



Exposure to watermelon bud necrosis virus and groundnut bud necrosis virus alters the life history traits of their vector, *Thrips palmi* (Thysanoptera: Thripidae)

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Abstract

Thrips palmi transmits the tospoviruses watermelon bud necrosis (WBNV) and groundnut bud necrosis virus (GBNV) in persistent propagative way. Little is known about the *T. palmi*-WBNV and -GBNV relationship. In this study, we report the effects of WBNV and GBNV infection on the life history traits of *T. palmi*. Both WBNV and GBNV had some negative effects on the adult life span, fecundity and survival of *T. palmi* as compared to non-exposed *T. palmi*. Tospovirus exposure favoured a female-biased ratio in the experimental population.

Introduction

Thrips-transmitted tospoviruses (family *Tospoviridae*, order *Bunyavirales*) present a major threat to agricultural production worldwide. To date, 16 thrips species have been reported to transmit 29 tospoviruses infecting over 800 plant species [1] [2] (<https://edis.ifas.ufl.edu/pdffiles/PP/PP13400.pdf>). Present understanding of the thrips-tospovirus relationship is largely based on the interaction of *Frankliniella occidentalis* (Thysanoptera: Thripidae) and tomato spotted wilt virus (TSWV). Tospoviruses are propagated in the body of the thrips and are transported through the midgut to the salivary gland. Virus transmission occurs exclusively through adult thrips, while virus acquisition takes place during the early larval stages [3, 4]. The effects of TSWV on *F. occidentalis* may be deleterious, neutral, or beneficial, depending on the virus isolate, thrips species, host plant, and environmental factors [5–9]. Few studies have been conducted on the effect of other predominant tospoviruses such as watermelon bud necrosis virus (WBNV) and groundnut bud necrosis virus

(GBNV) on their thrips vectors. GBNV is considered the most destructive tospovirus in vegetable and ornamental plants. It causes economic losses of US\$ 89 million annually in Asia, with 70–90% yield loss in groundnut and 29% in potato [10–13], while 20–100% yield loss has been recorded in watermelon due to WBNV infection [12]. WBNV and GBNV are propagatively transmitted by *Thrips palmi* [14, 15]. In this study, the effects of WBNV and GBNV on the life history traits of their vector, *T. palmi*, are reported, and their implications are discussed.

Materials and methods

The initially virus-free adult females of *T. palmi* were taken from a stock population maintained at the containment facility of the Division of Plant Pathology, Indian Agricultural Research Institute (IARI), New Delhi. Identification of *T. palmi* was based on morphometric keys (Fig. 1A) and confirmed by determining the nucleotide sequence of mitochondrial cytochrome oxidase subunit I following a PCR protocol described in Ghosh et al. [16]. Healthy cowpea plants (var. Pusa Komal) were grown under insect-proof conditions, and a single female *T. palmi* was released on the cowpea plant within an insect-breeding box to generate an isofemale line of *T. palmi* (Fig. 1B). The population was reared under controlled conditions. Adults and larvae of *T. palmi* were collected from this isofemale line with a fine camel hair brush for further experimentation.

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