Asian Journal of Agricultural Sciences
ISSN:

Differential Protein Contents in Two Members of the Whitefly *Bemisia tabaci* (Hemiptera: Aleurodidae) Complex: Reproductive and Invasive Implications

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Abstract: Although the displacement of some native whitefly species by the B biotype of *Bemisia tabaci* has been noted in China, it is still unclear which physiological and molecular mechanisms predominate during such invasions. Here, we investigated proteome variability in both B biotype and the native ZHJ1 haplotype. ZHJ1 eggs showed larger numbers of specific proteins than B eggs. A set of proteins found in B eggs were present at higher levels in ZHJ1. Three ZHJ1 egg proteins were present at higher levels in B eggs. ZHJ1 males possessed four specific proteins, and at least five other male proteins were shared by the two whiteflies. Two proteins identified in ZHJ1 males were present at higher levels in B males. Three other shared male proteins were found at much higher levels in ZHJ1 than in the B biotype. Both ZHJ1 and B expressed three specific female proteins. Most of the female proteins identified in ZHJ1 were present at much higher levels in B. In conclusion, protein content indexed by electrophoretic profiling has likely played an important role during the displacement of natives by the B biotype.

Key words: B biotype, *bemisia tabaci*, invasion, protein, ZHJ1 haplotype

INTRODUCTION

The whitefly *Bemisia tabaci* Gennadius is responsible for severe crop losses worldwide (Bleeker *et al*., 2009) through its feeding behaviour (Bedford *et al*., 1994a, b) and innate ability to transmit several viral diseases (Polston *et al*., 1999). In the 1990s, production was devastated in parts of East Africa following the spread of a pandemic of severe cassava mosaic virus disease by *B. tabaci* (Legg *et al*., 2003). In fact, this whitefly comprises a species complex (Brown *et al*., 1995), members of which vary markedly in biological traits (Perring, 2001). The invasive biotype B, for which several hypotheses regarding its invasive potential are currently under evaluation in many locations, has been studied in depth (Hsieh *et al*., 2007). Native to the Middle Eastern/North African region (De Barro and Khan, 2007), biotype B has become well established in most of the world's agricultural regions (Brown *et al*., 2000). Its high reproductive output has been shown to markedly influence its success in invasion (Brown *et al*., 2000). Once established, *B. tabaci* spreads quickly, and its establishment is often associated with a decline of indigenous populations, sometimes to local extinction (Lima *et al*., 2002; McKenzie *et al*., 2004).

In China, biotype B has displaced most resident whiteflies (Jiu *et al*., 2007), including the species studied here. This ability to outperform native whiteflies is a direct consequence of substantial biotype B embryo hatching success; the hatching of more eggs results in an increase in size of the larval population leading to large numbers of adults of both sexes and therefore to an increase in mating events. Male leaf-feeding insects must store sufficient lipids to secure as many matings as possible (Sibly *et al*., 1997), whereas females must accumulate nitrogen reserves for reproduction (Karlsson and Wickman, 1990). These physiological roles are due mainly to protein function, and the degree to which they vary is largely dependent on whole-body protein profiles. Female insects produce egg through vitellogenesis (Warr *et al*., 2004), a process during which yolk components are synthesised mainly by fat body cells (Hagedorn and Judson 1972; Oliveira *et al*., 2004) and later secreted into the haemolymph from which they are absorbed by the oocytes (Raikhel and Dhadialla, 1992; Seehuus *et al*., 2007). The yolk of insect eggs is principally composed of

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