

Oviposition host plants of *Lestes macrostigma*: a preference for the sea-club rush *Bolboschoenus maritimus*?

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Across the breeding sites of *Lestes macrostigma* the relative abundance of plant species and their state (i.e. living or dead) of substrates within which females oviposit is variable. *Lestes macrostigma* has been observed to lay eggs within living and dead *Juncus maritimus*, dead *J. acutus* and *Phragmites australis*, *Schoenoplectus lacustris*, dead *Tamarix gallica* and living *Carex stenophylla*, yet oviposition has been most often reported within *Bolboschoenus maritimus*. In the present contribution, we aimed at testing a preference for *B. maritimus* in the field and in a laboratory experiment.

Lestes macrostigma typically oviposits in tandem, within vertical stems and sprouts which the female protrudes with her cutting ovipositor. The oviposition site selection process begins with the “initial preference” which is assumed to be determined (1) by the male, who chooses the landing site, and (2) by the female, who chooses to bend the abdomen in order to examine the substrate with her ovipositor or to keep it straight until the pair flies to another substrate. The initial preference is then followed by (3) the choice of the ovipositor insertion site (OIS) by the female and finally by (4) the egg deposition, which can fail. During this last step, the female swings her abdomen laterally and moves continuously the valves of her ovipositor.

We studied *L. macrostigma* oviposition behaviour in the Marais du Vigueirat protected area (the Camargue, southern France) in 2011 and 2012. For each combination of plant species and plant state we recorded: (1) the frequency of tandem landings relative to the available sprouts, (2) the frequency of female initial abdomen bending per landing, (3) the frequency of sprouts where the deposition of at least one egg was observed, (4) the egg deposition success i.e. the frequency of OIS where an egg was deposited, (5) the duration and the number of abdominal swings required to deposit one egg, and (6) the egg

deposition rate i.e. the number of laid eggs within a sprout divided by the duration of stay on this sprout. Additionally, the anatomy and stiffness of living sprouts of different plant species were studied in the laboratory.

Based on the observation of 84 initial landings, we found that males had a preference for *B. maritimus* and dead *J. maritimus* but disfavoured living *J. maritimus*. Based on the observation of 38 females landing on 1,152 sprouts and 2,996 OIS we found that: (1) females bended more frequently their abdomen to examine *B. maritimus* and dead *J. acutus* sprouts, (2) sprout fitting frequency was the highest in *B. maritimus*, (3) egg deposition success was the lowest in *B. maritimus*, (4) duration and number of abdominal swings required to deposit one egg were the lowest in *B. maritimus*. Egg deposition rate was the highest in dead *J. maritimus* and then in *B. maritimus*, suggesting a preference for these oviposition substrates by *L. macrostigma*.

The plant anatomy study revealed that in *B. maritimus*, in contrast to the other living plant substrates, the waxy cuticle is rather weak and the supporting tissues are separated by several air channels and parenchyma. Further, among living plant substrates where oviposition was observed in the field, the stiffness of *B. maritimus* was the lowest. This may explain the performance of females in *B. maritimus* during oviposition and the reason for the substrate preference by *L. macrostigma*.