

OLIVE FRUIT FLY: A threat to the South African olive industry?

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Olive fruit fly (*Bactrocera oleae*) is the most serious pest of cultivated olives in the Mediterranean basin. To date we have not seen the same level of damage in South Africa, but the question remained whether it poses a similar threat as the local olive industry expands.

Dr Christian Giacalone from Palermo University in Sicily (Italy), in collaboration with Prof. Virgilio Caleca (Palermo University) and ARC Infruitec-Nietvoorbij, conducted a study to compare olive fruit fly (OFF) infestation in the Western Cape and Sicily. During the 2008/2009 and 2009/2010 seasons, OFF infestation in olives collected from untreated commercial olive groves in Somerset West and Franschhoek in the Western Cape were compared to infestation in untreated olives in the Trapani province of Sicily, a coastal area usually heavily infested.

Olives collected in March and April in the Western Cape had an average OFF infestation level of 2.7% in 2009 and 4.5% in 2010. With the exception of one sampling site, OFF infestation never exceeded the 15% action threshold adopted in the Mediterranean areas. In Sicily the average OFF infestation did not exceed the action threshold in 2008, but in 2009 the average OFF infestation exceeded 15% by mid-September and in 2010 it exceeded 15% as early as the second week of August. The levels of OFF infestation in the Western Cape were clearly much lower than in Sicily.

What limits OFF infestation in the Western Cape?

It has been suggested that parasitoids found in wild olives in South Africa are keeping OFF populations from reaching economic damaging levels in cultivated olives. Four parasitoids of OFF have been recovered from wild as well as cultivated olives in the West-

ern Cape, namely *Utetes africanus*, *Psytalia lounsburyi*, *Bracon celer* and *Psytalia humilis*. The level of larval parasitism in wild olives collected in the Western Cape during this study was 27%, compared to 48% in Trapani province, Sicily. The parasitism rate of OFF larvae in cultivated olives sampled in the Western Cape was 6%, compared to 16% in Sicily. The higher rate of parasitism in wild olives is mainly ascribed to the fact that the specialized parasitoids find it more difficult to reach OFF larvae in the dense, thick pulp of cultivated olives than in wild olives. These findings indicate that indigenous OFF parasitoids are not the primary limiting factor of OFF in the Western Cape.

The other possible limiting factor is climate. Olive fruit fly females lay eggs during dusk and early evening, but only when conditions are suitable, namely olives with a hardened pit must be available, temperature must be at least 16-17°C and relative humidity >40%. Under hot, dry summer conditions (temperatures above 30°C and relative humidity 20-40%) OFF females enter a summer reproductive diapause, absorbing the ovarian follicles and eggs. This diapause is broken when temperatures drop and relative humidity increases. For this reason sampling adult OFF early in the growing season is not a reliable indicator of expected fruit infestation and thresholds based on these counts tend to result in excessive and unnecessary insecticide treatments. Female fruit flies need to feed on juice from the developing olive fruit for their ovaries to

mature. They puncture the skin of the olive with the ovipositor and suck the juice from



Figure 1. Olive fruit fly female sucking a droplet of juice from a puncture wound in olive (PICTURE FROM [HTTP://NATURE.BERKELEY.EDU](http://nature.berkeley.edu)).



Figure 2. Puncture wound by ovipositor of Olive fruit fly female.

the wound (Fig. 1). These shallow, sterile or fertile punctures by the female's ovipositor close rapidly without allowing microorganisms to penetrate and degrade the olive pulp



Figure 3. Exit holes of fully grown olive fruit fly larvae with residues of the fruit cuticle clearly visible.



Figure 4. Exit hole of olive seed wasp with well-defined edge (no residues of fruit cuticle).

