

Transgenic Bt cotton tissues have no apparent impact on soil microorganisms

H. Hu¹, M. Xie², Y. Yu³, Q. Zhang⁴

¹Key Laboratory of Microbial Resources, Ministry of Agriculture, Institute of Agricultural Resources and Regional Planning, Chinese Academy of Agricultural Sciences, Beijing, P.R. China

²Institute of Plant Protection, Anhui Academy of Agricultural Sciences, Hefei Anhui, P.R. China

³China National Environmental Monitoring Centre, Beijing, P.R. China

⁴College of Agronomy and Biotechnology, China Agricultural University, Beijing, P.R. China

ABSTRACT

The impact of transgenic *Bacillus thuringiensis* (Bt) cotton residues on soil microorganism communities was investigated. Leaves of three different varieties of transgenic Bt cotton and their near-isogenic lines were placed in soil and the numbers of indigenous soil microorganisms were measured with cultivation-dependent approaches under laboratory conditions. The soil samples were collected after 7, 14, 21, 28, 56 and 84 days of incubation. Numbers of bacteria, actinomycetes and fungi in the soil were measured by counting colony forming units after incubation on appropriate medium. Overall, although there were differences in bacteria, actinomycetes and fungi population between soil amended with Bt and non-Bt cotton throughout the whole incubation in three experiments, these differences were transient and not persistent from one sampling stage to the next. These results suggest that Bt-transgenic cotton tissues have no apparent impact on soil microorganism population.

Keywords: risk assessment; *Bacillus thuringiensis* (Bt) toxin; culturable microorganisms; microorganism population; residue decomposition

Some strains of cotton were genetically modified to express the *Cry* proteins from the bacterium *Bacillus thuringiensis* (Bt) to produce a protein that is toxic to the larvae of a number of lepidoptera species, particularly the cotton bollworm *Helicoverpa armigera* (Hübner) (Zhao et al. 1998, Shelton et al. 2002). This reduces the requirement for specific insecticide treatments (Mascarenhas and Luttrell 1997) and the risk of pollution from chemical insecticide applications. However, the large-scale commercial release of Bt crops is of public concern because of the potential threat to natural and agricultural ecosystems (Hails 2000, Stotzky 2000, 2004, Hu 2009, Velmourougane 2013). When assessing the ecological risks of transgenic plants, their impact on soil microbes should be considered, because the structure of the soil microbial community is an important component of soil quality and health, and soil microbiological properties are early and sensitive indicators of anthropogenic effects on soil ecology in both natural and agricultural ecosystems (Visser and Parkinson 1992).

Supported by the '973' Project, Project No. 2006CB102006.