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Efficacy of *Beauveria* sp. in the Control of First Instar Larvae of the Andean Potato Weevil (*Premnotrypes suturicallus* Kuschel)

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Abstract

The Andean potato weevil (*Premnotrypes suturicallus*) is a main insect pest for the potato production in the high Andes, causing 20–25 % yield loss through tuber damage. The objective of this research was to investigate the use of entomopathogenic fungi to control first instar larvae (L1) before they enter the tuber. In a first trial, potato tubers were placed into pots and covered with sterilized soil. In treatment 1 (T1), the larvae were inoculated with *Beauveria* sp.; in treatment 2 (T2) the soil was inoculated. Larvae were liberated on top of the soil. After 1 month, mortality in the control was 3 %, compared to 22 % in T1 and 12 % in T2. In a bioassay on potato tubers for alimentation the LC_{50} assessed after 30 days as survival rate exceeded 1×10^8 conidia ml^{-1}. In another bioassay, without potato tubers, LC_{50} was 5.3×10^5 conidia ml^{-1} after 7 days. In order to understand the low mortality of larvae when feeding on tubers, the adherence of conidia to the insect cuticle was studied. L1 were inoculated with *Beauveria* sp. In treatment 1 (T3) larvae were placed on tubers, in treatment 2 (T4) larvae were kept in soil and in treatment 3 (T5) larvae were placed into empty eppendorf caps. After 24 h, larvae were washed with Tween 80 (0.1 %), the solution, applied on antibiotic agar and the number of colony forming units (cfu) assessed. The median values were 23.7, 2.3 and 626 cfu per larva for T3, T4 and T5 respectively. Both, SEM and fluorescent microscope studies revealed few or no conidia on the cuticle of larvae that were kept in soil or on tubers for 24 h, compared to a heavy load of conidia on the larvae in empty pots. These results indicate, that the first instar larvae can shed conidia from their cuticle and are therefore difficult to target with entomopathogenic fungi.

Keywords: Andean potato weevil, *Beauveria* sp., biological control, entomopathogenic fungi, potato pest, *Premnotrypes suturicallus*

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