

## ABSTRACT

*Wolbachia*, is a maternally transmitted endosymbiont that is capable of manipulating host's reproductive biology and can be used to control the disease vector population. *Wolbachia* induced population suppression is due to cytoplasmic incompatibility (CI) induced when *Wolbachia* infected males mate with the uninfected females resulting non-viable progeny. The main objective of the current study was to evaluate the *wAlbB* *Wolbachia* potential to suppress the wild population of *Aedes aegypti* when *Wolbachia* infected males were released in variable ratios under semi-field conditions. Wild population of major dengue vector *Ae. aegypti* varies under natural conditions and release of *Wolbachia* infected males needs to be evaluated in particular ratios to suppress maximum population of mosquitoes. For this purpose, experiments were conducted in two phases, in phase 1 keeping constant wild female population ( $cL_{\text{♀}}$ ) variable ratios of *Wolbachia* infected ( $wcL_{\text{♂}}$ ) and non-infected males ( $cL_{\text{♂}}$ ) were released ( $cL_{\text{♂}}: wcL_{\text{♂}}$  as 70:30, 50:50, 30:70) in semi-field conditions. In phase 2 experiment keeping wild population of male and females constant, various ratios of *Wolbachia* infected males were released ( $cL_{\text{♀}}: cL_{\text{♂}}: wcL_{\text{♂}}$  as 1:1:1, 1:1:3, 1:1:5, 1:1:10) to evaluate the best release ratio for effective population suppression. The results indicated that *wAlbB* strain of *Wolbachia* does not affect fecundity or egg laying capacity/female. However, the same strain of *Wolbachia* affects the female fertility (percent hatch rate) indicating inverse relationship with the population suppression of wild mosquitoes. In addition, *Wolbachia* induced population suppression increased with maximum number of *Wolbachia* infected males released ratio (30:70). However, the number of *Wolbachia* infected males beyond optimum release ratio (1:1:5) did not affect the degree of CI. The optimum release ratio coincides with the value of competitiveness index for the released *Wolbachia* infected males with already present wild males in nature. Highest value of competitiveness index (1.33) was obtained with optimum release ratio (1:1:5) as compared to the other ratios released under semi-field conditions. Moreover, the age of *Wolbachia* infected male mosquitoes was inversely proportional with *Wolbachia* induced population suppression indicating that the *Wolbachia* density may decrease with the age of male mosquitoes released in semi-field conditions. Therefore, the age of released males in wild population needs to be considered for population suppression. It is concluded that *wAlbB* *Wolbachia* strain has a great potential to suppress wild population of major dengue vector *Ae. aegypti* when released in 1:5 optimum ratio in nature. Further field trials are required with mass reared *Wolbachia* infected males in natural conditions of Pakistan.