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Bioefficacy of Different Insecticides Against Fruitfly *Carpomyia vesuviana* Costa (*Tephritidae : Diptera*)

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Ber (*Zizyphus mauritiana* Lamark) is one of the most ancient and common fruits of India, occupying an area of about 22,000 hectares. About 8 insect pests are listed on ber in India (Butani, 1979). Of these, fruitfly *Carpomyia vesuviana* Costa is of much significance, inflicting direct damage to fruits. In India, damage due to fruitfly has been reported as 16.6 per cent (Cv. Gola) in Rajasthan (Sachan, 1984), 80 per cent in Punjab (Batra, 1953) and 100 per cent in South India (Cherian and Sundaram, 1941). Pruthi and Batra (1960) also found fruitfly to be the most serious pest of ber in North-West India. Considering the importance of the pest in the region, a field trial was undertaken to find out effective and economical insecticide against the pest.

The experiment was laid out in Randomised Block Design with seven treatments and four replications at Central Cattle Breeding Farm, N. H. No. 8, Dhamrod, Dist. Surat from the year 1993-94 to 1995-96. Four ber trees (Cv. Gola, spacing : 6 x 6 m) were allotted to each treatment considering one tree as one replication. In all, two sprays of different treatments was given *i.e.,* first coinciding with peanut stage of the fruits when fruitfly infestation normally begins during December-January and second spray 15 days after first spray. For sampling, four branches were tagged one each from each direction per tree and fruits on them were observed for the incidence of fruitfly before and 7, 14, 21 and 28 days after spraying.

The fruits were categorized as damaged by the presence of either oviposition puncture specially during peanut stage or exit holes, maggot inside fruits mainly at fruit maturity. Hence, depending on size and stage of the fruits, all of the above parameters were considered for fruit infestation. As regard the yield, at each picking total fruits were harvested from each four tagged trees. Infested and healthy fruits were separated and weighed treatment-wise and finally yield of healthy fruits were determined on hectare basis. The data obtained on incidence of fruitfly and yield were subjected to statistical analysis. The economics of the treatments were also calculated.

Anova of pooled analysis of the data taken for three consecutive years (Table 1) indicated that all the insecticidal treatments were significantly superior over untreated control in reducing incidence of fruitfly. The per cent infestation of fruitfly was significantly lowest in the treatment of fenthion 0.1%

TABLE 1

Effectiveness and economics of different insecticides against ber fruitfly*.

Treatment and Concentration	Per cent fruits infested	Fruit yield (kg/ha)	Economics of the treatments						
			Quantity of pesticide used for two sprays	Cost of insecticide	Total cost of plant protection	Gross realization	Net realization	Realization over control	CBR
			lit./ha	Rs/ha	Rs/ha	Rs/ha	Rs/ha	Rs/ha	
Neemark 100 E.C. 0.1%	26.829[d] (20.37)	1336.343[c]	1.389	292.61	792.61	13363.43	12570.82	3952.76	1 : 4.99
Malathion 50 E.C. 0.07%	23.263[c] (15.60)	1628.935[b]	1.944	531.37	1031.37	16289.35	15257.98	6639.92	1 : 6.44
Ethofenprox 10 E.C. 0.015%	23.359[c] (15.72)	1318.750[c]	2.083	4277.11	4777.11	13187.50	8410.39	–207.67	1 : –0.04
Quinalphos 20 A.F. 0.5%	22.079[b] (14.13)	1135.417[d]	3.472	2002.16	2502.16	11354.17	8852.01	233.95	1 : 0.09
Endosulfan 35 E.C. 0.07%	21.982[b] (14.01)	1257.176[c]	2.778	863.01	1363.01	12571.76	11208.75	2590.69	1 : 1.90
Fenthion 100 E.C. 0.1%	19.480[a] (11.12)	1797.917[a]	1.389	1314.91	1814.91	17979.17	16164.26	7546.20	1 : 4.16
Contrrol (Water spray)	38.303[e] (38.42)	911.806[e]	—	—	500.00	9118.06	8618.06	—	—
Mean	25.042 (17.92)	1340.906							

* Data based on three years study.

Note : 1. Figures in the parentheses are retransformed mean those outside are the $\text{Sin}^{-1}\sqrt{x}$ transformed mean.
2. Figures with same letter (s) are statistically at par in respective columns.
3. Quantity of spray fluid used : 5 lit. tree.
4. Price of marketable fruits (pooled) : Rs. 10/kg.
5. No. of labour employed per spray : 10.
6. Labour charge Rs. 25 per day (pooled).

(11.12). It was followed by endosulfan 0.07% and quinalphos 0.05%, which were comparable and significantly superior than remaining treatments. As regard the yield, the treatment of fenthion recorded highest healthy fruit yield (1797.917 kg/ha) among all. It was followed by malathion, neemark, ethofenprox, endosulfan and quinalphos. Considering economics of the treatment, malathion 0.07% ranked first (CBR 1 : 6.44) followed by neemark 0.1% (1 : 4.99), fenthion 0.1% (1 : 4.16) and endosulfan 0.07% (1 : 1.90).

Thus, based on the effectiveness and economics of application of insecticides two sprays of any of the above treatments in order of preference can be taken advantage for the control of ber fruitfly. The performance of fenthion in present investigation is in confirmity with those of Patel *et al.*, (1990). Malathion is also reported effected against this pest (Singh *et al.*, 1973 Saxena, 1968, Lakra and Singh, 1981).

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