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## Evaluation of chemical insecticides in combination with lures and bait against fruit fly

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#### Abstract

The research investigation entitled “evaluation of chemical insecticides in combination with lures and bait against fruit fly” consisting of 6 treatments in 3 replication, T1 [Dichlorvos (DDVP) + Lure (attractant) + Jaggery], T2 [Lamdacyhalothrin + Lure (attractant) + Jaggery], T3 [Cypermethrin + Lure (attractant) + Jaggery], T4 [Spinosad + Lure (attractant) + Jaggery], T5 [Lure (attractant) + Jaggery] and T6 [untreated control] was conducted during 2016-17 and 2017-18 at farmer’s field of Jamanpada, