

Selectivity of some newer horticultural mineral oils and some insecticides on parasitoid complex of San Jose scale (*Quadraspidiotus perniciosus* Comstock) on apple in Kashmir

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Field trials were conducted during 2004 to study the effectiveness of five horticultural mineral oils (HMOs) viz., D.C. tron plus (O_1), P.D. spray oil (O_2), H.P. spray oil (O_3), Atso spray oil (O_4) and Diesel oil (O_5) @ 2 per cent alone and in combination with five chemical insecticides, viz., endosulfan (C_1), ethion (C_2), Chlorpyrifos (C_3), dimethoate (C_4) and quinalphos (C_5) @ 0.05, 0.05, 0.021, 0.03 and 0.03 per cent, respectively against the San Jose scale (*Quadraspidiotus perniciosus* Comstock) on apple trees used as dormant spray. All treatments were observed effective against the pest but at the same time all treatments were evaluated for their impact on emergence of predominant parasitoids of San Jose scale (*Encarsia perniciosus* and *Aphytis proclia*). It was observed from the caged twig samples that all insecticides have more or less deleterious effect on the bio-agents. In oils alone highest population (3.66) of parasitoids were found associated with O_5 (Diesel oil) and lowest with O_1 (D.C. tron plus) 1.22 per cm² while in combination highest (2.55) emergence of parasitoids were found associated with O_2C_2 (P.D. spray oil + ethion) and lowest (0.11%) with O_1C_3 (D.C. tron plus + chlorpyrifos). It was observed from the data that all oils were found safe to both the parasitoids with D.C. tron plus (O_1) slightly more toxic than other oils, while oil-chemical combination have deleterious effect on emergence of parasitoids.

Key words: Horticultural mineral oils, Insecticides, Dormant spray, Parasitoids, Apple, Selectivity.

INTRODUCTION

Apple crop in Kashmir valley is damaged by many insect pests and several insecticides and oils are recommended for their control. San Jose scale *Quadraspidiotus perniciosus* Comstock (Homoptera ; Diaspididae) is the most destructive of all armoured scales and injurious to deciduous fruit orchards throughout the world (Buhroo, 2000). However, resurgence of the pest has been observed in some areas of Kashmir valley requiring evaluation of some newer oils alone and in combination with some insecticidal for the control of the pest. The present observations were taken with a view to evaluate the impact of new dormant sprays on the natural enemies complex i.e. parasitoids of the pest.

MATERIALS AND METHODS

The present investigation was carried out during 2004 in farmers orchard at Tailbal, Srinagar, Kashmir. The selected trees were marked and were pruned during winter. In the present investigation five oils alone and five insecticides in combination with oils were evaluated

against the San Jose scale. The experiment was laid out in randomised block design in a factorial set up with 31 treatments including control (water spray). Each treatment was replicated thrice and one tree served as one replicate in the experiment. The HMOs viz., D.C tron plus (O_1), P.D spray oil (O_2), H.P spray oil (O_3), Atso spray oil (O_4) and Diesel oil (O_5) at 2 per cent each and chemicals used at one concentration viz., endosulfan (C_1), ethion (C_2), chloropyrifos (C_3), dimethoate (C_4) and quinalphos (C_5) at 0.05, 0.05, 0.21, 0.03 and 0.03 per cent, respectively. The samples (twigs) collected from four quadrants (15 cm) of a tree were taken randomly taken and brought to laboratory from treated orchard after 40, 50 and 60 days after treatments. Each twig (15 cm) was waxed and caged at 23 ± 2 °C for recording the emergence of parasitoid adults over a period of 10 days.

RESULTS AND DISCUSSION

The impact of these dormant sprays on the natural enemies of San Jose scale (*Quadraspidiotus perniciosus*), data was recorded by taking observations on treated infested

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