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EFFICACY OF SELECTED INSECTICIDES AGAINST SAP BEETLES INFESTING LITCHI FRUITS

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ABSTRACT

Investigation was carried out to study the efficacy of selected insecticides against sap beetles *Carpophilus* spp. infesting litchi during 2013 at BRA University, Muzaffarpur. It is evident from the findings that Dimethoate (0.04%) exhibited the best response with minimum fruit infestation (11.2%) followed by Carbaryl (0.3%) with 14.2 per cent infested fruits as compared to other insecticides included in the trial. Both these treatments outyielded the rest.

Keywords : Litchi, sap beetles, *Carpophilus,* infestation, Insecticides

INTRODUCTION

Litchi (*Litchi chinesis* Sonn) an important sub–tropical fruit crop belonging to family Sapindaceae, is believed to have originated in China. In India, litchi was introduced by the end of 17th century through Burma, and from there, it spread to many countries. India and China account for more than 90 per cent of the world litchi production, but it is mainly marketed locally. In India, 428,900 metric tonnes of litchi is produced annually from 56,200 hectares. In India, litchi ranks 7th in area and 9th in production among fruit crops but in value terms, it ranks sixth. At national level, banana and mango are the most important fruits, but in Bihar litchi is considered to be the most important fruit as it contributes significantly to total fruit production. Litchi is confined to a few states with 74 per cent of production recorded in Bihar. Besides Bihar, litchi is cultivated in certain parts of U.P., Uttrakhand, Tripura, Assam, West Bengal and Punjab. In Bihar, litchi is mainly cultivated in the districts of Muzaffarpur, Sitamarhi, Darbhanga, Smastipur, Vaishali, East Champaran & West Champaran. According to Thaper (1960), the other countries which cultivate litchi crop besides China and India are Madagascar, Burma, USA (Hawaii island), Jamaica and Brazil. Sinha (1982) reported that litchi is grown in Thailand, South Japan, Formosa, Newzealand, South Africa, Mauritius, Australia and West Indies.

Litchi is an important fruit from the health point of view as it helps to fight various diseases like cancer, heart disease, digestive problems and skin diseases. Kumar (2014) reported that litchi fruits contain 70 per cent pulp, which is very delicious and sweet having sugar contents that vary from 10–15 per cent and protein 1.5 per cent. It is a good source of vitamin C, riboflavin, thiamine and also contains rich quantity of phosphorus, calcium and iron (Singh and Sah, 1982). Kumar and Lall (1988) reported various borer pests of litchi fruits in Bihar viz. *Carpophilus obsoletus*, *Carpophilus mutilates*, *Platypepla illepida*, *Ephestia Cautella* and *Dacus dorsalis*. According to Kumar *et al* (1990) *Carpophilus hemipterus* Linn is also a serious litchi borer pest in North Bihar. *Carpophilus* beetles also infest stone fruits (Hossain *et al*, 2013). It is evident that *Carpophilus* spp. are very destructive to litchi fruits in Bihar. In view of the seriousness of the problem present investigations were carried out to minimize the degree of infestation of litchi fruits by using different insecticides.

MATERIALS AND METHODS

To evaluate the comparative efficacy of certain insecticides to control the infestation of litchi fruits by sap beetles (*Carpophilus* spp.) an insecticidal trial was conducted in a randomized block design as post fruiting treatment in litchi orchard at Kanhauli (Muzaffarpur) in the first week of April, 2013. The space between plant to plant was 10 metres and row to row was 8 metres. Insecticides included in the trial were :

T1 = Thiometon (0.08%)

T2 = Trichlorophenol (0.1%)

T3 = Methyl demeton (0.02%)

T4 = Dimethoate (0.04%)

T5 = Phosphamidon (0.05%)

T6 = Malatnion (0.1%)

Table 1. Efficacy of selected insecticides as post fruiting treatment against the litchi fruit infestation by *Carpophilus* spp. during 2013

