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FIRST RECORD OF THE YELLOW SUGARCANE APHID *SIPHA FLAVA* (FORBES) (HEMIPTERA APHIDIDAE) IN THE EUROPEAN CONTINENT

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Hernández-Castellano C., Pérez Hidalgo N. – First record of the yellow sugarcane aphid *Sipha flava* (Forbes) (Hemiptera Aphididae) in the European continent.

The yellow sugarcane aphid *Sipha flava* (Forbes) is recorded for the first time in the Iberian Peninsula and also in the European continent, on the common thatching grass *Hyparrhenia hirta* (L.) Stapf in Oliver, in two localities of Catalonia (La Selva del Camp and Blanes, provinces of Tarragona and Girona, respectively; NE Spain). Data on its biology and distribution worldwide and notes on its pest behaviour are given. *Sipha flava* had been recorded previously from Azores Islands (in 1979), and recently from Morocco (in 2008).

KEY WORDS: *Sipha flava,* yellow sugarcane aphid, alien species, pest, European continent

INTRODUCTION

The genus *Sipha* Passerini gathers twelve species (WIECZOREK, 2010). Four of them in the subgenus *Sipha* (two are Nearctic and the other two Palaearctic) and eight in the subgenus *Rungsia*. The species of this genus are characterized by composite eyes (non-pedunculated), ultimate rostral segment short and triangular, five-segmented antennae and stump-shaped or cylindrical and slightly elevated siphunculi, placed on the fifth abdominal segment. The length of body is at most twice its width, and the apterous are well sclerotized and highly pigmented, with spiny setae and rounded anal plate (BLACKMAN & EASTOP, 2006; WIECZOREK, 2010). All the species are monoecious and holocyclic, and live on Poaceae, although some species can develop on Cyperaceae or Juncaceae.

In Europe 10 species of this genus have been recorded (HOLMAN, 2009; WIECZOREK, 2010; NIETO NAFRÍA *et al.,* 2013): 3 in the subgenus *Sipha* and 7 in the subgenus *Rungsia*. In the Iberian Peninsula three of them were recorded (NIETO NAFRÍA & MIER DURANTE, 1998): *Sipha* (*S.*) *glyceriae* Kaltenbach, *Sipha* (*Rungsia*) *elegans* Del Guercio and *Sipha* (*Rungsia*) *maydis* Passerini.

We found four colonies of *Sipha* on four different plants of the common thatching grass *Hyparrhenia hirta* (L.) Stapf in Oliver (Fig. I, 1) in an organic citrus grove located in La Selva del Camp (Tarragona, NE Spain 41°13'07"N, 01°08'35"E) during a sampling campaign (17th June, 2014) in the context of a scientific project about arthropod trophic webs, and two colonies on the same host-plant in Blanes (Gerona 41°40'40"N, 2°48'22"E) on 28th June, 2014. The colonies of aphids were attended by the ants *Pheidole pallidula* Nylander and *Plagiolepis pygmaea* Latreille in La Selva del Camp and Blanes, respectively.

The samples have apterous and alatae females and were prepared and measured so as to confirm the identification of the aphid species. The slides are deposited in the aphidological collection of the University of León (Spain) with the reference T-7 (sample from La Selva del Camp) and GE-30 (sample from Blanes), and both the host plant and the associated ants are in the collection of the Autonomous University of Barcelona.

THE APHID SPECIES

The identification of the samples by the keys of BLACKMAN & EASTOP (2006) and WIECZOREK (2010) allowed us, without doubts, to confirm the presence of *Sipha* (*S.*) *flava* (Forbes, 1884) for the first time in the Iberian Peninsula and therefore in the European continent.

The apterous of *Sipha flava* are straw to bright yellow (Fig. I, 2) or green at low temperatures (BLACKMAN & EASTOP, 2006), have knobbed cauda, numerous dorsal thorn-like hairs (Fig. II, 1) arranged in 3 rows, antennae of 0.84-1.06 mm long (0.45-0.54 times body length) and long terminal process (1.8-2.6 times the base) in the antennal segment VI. The alatae (Fig. II, 2) are similar to the apterous but with abdominal sclerites and antennal segment III with 5 or 6 secondary sensoria. WIECZOREK (2010) gives a very good descriptions and illustrations of all the forms.

