



Delayed dormant spray (Bal-Spray oil) for the management of two major sucking pests of apple in Kashmir

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ABSTRACT: Field studies were conducted to evaluate the efficacy of two oil dormant sprays at different concentrations to manage San Jose scale (*Quadraspidiotus perniciosus* Comstock) and European red mite (*Panonychus ulmi* Koach) on apple (*Malus × domestica* Borkh.) during 2017-18 at Bandipora of Kashmir. The highest cumulative mean mortality (80.13%) was recorded with the application of bal spray oil (2.5%) followed by 77.35% mortality of SJS @ 2.0% concentration of bal spray oil while as H.P spray oil @ 2.5% concentration exhibited 79.73% cumulative mean mortality of SJS. and lowest cumulative mean mortality of 75.24% @ 1.5% concentration of bal spray oil for both the years. The impact of oils on European red mite revealed that highest cumulative mean mortality (85.01%) was recorded with the application of bal spray oil at concentration of 2.5% followed by 79.69% mortality of ERM @ 2.0% concentration of Bal spray oil. The impact of these delayed dormant oils on natural enemies of the two key pests of apple was also recorded.

Keywords: Delayed dormant spray, oil, San jose scale, apple, Kashmir

INTRODUCTION

San Jose scale (SJS), *Quadraspidiotus perniciosus* is a major pest of apple trees. It can injure fruit directly and can also reduce tree vigour by removing sap, eventually killing the tree. Introduced into the United States from China in 1870 (Muneer, 2008), this scale insect continues to be a major pest in apple-growing regions of North America (Pfeiffer, 1985; Rice and Jones, 1988; Rice *et al.*, 1979). Apple *Malus domestica* (Borkh) is a highly remunerative crop, a native of southwestern Asia, Europe and is grown in all temperate regions of the world. In Kashmir, apple is the most important fruit crop among all the cultivated fruits. However, the production and quality of apple is affected because of several factors including insect pests. The major insect pests attacking this crop are San Jose scale, European red mite, two spotted mite and apple wooly aphid. Among all these pests, San Jose scale and European red mite are the most destructive and widely distributed all over the world (Bhalla and Gupta, 1993). Since these pests have been accidentally introduced to many countries and are considered major pests in most regions of the world where deciduous fruits are grown (Madson and Morgan, 1970). The damage by San Jose scale is caused by nymphs and female scales, which suck the sap from branches, twigs and fruits, weakens the plant and leaves, render the fruit unacceptable and unmarketable. European Red Mite, *Panonychus ulmi* (ERM) is another serious pest feeding on foliage and thereby reducing

the yield of the plant. Keeping in view the severity of the pests the experiment was undertaken to test the bio efficacy of petro star horticulture mineral oil (HMO), its impact on quality of apple yield and effect on natural enemies in the apple ecosystem of Kashmir Valley. In this study, we tried to find the effect of oils on both SJS and ERM, their natural enemies and ultimately on yield.

MATERIALS AND METHODS

Field trials were laid out in two locations and different seasons i.e. dormant and summer in Shelvat and Shadipora of district Bandipora in Kashmir. The apple trees were pruned during dormant season in the month of December. During dormant season, Bal spray oil were sprayed at 1.5, 2.0, 2.5% concentrations along with standard check H.P oil at 1.5, 2.0, 2.5%, while as during summer bal spray oil were sprayed at 0.5, 0.75, 1.0% concentration along with standard check (H.P Oil) at same concentration against San Jose Scale *Q. perniciosus* European red mite, *P. ulmi* infesting apple variety Red Delicious of 18-20 years old fruit trees at Shelwat & Shadipora (Bandipora) during 2017. The pesticide molecule were sprayed with the help of motorized sprayer and over wintered eggs/live ERM population were counted from the samples from each tree and egg/adult mite population was observed under binocular one day before application of pesticide spray and at subsequent intervals. Post count observations were also recorded. The experiment was laid in RBD with 7 treatments and 3 replications both during dormant and

summer season. Percent mortality was worked out by computing the difference between pre and post treatment population of the pest.

