Influence of the symbiont Wolbachia on life history traits of the cabbage root fly (Delia radicum)

Valérie Lopez*[1], Anne Marie Cortesero[1], and Denis Poinsot*[1]

[1]Institut de Génétique, Environnement et Protection des Plantes (IGEPP) – Universite de Rennes 1 : UMR1349 – Campus Beaulieu - Bât. 25 - 4ème étage - 263, avenue du Général Leclerc - 35042 Rennes Cedex, France

Abstract

Wolbachia is an endocellular bacteria infecting arthropods and nematodes and only transmitted vertically by females via the cytoplasm of the egg. It is often a manipulator of host reproduction, causing cytoplasmic incompatibility, thelytokous parthenogenesis, feminisation or male killing, which all increase the proportion of infected females in the population. However, *Wolbachia* can modify life history traits of the host without causing the above phenotypes and each species illustrates the variability of relationships between this remarkably versatile symbiont and its many hosts. We have measured maternal transmission and the impact of a natural *Wolbachia* infection in the cabbage root fly *Delia radicum*, a major agricultural pest. We used a population that is polymorphic for the infection to ensure identical genetic and microbiome backgrounds. Maternal transmission of the infection was 100% in our sample (n = 707 offspring of 70 females assayed by PCR). We found no evidence of cytoplasmic incompatibility, thelytokous parthenogenesis, feminisation nor male killing. *Wolbachia* infection significantly reduced hatch rate in infected eggs (by 10%) but improved larvo-nymphal viability sufficiently so that infected eggs yielded 5% more adults as uninfected ones in our sample (the difference is NS), albeit with a 1.5% longer total development time. Starved females laying eggs suffered a significantly reduced viability (–20%) when infected, but this effect was not found in starved virgin females nor in starved males, suggesting that the energetic cost of the infection is only revealed in extreme conditions. *Wolbachia* had no effect on egg hatch time or offspring size. The perfect vertical transmission and the significant but mutually compensating effects found suggest that this infection might be close to neutral for the host and might only drift slowly, which would explain why the infection rate has been stable in our laboratory (approx. 50% individuals infected) for at least 30 generations.

*Speaker