

## Sexuales of Aphids (Insecta, Hemiptera, Aphididae) – An Alternative Target in the Pest Control

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The known world fauna of aphids (Insecta, Hemiptera, Aphididae) recently reached a total of 5000 species, placed in 510 currently accepted genera and recorded from about 300 plant families [1,2]. Aphids are also one of the most dangerous groups of pests on cultivated plants in the temperate regions. They can cause the weakening and distortion of host plants, decreased growth rates, because they secrete a large amount of honeydew, which results in a complete inhibition of growth and they also transfer plant viruses. The unique strategy of these hemipterans is to adapt to the life cycle of the seasonal changes in host plants—mainly to avoid adverse trophic conditions in the middle of summer. These strategies include a higher fertility rate in the spring and autumn that is reduced in the summer of monoecious species, a change in the host plants in heteroecious species, shortening of the life cycle, feeding on different parts of the host plant or in galls [3].

The fight against aphids is difficult due to the very high female fertility, the presence of many generations in one season, wintering in the form of eggs on stems near the bud, intraspecific variation, the ability of the winged migration of individuals, the way in which foraging affects the physiology of the plants infested and the observed lack of susceptibility to some insecticides [4-6]. Knowledge about the aphid reproductive strategy, i.e. apomictic parthenogenesis (clonal or asexual reproduction) which switched on to sexual reproduction (sexuales: oviparous females and males), is the basis for developing effective ways to prevent and combat these pests and the diseases transmitted by viruses. Asexual viviparous reproduction with a stem mother as the first viviparous generation ensures a high population increase during the growing season, and natural selection gives the fittest genotypes a considerable demographic advantage due to sustained clonality. Oviparous sexual reproduction, on the other hand, leads to the production of genetically recombined individuals, i.e. cold-resistant forms of the eggs, which allows aphid populations to resist

harsh winters and to produce an array of new genotypic combinations each year [7].

Therefore, sexuales, which are the least known, seem to be the key morphs in the life cycle of aphids. The lack of basic information on the reproductive system of oviparous females and male aphids is a significant gap in the biology of these hemipterans, especially in comparison with advanced research on the genome of these insects. The future studies should focus on the examination of the structures of the reproductive system in these key morphs. A better understanding of the reproductive strategy of aphids will contribute to the development of effective ways of protecting plants in the context of the Directive 128/2009 of the European Parliament and of the Council of Europe and the principles of the Integrated Pest Management (IPM) as well as the global need of food security [8].

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