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Comparative Effects of Some Biorational and Conventional Insecticides against Immature and Adult Stages of the Colorado Potato Beetle, *Leptinotarsa decemlineata* (Say.) (Coleoptera: Chrysomelidae) in Russia

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ABSTRACT

Efficacy of some biorational and conventional insecticides against different stages of the Colorado potato beetle, *Leptinotarsa decemlineata* (Say.) (Coleoptera: Chrysomelidae) was evaluated under laboratory conditions. Seven different commercial products were tested, including the biorational insecticides: Spinosad, Mectin, Fitoverm, Match, Neemix in addition to two conventional insecticides: Actara and Actellic. Data indicated that all tested insecticides showed low toxic effect to *L. decemlineata* eggs, but most hatching neonates died shortly after hatching. All tested insecticides, at their field rates showed high toxicity to larvae of *L. decemlineata.* Highest mortality was obtained in earlier instars compared to older ones and mortality increased with the time of exposure. Moreover, the lower concentrations (up to 25% of the field rate) of Actara, Mectin, Spinosad and Fitoverm showed high efficacy against *L. decemlineata* 3rd instar larvae. Also, Actara caused highest mortality in *L. decemlineata* adults, followed by Spinosad, Mectin and Fitoverm compared to Actellic, Match and Neemix. In pupal bioassay, Fitoverm caused highest reduction in *L. decemlineata* adults' emergence followed by Mectin, Actara, Actellic and Spinosad. In Translocation bioassays, Actara caused highest mortality in *L. decemlineata* 3rd instar larvae or adults followed by Spinosad and Mectin. Residual activity of the tested insecticides against 3rd instar larvae was also evaluated. Actara, Spinosad and Mectin exhibited residual effect under field conditions, as the percentages of mortality after 30 days of application were 46.67, 44.44 and 35.56%, respectively.

Key words: *Leptinotarsa decemlineata,* Biorational, Conventional Insecticides, Mortality, Bioassay, Residual effect.

INTRODUCTION

Potato, *Solanum tuberosum* L., is the world's most widely grown tuber crop and the fourth largest food crop in terms of fresh production after rice, wheat, and maize (Rutz and Janssen, 2007). This crop is subjected to severe attack with scores of insect and pathogen pests, which affect its production. The actual average worldwide losses in potato yields due to agricultural pests was estimated at 39% (Oerke and Dehne, 2004). In Russia, for instance, as much as 4 million tons of potatoes are lost annually because of the infestation with the Colorado beetle (CPB), *Leptinotarsa decemlineata* (Say.) (Coleoptera: Chrysomelidae), late blight and plant viruses (Potato World, 2008).

CPB is one of the major insect pests attacking potato in many of the potato-producing regions worldwide. In addition to potato, the preferred host plant, it devastates, by its voracious feeding, other solanaceous crops such as; eggplant, tomato, pepper, and tobacco (Hare, 1990). Moreover, CPB is widely considered as a quarantine pest in most of the world countries including Egypt (EPPO, 2006).

CPB adults over-winter below the soil surface in the potato field or in other protected sites around the field. The adults emerge in late spring, move into the field, and establish themselves on plants where they mate.

Until recently, there have been no effective biocontrol agents for the CPB. Control of this pest has relied over the past 50 years on conventional insecticides (Lipa, 2008). Shortly after insecticide applications, CPB developed resistance to the common used insecticides (Leontieva *et al.*, 2006). Biological control would be the concerted use as a major component of integrated pest management for control of CPB. Natural enemies of CPB include a variety of predatory insects, parasitoids and microbial control agents (Lacey *et al.*, 1999). Fortunately, biological control using bio-rational insecticides has become the most effective means in potato pest management programs; because their use reduces pollution and delay the development of resistance to other classical insecticides (Barčić *et al.*, 2006).

Therefore, the aim of this study is to evaluate the efficacy of some biorational insecticides for controlling CPB compared to the conventional insecticides as a contribution to introduce safer insecticides in IPM protocol for controlling several insect pests in vegetable crops.

MATERIALS AND METHODS

All experiments were conducted in the Laboratory of Plant Protection Department, Russian State Agrarian University – Moscow, Russian Federation during the period from May to August,