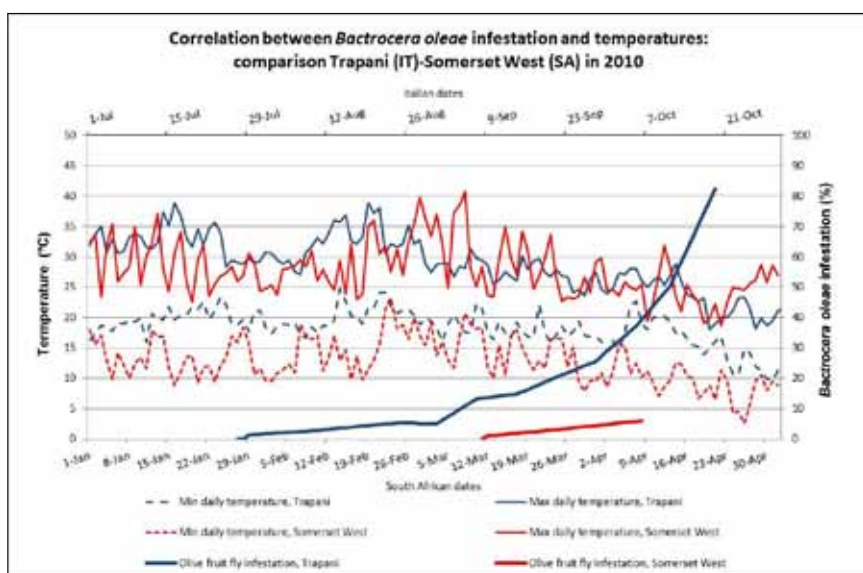


Figure 5. Daily maximum and minimum temperature during the olive growing season at Somerset West and Trapani trial sites in 2010 with average olive fruit fly infestation level at each site.

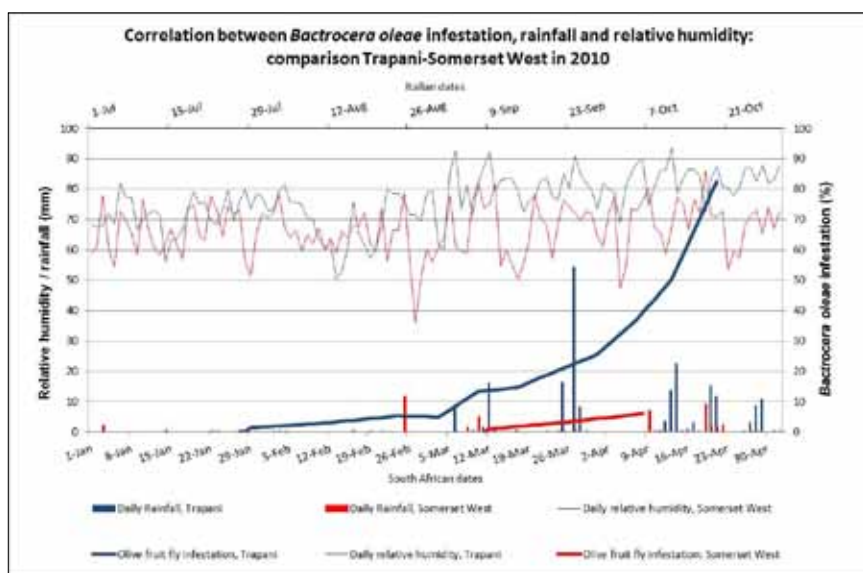


Figure 6. Daily relative humidity and rainfall during the olive growing season at Somerset West and Trapani trial sites in 2010 with average olive fruit fly infestation level at each site.

(Fig. 2). Even in table olives these small punctures become invisible during processing. However, the exit holes made by fully developed OFF larvae are large enough to allow the penetration of oxygen and microorganisms that can degrade the pulp and its oil content (Fig.3). These holes should not be confused with the smaller exit holes of olive seed wasps (Fig. 4), which have very well-defined edges and a short tunnel below, coming straight from the kernel. Seed wasps are native to South Africa and so far are unique to its olive growing area.

An analysis of the climate over four years (2007-2010) showed a higher diurnal temperature variation in Western Cape sites, particularly a lower minimum temperature at night, and a quite stable climate at the end of summer and beginning of autumn. In Trapani, Sicily (Italy), an increase in relative humidity and cooler temperatures towards the end of summer favour an increase in OFF infestation. For example, comparing the weather data for 2010 in Trapani and Somerset West, it is evident that the daily minimum temperature in Somerset West is consistently lower than in Trapani (Fig. 5), and that the relative humidity does not increase towards the end of summer and beginning of autumn as it does in Sicily (Fig. 6). The more favourable conditions for OFF in Trapani is reflected in the very high level of OFF infestation compared to infestation in Somerset West.

From this study it is clear that the climatic conditions during the period preceding harvest are unfavourable for rapid population growth of OFF in the Western Cape, in contrast to conditions in the coastal area of Trapani province in Sicily. Climate, and not parasitism, appears to be the main factor limiting OFF population levels in the Western Cape. While sporadic outbreaks of economically damaging OFF infestations can be expected in areas where the climatic conditions during a particular season or part of a season are favourable for OFF, the generally unfavourable climatic conditions mean that OFF is not expected to pose a similar threat to olive production in the Western Cape as it does in the Mediterranean basin.