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Research article/Araştırma makalesi

Effect of three insecticides on tomato (*Solanum lycopersicum*) seedling germination and early plants growth

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Abstract

Tomato (*Solanum lycopersicum* L.) is one of the most important vegetables, whose production and consumption increased quite rapidly. The effect of three insecticides (alpha-cypermethrin, chlorpyriphos and pirimicarb) on seed germination and seedling growth of this species has been studied, based on morphological parameters monitored and by using four dilutions of the normal concentration used in agriculture (100%, 75%, 50%, 25%) for germinating seeds, and only the recommended concentration in agriculture for growing plants. The results show that the three insecticides induced a delay of germination and growth process. The germinated rate of seeds treated was lower compared to control, and the length of roots and shoots in treated seeds and plants was reduced.

Key words: Insecticides, Tomato, *Solanum lycopersicum*, Germination, Growth

1. Introduction

Tomato (*Solanum lycopersicum* L.) is one of the most widely grown vegetables in the world. In recent years, competition has intensified increasingly as world exports of tomato products from main suppliers. Processing tomatoes are attacked by various arthropods, plant diseases and nematodes which significantly reduce yield and quality of fruit (Oerke et al., 1994).

In the Northern Morocco, the most important way to protect cultures is the chemical pesticides use. Many pesticide types are used, especially organochlorine pesticides, organophosphorus pesticides, carbamate pesticides and pyrethroid pesticides (El Bakouri et al., 2008).

Synthetic pyrethroids are widely used as the broad-spectrum pest control agents in agricultural production because of their selective insecticidal activity, rapid biotransformation and excretion by the mammalian catabolic system and non-persistence in the environment (Ye et al., 2006). Moreover, the pyrethroid insecticides have a greater photostability and a relatively low toxicity when compared to the organochlorine and organophosphorus insecticides (Pang et al., 1994a, b). However, the risk of pesticide residues on the food consumed is present, due to the overuse and accumulation in food chain.

Organophosphorus insecticides (OP) constitute one of the most used pesticide classes employed for both agricultural and landscape pest control. Use of OP has increased considerably, due to their low toxicity and low persistence in environment and mammalian system, compared to organochlorine pesticides. The main mechanism of OP toxicity is related to irreversible binding to acetylcholinesterase (Kamath et al., 2008).

The carbamates correspond to N-substituted esters of carbamic acid and form three classes of carbamates: insecticide carbamate with a methyl group, herbicide carbamate with an aromatic or aliphatic compound, and fungicide carbamate with benzimidazol group (World Health Organization, 1986).

However, the use of these pesticides obtained by chemical synthesis represents the major cause of agricultural soil and groundwater contamination because of their persistence, biodisponibility and mobility (Arias-Estevez et al., 2008). In this way, the study of pesticide occurrence in agricultural soil of the Tangier region shows the presence of many pesticides types such as endosulfan isomers (alpha and beta), endosulfan sulfate, some DDT metabolites and alpha HCH (El Bakouri et al., 2008).

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