Treatments	Dosage	percentage of fruit infestation under each replicate					Average % of infestation	Average fruit yield / tree in kgs
		1	2	3	4	5		
Thiometon T1	0.08%	24 (29.33)	29 (32.58)	35 (36.27)	32 (34.45)	20 (26.56)	28 (31.84)	63.7
Trichlorophenol T2	0.1%	20 (26.56)	24 (29.33)	32 (34.45)	19 (25.84)	22 (27.97)	23.4 (28.83)	69.4
Methyl demeton T3	0.02%	17 (24.35)	15 (22.79)	22 (27.97)	25 (30.00)	16 (23.58)	19 (25.74)	73.9
Dimethoate T4	0.04%	12 (20.27)	9 (17.46)	7 (15.34)	15 (22.79)	13 (21.13)	11.2 (19.40)	84.5
Phosphamidon T5	0.05%	19 (25.84)	24 (29.33)	28 (31.95)	34 (35.67)	36 (36.87)	28.2 (31.93)	63.5
Malathion T6	0.1%	24 (29.33)	30 (33.21)	26 (30.66)	34 (35.67)	35 (36.27)	29.8 (33.05)	62.7
Carbaryl T7	0.3%	14 (21.97)	12 (20.27)	17 (24.35)	15 (22.79)	13 (21.13)	14.2 (22.10)	80.6
Check (Untreated) T8	–	40 (39.23)	37 (37.47)	36 (36.87)	36 (36.87)	35 (36.27)	36.8 37.34)	54.1

( ) denotes the value of angular transformation ($\sin^{-1}\sqrt{P}$)

The percentage of infestation in different treatments with respect to check under different replicates has been calculated and the analysis has been done accordingly.

S.E per plot = 3.01

S.E. Tr. mean = 1.35

C.D. at 5% = 3.91

C.D. at 1% = 5.28

T4	T7	T3	T2	T1	T5	T6	T8
19.40	22.10	25.74	28.83	31.84	31.93	33.05	37.34

T7 = Carbaryl (0.3%)

T8 = Check

There were eight treatments including check. Each treatment was replicated five times. The trees with young litchi fruits were sprayed with recommended concentration of selected insecticides with power sprayer. At the time of harvest of litchi fruits in the month of June 2013, one hundred litchi fruits were harvested from each replicate of all treatments and brought to the laboratory. Number of healthy and infested fruits were separated and counted under each treatment. Then percentage of infestation was estimated. Average yield of litchi fruits / tree was also estimated under each treatment.

RESULTS AND DISCUSSION

Data have been summarized in Table 1 and Figure–1. It is evident from the data that the average fruit infestation of the treated trees was comparatively lower in comparison to untreated ones. Dimethoate (0.04%) gave the best response followed by Carbaryl (0.3%) as compared to other insecticides included in the trial. The percentage of fruit infestation was significantly lowest 11.2 when treated with Dimethoate while 14.2 with carbaryl. From statistical analysis, it is also apparent that Dimethoate treatment was and highly significant. Average yield of litchi fruits / tree was maximum (84.5 kgs) in Dimethoate while the untreated trees gave minimum yield (54.1 kg fruits / tree). From the data of the Table 1, it is also evident that when percentage of fruit infestation decreases, average yield of fruits / tree increases. According to Rajagopal and Channabasavanna (1977) four applications with carbofuran granules at a rate of 1 kg / acre at 20 days intervals after sowing of maize gave good control of the maize pests including the sap beetles (*Carpophilus* spp.). Kehat *et al.* (1976) reported that pirimiphos methyl (0.1%) and azinphos methyl (0.5%) were efficient in controlling nitidulide (*Carpophilus hemipterus*, *C. mutilates* and *Urophorus humeralis*). Vincent & Lindgreen (1972) reported that the sap beetles (*Carpophilus* spp.) were controlled by ethyl formate. According to Kehat *et al.* (1987) one treatment of Azinophos methyl (25% w.p.) applied two months before

