

Article

Effects of Bt+CpTI transgenic cotton on the performance of *Tetranychus turkestani* (Acari: Tetranychidae)

GUANG-YUN LI¹, JING-JING LI¹, WEI XIA¹, HE-LI QU¹, SHUAI YANG² & JIAN-PING ZHANG^{1,3}*

¹ Department of Plant Protection, College of Agricultural, Shihezi University, Shihezi, Xinjiang 832000, China

² Zibo Nab Agrochemicals Limited, Zibo, Shandong 256410, China

³ Center for Popularization of Agricultural Technology of Xinjiang Production and Construction Corps, Shihezi, Xinjiang 832000, China

* Corresponding author. E-mail: zhangjp9507@yahoo.com.cn

Abstract

Transgenic cotton is very effective in controlling targeted pests such as cotton bollworm (*Helicoverpa armigera*). However, increases in spider mite (Acari: Tetranychidae) populations have been reported in fields of transgenic cotton. The objectives of our laboratory experiments were (i) to determine host plant preference (transgenic or non-transgenic cotton) of *T. turkestani* females and (ii) to compare the life table parameters of *T. turkestani* females reared on transgenic or non-transgenic cotton. Enzyme-linked immunosorbent assays indicated that *T. turkestani* females reared on transgenic cotton leaves contained 14.9 ± 0.23 μ g Bt toxic protein per gram fresh weight, about 57.4% toxin in the transgenic cotton leaves. Results of dual-choice disc tests showed that *T. turkestani* females preferred to feed and lay eggs on non-transgenic cotton. Food source (transgenic or non-transgenic cotton) had no significant effect on the life table parameters of *T. turkestani* females. We conclude that increases in the population of spider mites in fields of transgenic cotton cannot be attributed to host plant preference or to the effects of Bt toxic protein on the non-targeted arthropods life cycle. Additional studies should be done to determine if the increases are due to less insecticide application or less competition with primary insects in transgenic cotton fields.

Key words: Transgenic cotton, ELISA, Host plant preference, Life table

Introduction

Spider mites are one of the most destructive herbivorous pests in cotton field worldwide (Luttrell *et al.* 1994). The mites generally feed on the lower surface of cotton leaves by piercing mesophyll cells with their stylets. Yellowish-white spots appear on damaged leaves shortly after infestation. Several days later, reddish brown patches form as the number of spots increases. Finally the cotton leaves begin to roll. Mite injury always causes a reduction in leaf chlorophyll content, resulting in severe declines in cotton yield and quality (Park and Lee, 2002). In northwest China, the spider mite population consists of several species, including *Tetranychus turkestani* (Ugarov et Nikolskii), *Tetranychus truncatus* Ehara, *Tetranychus dunhuangensis* Wang, and *Tetranychus cinnabarinus* Boisduval. Among these species, *T. turkestani* is a damaging and important pest (Guo *et al.* 2013), also it causes the most damage to cotton in the northern part of the Xinjiang Uyghur Autonomous Region (Lu, 1990). Spider mite populations have increased since the widespread adoption of transgenic cotton (Wu and Guo, 2005; Zhao *et al.* 2011). In some cases, spider mites have become the primary pest of transgenic cotton.