RESULTS AND DISCUSSION

Effect of bal spray oil against San jose scale (SJS) and European red mite (ERM)

On the basis of pooled data of 2017-18 revealed that highest cumulative mean mortality (80.13%) was recorded with the application of bal-spray oil at concentration of 2.5% followed by 77.35% mortality of SJS @ 2.0% concentration of bal spray oil while as

standard check H.P @ 2.5% concentration exhibited 79.73% cumulative mean mortality of SJS. and lowest cumulative mean mortality of 75.24% @ 1.5% concentration of Code-391 for both the years (Fig-1). On the basis of pooled data for both years 2017-18 revealed that highest cumulative mean mortality (88.01%) was recorded with the application of bal spray oil at concentration of 2.5% followed by 83.24% mortality of ERM @ 2.0% concentration of Code-391 while as standard check H.P @ 2.5% concentration exhibited 83.32% cumulative mean mortality of ERM. and lowest cumulative mean mortality of 76.94 % @ 1.5% concentration of bal-spray oil for both the years (Table 1).

Table 1. Bioefficacy of Bal-spray oil (Dormant stage) against European Red Mite (ERM) on apple at Bandipora

Treatment (HMO)	Concentration. (%)	Per cent mean hatchability		Per cent mean mortality		Pooled mean	Yield (A –grade boxes)
		Shelwat	Shadipora	Shelwat	Shadipora		
Bal Spray oil	1.5	22.55	23.33	73.20	76.70	74.95	8.00
	2.0	12.09	21.86	81.25	78.14	79.69	12.00
	2.5	8.82	17.66	87.84	82.34	85.09	12.33
H.P oil	1.5	22.16	34.47	67.38	65.52	66.45	8.00
	2.0	16.06	29.04	73.90	70.95	72.42	10.33
	2.5	8.57	23.47	81.25	76.52	78.88	12.00
Check		87.52	81.81	10.43	18.18	14.30	4.33
CD (P=0.05)		(3.55)	(3.48)	(2.24)	(2.11)		

Effect of delayed dormant oils on natural enemy complex of SJS and ERM

Pooled effect of bal-spray oil besides H.P as standard check and water as control were evaluated against natural enemy complex of San Jose Scale (SJS) and European red mite(ERM) at Bandipora during 2017-18. Bal-spray oil @ 1.00% concentration resulted in highest cumulative mean mortality of natural enemies (NE) (38.18%) of SJS , While as code-391 @ 0.75% concentration exhibited 29.08% cumulative mean mortality NE of SJS. on the other side bal-spray oil @ 1.00% concentration resulted in cumulative mean mortality of NE (35.49%) of ERM

, While as code-391 @ 0.75% concentration exhibited 28.75% cumulative mean mortality natural enemies(NE) of ERM (Table 2).

Effect of delayed dormant oils on yield

Pooled effect of bal spray oil besides H.P as standard check and water as control were evaluated on quality of apple yield. Bal spray oil @ 1.00% recorded 13.83 boxes of A quality while as the same molecule recorded 12.5 a grade boxes. On the other side Standard check H.P @ 1.00% recorded 13.66 Of A grade boxes while as control recorded 3.83 A grade boxes (Table 2).

Table 2. Toxicity of Bal-spray oil against natural enemies of ERM and San Jose Scale on apple cv. Red Delicious at Bandipora

Treatment (HMO)	Concentration (%)	Mortality of SJS natural enemies (%)		Pooled mean	Mortality of ERM natural enemies (%)		Pooled mean
		2017	2018		2017	2018	
Bal-spray oil	0.50	25.80	20.97	23.38	27.29	17.83	22.56
	0.75	33.20	24.96	29.08	30.36	27.14	28.75
	1.00	38.19	38.17	38.18	39.22	31.76	35.49
H.P oil	0.50	21.50	25.86	23.68	29.41	21.66	25.53
	0.75	29.49	31.42	30.45	40.82	21.17	30.99
	1.00	33.03	37.10	35.06	48.83	29.89	39.36
Control		0.00	0.00	0.00	0.00	0.00	0.00

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