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Insecticidal activity of *Bacillus thuringinesis* strains against rice grain moth, *Corcyra cephalonica*

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ABSTRACT

This investigation was carried out at Department of Plant Protection, Allahabad Agricultural Institute-Deemed University, Allahabad. Toxicity tests for Bt subsp *kenyae*, Bt subsp. *kurstak*i HD-1 , Bt subsp *sotto*, Bt subsp. *kurstaki* HD-73 and Bt subsp *tolworthi* were performed against second instar larvae of *Corcyra cephalonica* at concentrations ranging from 0.5 to 3.0 per cent. The LC_{50} and LC_{90} values at 72 hrs were 0.8417 and 14.84, 0.384 and 9.549, 0.2367 and 10.04, 0.3480 and 10.31 and 0.1631 and 2.965, respectively.

Key words : *Bacillus thuringiensis*, Toxicity, LC_{50}.

Among the biopesticides based on entomopathogenic micro-organisms the most widely used microbial insecticides are *Bacillus thuringiensis (*Bt*)* which is rod shaped, gram positive bacterium, abundant in soil and other habitats throughout the world. During sporulation Bt produces a parasporal crystal compared of proteins known as delta-endotoxin or Insecticidal Crystal Proteins (ICPs). Following ingestion, solublization and in some cases proteolysis, activation toxins bind to receptors and form pores in the midgut epithelium of susceptible insects (Gill *et al.*, 1992). The process results in disruption of membrane integrity, starvation and ultimately death. Because d-endo-toxins are generally safe to vertebrates (Siegel and Shadduck, 1989) and to beneficial arthropods and are often highly toxic to insect pests at relatively low doses, genes encoding these proteins were among the first to be used in genetic engineering of plant for enhanced insect resistance (Vaeck *et al.*, 1987).

Most currently, formulation of Bt used for controlling insect pests are based on the HD-1 strains of the Bt subsp. *kurstaki* because of its high activity against various lepidopteran pests in agriculture (Kees van Frankenhuyzen *et al*., 1992). However, it is not necessary that HD-1strain is the most effective strain for the control of lepidopterans. There are other Bt strains which should be screened for their efficacy as few reports showed that few insects developing resistance to Bt formulations. Keeping this in view some Bt strains are evaluated against a lepidopteran stored grain pest in this investigation

MATERIALS AND METHODS

The present study was conducted in the Department of Plant Protection Allahabad Agricultural Institute Deemed University, Allahabad, Uttar Pradesh.India.

Bacterial strains and culture conditions:

B. thuringiensis strains *viz.*, Bt subsp. *kurstaki* HD1, HD 73, *Bt* subsp. *tolworthi*, Bt subsp. *sotto* and Bt subsp. *kenyae* were obtained from Bacillus Genetic Stock Center (BGSC), Ohio State University, USA. And these strains were cultured on nutrient agar(peptone 20.0g, beef extract 3.0g, Nacl 3.0g and agar 20.0g in 1000ml of distilled water) at 30^0C. Nutrient agar slants containing bacterial strains were also maintained at 4 ^{0}C until use.

Preparation of spore crystal mixture of Bacillus thuringiensis strains:

Pure culture of Bt strains maintained on nutrient agar plates were used by inoculating a loopful in 250 ml sterile nutrient broth kept in 1 litre conical flask. The flask was incubated in an incubator shaker at 150 rpm for 7 days at 30^0C with continuous shaking. After that it was centrifuged at 6000 rpm for 10 min. The resulting pellet containing spore and parasporal protein crystals were washed in 20 ml sterile distilled water and centrifuged at 6000 rpm for 5 minutes and washing was repeated twice. The pellets were resuspended in 10 ml of sterile distilled water and kept at 4 ^{0}C (Carozzi *et al.*, 1991).

Rearing of rice grain moth Corcyra cephalonica:

Rearing of rice grain moth, *C. cephalonica* from eggs to adult stage was undertaken using broken grain of sorghum in wooden rearing cage of 45 x 30 x 15 cm size, covered with wooden lid. Broken sorghum grains were first sterilized at 110 ^{0}C for 2hrs. in a hot air oven and used for mass rearing. The sterilized grains were mixed