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Preliminary results on phylogenetic relatedness of potential and known Auchenorrhyncha vectors of phytoplasmas

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Phytoplasmas are a group of cell wall-less bacteria with small genome sizes (530 - 2220 kb) belonging to the class Mollicutes, and they are obligate parasites of plant phloem tissue. Phytoplasma vectors are Hemiptera (Insecta) belonging to the suborders Cicadomorpha (leafhoppers) and Fulgoromorpha (planthoppers) and the family Psyllidae (psyllids) in the suborder Sternorrhyncha. In Cicadomorpha, the superfamily Membracoidea itself contains the largest number of known vector species (Nielson 1979, Weintraub & Beanland 2006). Despite their economic importance, there are surprisingly many gaps in the knowledge on the phylogeny, taxonomy, life history and biology of leafhoppers and planthoppers. Previous authors advocated the use of phylogenetic analyses to make predictions concerning pest species (Dietrich 2013), because phylogenetic conservatism in certain behavioural traits, and consequent predictability of their expression, may elucidate the evolution of vectoring ability. However, phylogenetic relationships among lower taxa of Auchenorrhyncha remain largely unexplored.

This preliminary study reviews the a state of the art of research on known and potential vectors of phytoplasmas recorded until now, highlighting the phylogenetic relatedness among species reported in the literature.

In the context of two parallel projects (USA - Europe), an international collaboration has been undertaken to investigate the traits (genetic, ecological and morphological distinctness) associated with vector competence. Goals of these projects include compiling a database comprising all known records of phytoplasma–Auchenorrhyncha associations and associated ecological data, screening genomes to identify genetic traits associated with vector capacity, and constructing detailed phylogenies of major groups of Auchenorrhyncha vectors using molecular data.

References

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