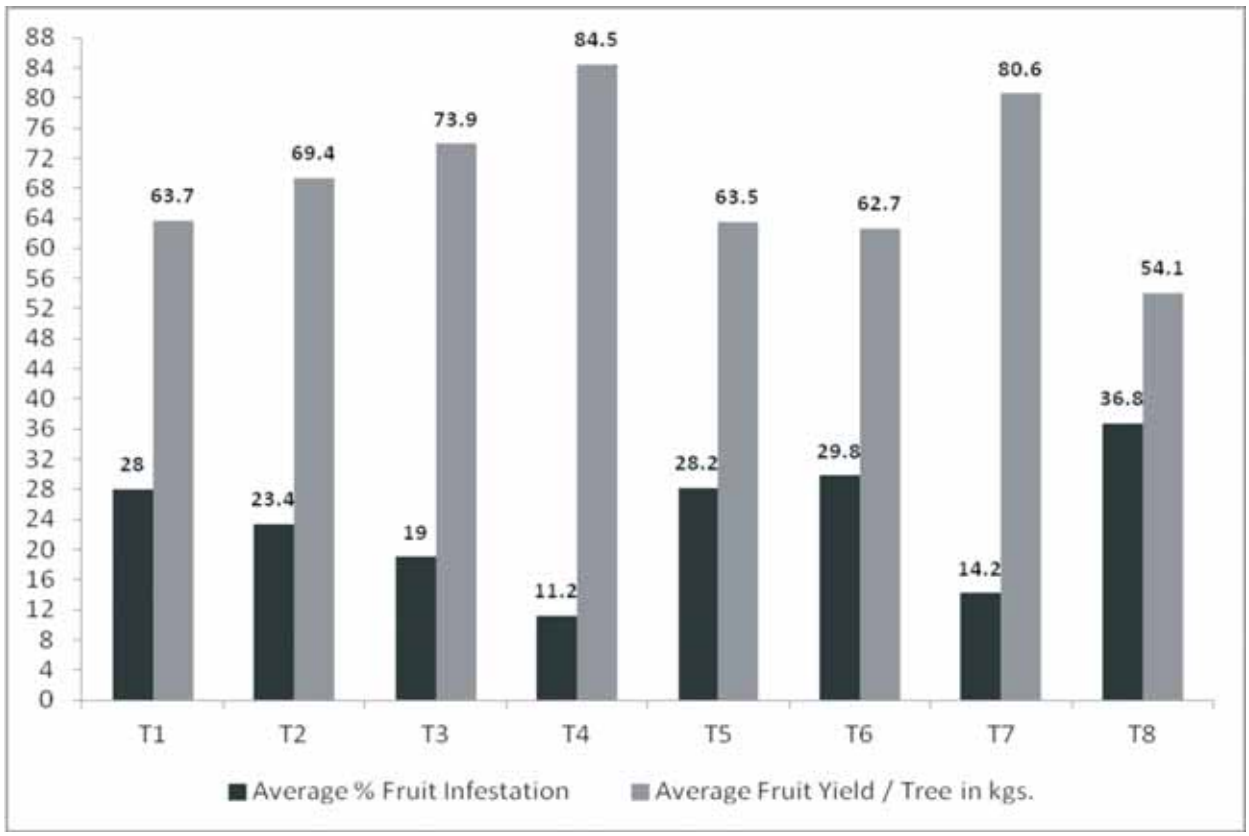

Figure 1. Efficacy of Different Insecticides Against the Litchi fruit infestation by the Sap Beetle (*Carpophilus* spp.) Abbreviations : T1 = Thiometon, T2 = Trichlorophenol, T3 = Methyl Demeton, T4 = Dimethoate, T5 = Phosphamidon, T6 = Malathion, T7 = Carbaryl, T8 = Check

harvest of dates gave better control of *Carpophilus* spp. Kumar (2014) reported that Dimethoate (Rogor) gave effective response in controlling litchi fruit borer *Platypepla illepida*.

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