

Comparison effects of botanical pesticides on first instar nymphs of the citrus cushion, *Pulvinaria aurantii* Cockerell and its ladybird predator, *Cryptolaemus montrouzieri* Mulsant

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The citrus cushion, *Pulvinaria aurantii* Cockerell has been the most important pests of north citrus orchards in recent years. This pest has two generations per year in Mazandaran province. It is settled on the leaves, fruits, and young shoots and feeds on the plant sap. In high density, it results in a general weakness in the host, fruit and leaf shedding, and drying of young shoots. Moreover, with honeydew excretion, it results in the growth of sooty mold on the surface of the plant and the reduction of the level of plant photosynthesis. *Cryptolaemus montrouzieri* Mulsant is an important predator of the pest and feeds on the eggs inside the ovisac in the larval and adult stages. Chemical control is one of the common methods used to control this pest. Due to the harmful effects of chemical compounds, the use of basic botanical pesticides seems to be a safe and appropriate solution for controlling the pest. In this study, contact toxicity of different compounds on the 1st instar nymphs of citrus cushion, *P. aurantii* and adult insects of *Cryptolaemus* ladybirds was evaluated. The chemical treatments were included, washing up liquid 1%, Dayabon 0.5%, 0.6%, 0.7%, 0.8%, 0.9% and 1%, Palizin 0.15%, 0.2% and 0.25%, Palizin 0.15%, 0.2%, 0.25% + Sytrol oil 0.5%, Tondexir 0.2 and 0.3% + soap 0.1%, Dursban 0.2% and control (water). The experiment was carried out in a completely randomized design with three replicates for each treatment under conditions of 25±5°C and 60% relative humidity. In each replication, fifty 1st instar nymphs of *P. aurantii* and ten adult insects of ladybird was placed on each citrus leaf and were sprayed with 10 ml solution. After 24 hours, the number of live and dead insects were counted and the percentage of mortality was calculated. The data analysis of results showed that the highest percentage of mortality (100%) was observed in the treatment of Dayabon 0.9% and 1% and the lowest one (34%), except control was observed in the treatment of Palizin 0.15%. In regard to *Cryptolaemus* ladybird, the highest and lowest percentages of mortality were observed in treatments of Dursban 0.2% (76.66%) and in Dayabon 0.5% and Palizin 0.2% (3.33%), respectively. Also no statistically significant difference was observed in the other treatments, except in the treatment of Dursban. It seems that, based on the obtained results, treatments of Dayabon 0.9 and 1% had an effective control on the citrus cushion with no adverse effect on *Cryptolaemus* and can be replaced with hazardous chemical pesticides in pest control.

Keywords: Citrus, *Pulvinaria aurantii*, chemical treatments, mortality, Dayabon.