

Effects of transgenic *Bt* cotton on soil fertility and biology under field conditions in subtropical inceptisol

Raman Jeet Singh · I. P. S. Ahlawat ·
Surender Singh

Received: 6 August 2011 / Accepted: 3 February 2012 / Published online: 21 February 2012
© Springer Science+Business Media B.V. 2012

Abstract Although there is large-scale adoption of *Bt* cotton by the farmers because of immediate financial gain, there is concern that *Bt* crops release *Bt* toxins into the soil environment which reduces soil chemical and biological activities. However, the majorities of such studies were mainly performed under pot experiments, relatively little research has examined the direct and indirect effects of associated cover crop of peanut with fertilization by combined application of organic and inorganic sources of nitrogen under field conditions. We compared soil chemical and biological parameters of *Bt* cotton with pure crop of peanut to arrive on a valid conclusion. Significantly higher dehydrogenase enzyme activity and $\text{KMnO}_4\text{-N}$ content of soil were observed in *Bt* cotton with cover crop of peanut over pure *Bt* cotton followed by pure peanut at

all the crop growth stages. However, higher microbial population was maintained by pure peanut over intercropped *Bt* cotton, but these differences were related to the presence of high amount of $\text{KMnO}_4\text{-N}$ content of soil. By growing cover crop of peanut between *Bt* cotton rows, bacteria, fungi, and actinomycetes population increased by 60%, 14%, and 10%, respectively, over *Bt* cotton alone. *Bt* cotton fertilized by combined application of urea and farm yard manure (FYM) maintained higher dehydrogenase enzyme activity, $\text{KMnO}_4\text{-N}$ content of soil and microbial population over urea alone. Significant positive correlations were observed for dry matter accumulation, dehydrogenase enzyme activity, $\text{KMnO}_4\text{-N}$ content, and microbial population of soil of *Bt* cotton, which indicates no harmful effects of *Bt* cotton on soil biological parameters and associated cover crop. Our results suggest