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Evaluation of two neo-nicotinoid root absorbing insecticides for virus disease vector controlling in seed potato fields

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ABSTRACT

Viral diseases and their vector insects have a great concern in seed potato production. Systemic insecticides by killing the vectors reduce the incidence of the diseases especially in early growing stages of potato plants. In this study, the ability of seed tuber treatment with two neo-nicotinoid root absorbing systemic insecticides, thiamethoxam and imidacloprid, were evaluated to control the insect vectors and viral diseases under field conditions with natural occurrence of vector populations. The tests were conducted using a split plot RCBD design with 3 insecticides (thiamethoxam, imidacloprid and thiodicarb) as sub-treatment and 2 potato cultivars (Agria and Marfona) as main treatment in 4 replicates. The trials were performed in two locations, Bahar (Hamadan) and Firozkoh (Tehran), in 2001 and 2002. Each insecticide treatment consisted of seed tuber treatment at planting and second treatment at hilling. In seed tuber treatment, thiamethoaxam (Cruiser 350FS), imidacloprid (Gaucho 70WS) and thiodicarb (Larvin DF80) were used at 20mL, 28.5 gr and 37.5 gr ratio for 100 Kg seed tuber, respectively. In soil application at hilling stage of potatoes, thiamethoaxam (Actara 25WG), imidacloprid (Confidor 350SC) and thiodicarb (Larvin DF80) were used at 0.14 gr, 0.14 ml and 0.05 gr ratio, respectively, for each one meter of potato rows in field. Vector populations in 3 groups including aphids, leafhoppers and thrips were evaluated. Incidence of *Alfalfa mosaic virus* (AlMV), *Potato leaf roll virus* (PLRV), *Potato virus M*

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(PVM), *Potato virus S* (PVS) and *Potato virus Y* (PVY) in the plots was detected by double antibody sandwich-enzyme-linked immunosorbent assay (DAS-ELISA). Also, *Tomato spotted wilt virus* (TSWV) was detected by reverse transcription followed by polymerase chain reaction (RT-PCR) using specific primers as previously described. The data of early and late season tests were statistically analyzed. The results indicated that in early and late season, seed treatment with thiamethoxam and imidacloprid reduced significantly aphid and leafhopper numbers up to 3 fold relative to no treated controls. Thrips population was reduced up to 2 times in early season and 3 times in late season. Also, the incidence of AlMV, PVM, PVS, and PVY reduced up to half in early season and one third in late season in relative to non treated controls. Incidences of PLRV and TSWV in both early and late season were one fourth and one third of no treated controls, respectively. Thiodicarb treatments had not acceptable control on vector and disease incidence. Our results showed that seed potato tuber treatment at planting with thiamethoxam (Cruiser 350FS) or imidacloprid (Gaucho 70WS) at a ratio of 20 gr and 28.5 gr. per 100 kg of tubers, respectively, with a mid season soil application of thiamethoxam (Actara 25WG) or imidacloprid (Confidor 350SC) at a ratio of 0.03 gr and 0.14^{ml} per one meter of plant rows, would reduce the vectors populations and viral disease incidence in potato fields. The Advantages of application of systemic root absorbing pesticids in vector and virus control in seed potato fields was discused.

Key words: Thiamethoxam (Cruiser, Actara), imidacloprid (Gaucho, Confidor), thiodicarb (Larvin), Seed potato, Potato production, *Alfalfa mosaic virus*, *Potato leaf roll virus*, *Potato virus M*, *Potato virus S*, *Potato virus Y*, *Tomato spotted wilt virus*, Vector control.

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