

Influence of *Pseudomonas fluorescens* and a Nucleopolyhedrovirus on Cotton Bollworm *Helicoverpa armigera* (Hübner)

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Current approaches in crop protection emphasize utilization of microbials with non-toxic modes of action. For cotton, the nucleopolyhedrovirus of *Helicoverpa armigera* (HaNPV) is advocated against the pest along with chemical pesticides. The plant growth promoting rhizobacteria (PGPR), *Pseudomonas fluorescens* (*P. fluorescens*) has been found useful in disease management besides imparting induced systemic resistance. The bacterium has been shown to modulate the disease expression by baculoviruses due to enhanced phenolase activity. We investigated the possibility of integrating HaNPV and *P. fluorescens* on cotton (LRA 5166) against *H. armigera*. The HaNPV was applied to leaves (30 DAS), square (45 DAS) and bolls (70 DAS) excised from pot cultured cotton plants previously treated with *P. fluorescens* as seed treatment (ST) or as foliar application (FA) or combination of both and bioassayed against third instar *H. armigera*. The biochemical analysis conducted included, phenol, tannin, peroxidase (POD), polyphenol oxidase (PPO) and phenylalanine ammonia lyase (PAL). The results revealed that the application of *P. fluorescens* as a ST and FA, either alone or in combination with HaNPV significantly reduced larval and pupal weights of *H. armigera* that fed on cotton plant parts. Significantly low per cent mortality (60%) was noticed in cotton leaves treated with HaNPV and *P. fluorescens* through ST + FA than ST alone or FA alone. Enzymes like peroxidase, polyphenol oxidase and phenylalanine ammonia lyase were higher in *P. fluorescens* treated cotton plants than untreated checks. These phytochemicals and reduction in consumption of HaNPV treated plant parts could be responsible for the significant reduction in NPV induced mortality of *H. armigera* larvae.