BIOLOGY

Sipha flava is an holocyclic monoecious species (with apterous males) in regions with cold winters, but anholocyclic in warmer climates (BLACKMAN & EASTOP, 2006). During the growing season all individuals are parthenogenetic females (winged or wingless) (HALBERT *et al.,* 2013). It is an oligophagous species that has been

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Fig. I – 1, *Hyparrhenia hirta* (L.) Stapf in Oliver in the organic citrus grove located in La Selva del Camp (Tarragona, NE Spain). 2, colony (yellow) of *Sipha flava* (Forbes) on it; dark specimen corresponding to *Sipha* (*Rungsia*) *maydis*.

recorded on around 62 species of Poaceae in several genera: *Andropogon*, *Anoxopus*, *Avena*, *Bouteloua*, *Brachiaria*, *Cenchrus*, *Chloris*, *Cortaderia*, *Cymbopogon*, *Cynodon*, *Dactylis*, *Digitaria*, *Echinochloa*, *Eleusine*, *Eragostris*, *Erichloa*, *Eulalia*, *Festuca*, *Holcus*, *Hordeum*, *Hyparrhenia*, *Lolium*, *Melinis*, *Miscanthus*, *Oryza*, *Panicum*, *Paspalum*, *Pennisetum*, *Phalaris*, *Phleum*, *Poa*, *Rhynchelytrum*, *Saccharum*, *Setaria*, *Sorghastrum*, *Sorghum*, *Sporobolus*, *Stenotaphrum*, *Tricholaena*, *Triticum* and *Zea*. It has also been recorded on Cyperaceae (*Carex* and *Cyperus*) (BLACKMAN & EASTOP, 2006; WIECZOREK, 2010) and Commelinaceae (KINDLER & DALRYMPLE, 1999). This is the first record of *Sipha flava* on *Hyparrhenia hirta*. It is also the first record of an aphid on a plant of this genus in the Iberian Peninsula and in the Palaearctic Region (see NIETO NAFRÍA *et al.,* 1984; NIETO NAFRÍA & MIER DURANTE, 1998; NIETO NAFRÍA *et al.,* 2003; NIETO NAFRÍA *et al.,* 2005; HOLMAN, 2009).

Sipha flava settles on leaf blades, often forming large colonies (BLACKMAN & EASTOP, 2006). We found the aphid colonies on the underside of the lower leaves of *Hyparrhenia hirta* (Fig. I, 2), but eventually the aphids were found on the upper surface if the underside were highly occupied. In the colonies of La Selva del Camp we collected a mixed colony in which *Sipha* (*Rungsia*) *maydis* shared a considerable area with *S. flava*. This fact was also pointed out by NUESSLY (2005) with the aphid *Melanaphis sacchari* Zehntner on sugarcane (*Saccharum officinarum* L.) leaves. Although it was thought that *S. flava* is not attended by ants (BLACKMAN & EASTOP, 2006; WIECZOREK, 2010), however, BRADSHAW *et al.* (2010) found *Crematogaster cerasi* Fitch attending *S. flava* throughout Illinois (USA), and we confirm that *Pheidole pallidula* Nylander and *Plagiolepis pygmaea* Latreille were attending *S. flava* in La Selva del Camp and Blanes, respectively, in both cases in half of the colonies found. Nevertheless, such relations must be studied thoroughly as we also observed in La Selva del Camp several individuals of *Camponotus aethiops* Latreille and *Camponotus foreli* Emery in the surroundings attending *S. maydis* colonies or just foraging, but they could also have been attending non-located colonies of *S. flava*.

DISTRIBUTION

Sipha flava is thought to be originally a Nearctic species (native to North America), but it is also known from the Neotropical region (WIECZOREK, 2010). Therefore, it has become established in Central and South America, even in the Caribbean and the Hawaiian Islands (BLACKMAN & EASTOP, 2006; WIECZOREK, 2010), where it became a serious pest (KINDLER & DALRYMPLE, 1999). Moreover, it has also been recorded from Azores (SOUSA-SILVA & ILHARCO, 1995), and recently from Morocco (ABDELMAJID, 2008).

The first record of *S. flava* as an alien aphid in Europe was in the Azores islands (Portugal) in 1979 (SOUSA-SILVA & ILHARCO, 1995; COEUR D'ACIER *et al.,* 2010). Given that sugarcane (*Saccharum officinarum* L.) is one of the hosts, the expansion of this crop could favour the expansion of the aphid, and actually explains it (see ABDELMAJIB, 2008). Thus, the record of *S. flava* from the Iberian Peninsula demonstrates that the aphid can expand throughout the European continent and, in general, in the Palaearctic region.

