

# Screening of *Bacillus thuringiensis* isolates for high levels of Vip3A and Cry proteins and high thermostability to control *Spodoptera exigua*

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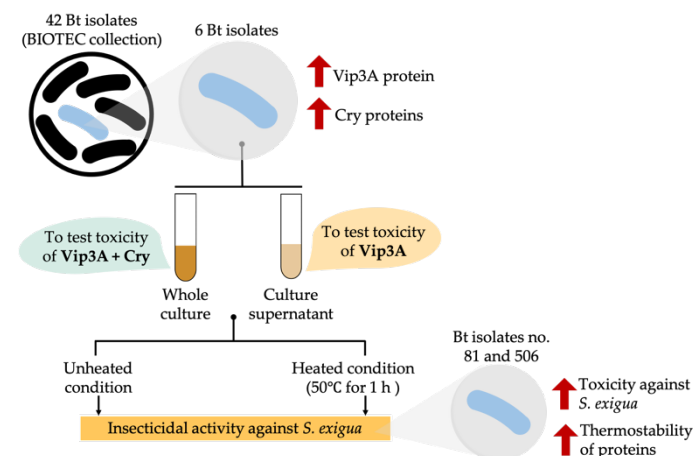
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**Abstract:** *Spodoptera exigua* or beet armyworm is one of major agricultural pests that causes serious crops production losses in Thailand. Moreover, *S. exigua* has been reported to develop resistance against chemical pesticides. Nowadays, Cry and Vip3A proteins produced by *Bacillus thuringiensis* or Bt have been used as environmental-friendly biopesticides to control *S. exigua*. The combination of Vip3A and Cry proteins has been found to delay insect resistance development and exhibit synergistic activity against a wide range of insect pests. This study thus aims to screen Bt isolates collected from Thailand for high levels of Vip3A and Cry proteins production and high thermostability to control *S. exigua*. 42 Bt isolates from BIOTEC collection, Thailand were screened by SDS-PAGE analysis to investigate levels and patterns of Vip3A and Cry protein production. Six Bt isolates with high levels of Vip3A protein and different patterns of Cry proteins were selected for insecticidal activity analysis of whole culture extracts containing both Vip3A and Cry proteins and culture supernatant containing secreted Vip3A protein against the second-instar *S. exigua* larvae. Thermostability of proteins was also tested by heating both whole culture and culture supernatant at 50°C for 1 h before feeding to *S. exigua* larvae. Two Bt isolates (81 and 506) showed 100% larvae mortality 3-4 days after feeding and also retained high larvicidal activity after heating. These two Bt isolates are selected for further studies to improve protein stability and formulation for potential field applications.

## Graphical abstract:



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**Keywords:** *Bacillus thuringiensis*; Vip3A protein; Cry protein; *Spodoptera exigua*

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