temperatures higher than 11 °C. Cagliari's climate fully satisfies the temperature requirements, it is at the limit for the number of rainy days per year, but it registers only 433 mm mean rainfall per year (Arrigoni, 1968).

On the contrary, in Olbia infestation seems to have already reached quite high levels which are even perceivable by residents. In Olbia, the climatic conditions with 662 mm mean rainfall per year (Arrigoni, 1968) are more favourable to *Ae. albopictus*. The fact that the town is near the rich tourist resorts of the Costa Smeralda where there are myriads of micro-habitats suitable for the development of the Asian tiger mosquito is a cause for concern. The establishment of the vector in this important regional territory will cause serious problems for the tourist industry.

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