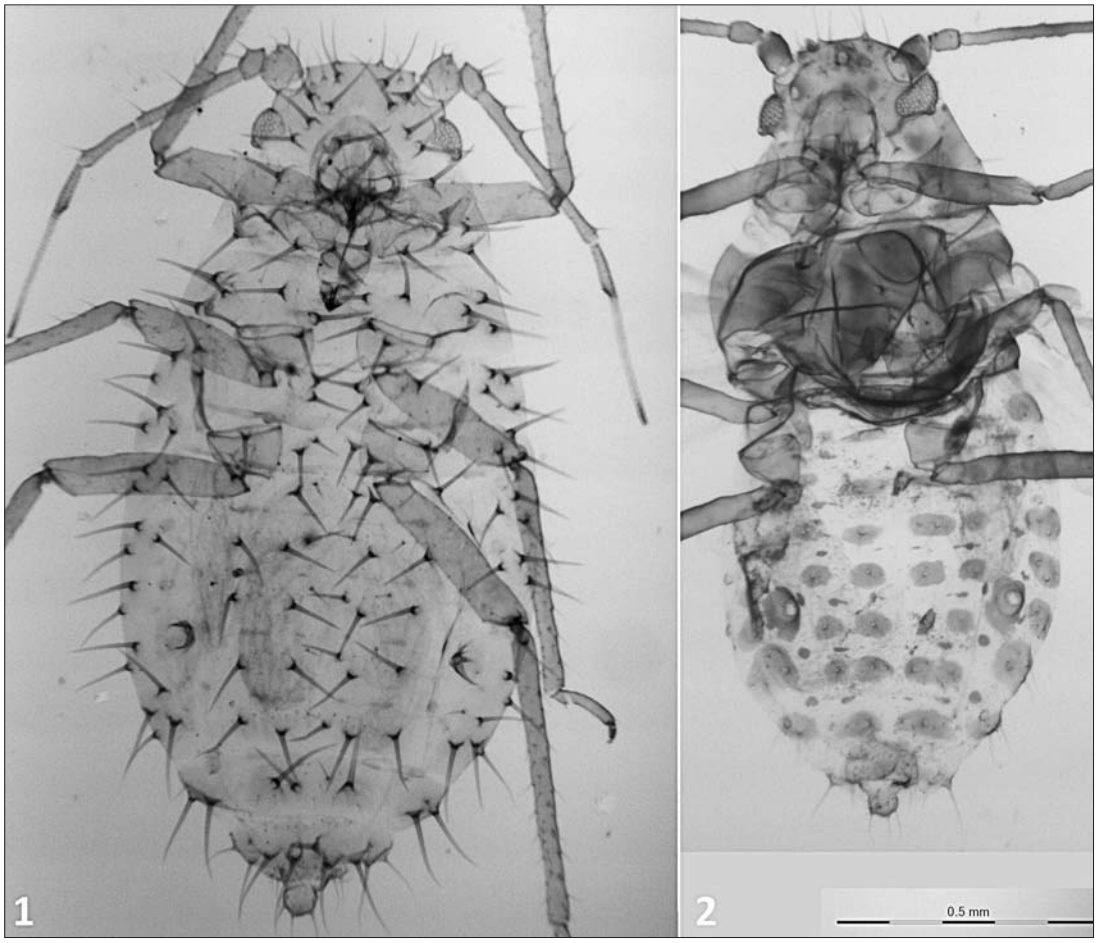

Fig. II - *Sipha flava* (Forbes):1, apterous female; 2, alate female.

DAMAGE TO THE HOST PLANTS AND BEHAVIOUR AS A PEST

Sipha flava is well known as the yellow sugarcane aphid. This aphid is an important pest of crops such as sugarcane (*Saccharum officinarum* L.), sorghum (*Sorghum* Moench) and several small grains and other pasture grass species (KINDLER & DALRYMPLE, 1999), although it can be found in other crops like corn (*Zea*) and rice (*Oryza*) (NUESSLY, 2005).

The honeydew excreted by the feeding aphids can lead to a sooty mould fungi growth (NUESSLY, 2005). The main symptoms in the infested plants are the appearance of circular chlorotic patches, followed by a general yellowing of the leaf blades, and finally a general drying that ends up in the plant dying (KINDLER & DALRYMPLE, 1999). Eventually in plants such as *Sorghum halepense* (L.) Pers. reddish spots on mature leaves can be found as a response of the plant to the aphid attack (COSTA-ARBULÚ *et al.,* 2001). Premature senescence of leaves, stalk or the whole plant can also occur, leading to a yield reduction (HALL, 2001) up to 19%, visible in the lost of the six lower leaves (where the aphid starts feeding) and in the sucrose decline in plant juice. Moreover, stalks become thinner and therefore are more likely to lodge from wind and rat damage (NUESSLY & HENTZ, 2002). This aphid can also transmit the sugarcane mosaic potyvirus (BLACKMAN & EASTOP, 2000), in addition to the causing of necrosis (VAN EMDEN & HARRINGTON, 2007). An increasing in temperature and torrential rains can reduce the aphid population, as well as an utilizing of resistant varieties and homologated insecticides (ABDELMAJID, 2008).

CONCLUSION

Although in Europe the sugarcane crop is rather marginal, *Sipha flava* may extend across the European continent through other Poaceae species, as has been demonstrated in the Iberian Peninsula. Moreover, in other Palaearctic regions like the Northern Africa, where the sugarcane crop is important and is experiencing a considerable growth (see FAO, 2014), the aphid may become a serious pest (ABDELMAJIB, 2008).

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