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Evaluation of insecticidal activity of Sri Lankan Bacillus thuringiensis kurstaki against Plutella xylostella and Cnaphalocrocis medinalis

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Bacillus thuringiensis (Bt) is a naturally occurring gram positive Bacillus that produces insecticidal crystal proteins which are toxic to different insect orders of Lepidoptera, Coleoptera and Diptera. Hence, it is used worldwide for pest management applications. Plutella xylostella (L.) (Diamondback moth) is a key pest of crucifers worldwide. Cnaphalocrocis medinalis is the deadliest pest of rice, posing a permanent threat to rice cultivation. The objective of the current study was to evaluate the insecticidal activity of Bt kurstaki (Btk) against P. xylostella and C. medinalis under laboratory conditions. Btk from the Industrial Technology Institute culture collection was used in this study. Btk was cultured in a molasses based medium using a fermentor under optimal culture conditions (pH=7, agitation 300 rpm, Temperature 30 ˚C) for 30 hours. Resultant culture was centrifuged at 6000 rpm for 10 min at 4 ˚C and pellet was freeze dried to obtain Bt primary powder. Colony forming units (CFU) were calculated for the obtained Bt powder. Adult P. xylostella were collected from cabbage fields in Kandy and reared in an insectary at Horticultural Crop Research and Development Institute, to obtain larvae under optimal growth conditions. Larvae of C. medinalis were collected from fields at the Rice Research and Development Institute. Leaf dip bioassay was performed to evaluate the insecticidal activity of Btk against P. xylostella and C. medinalis larvae. Tested spore suspension of Btk was prepared by dissolving Bt primary powder in 10 mL of sterile distilled water and preparing a 10 fold dilution series for testing. Fresh cabbage leaves and rice leaves were given as food for larvae every day. Larval mortality was recorded every 24 h until 100% mortality or pupation was observed. Abbottos formula was used to correct mortality. Lethal concentration (LC_{50}) was calculated using probit analysis for the data collected at 72 h after exposure. Percentage mortality of both P. xylostella and C.medinalis increased with time and spore concentration. Btk showed insecticidal activity having, LC_{50} = 3.34 x 10^8 spore/mL against C. medinalis and LC_{50} =1.76 x 10^7 spores/mL against P. xylostella. Mortality data showed that Btk was more toxic to C. medinalis than to P. xylostella. It was concluded that this native strain of Bt could be used as an effective bio-control agent against C. medinalis and P. xylostella.

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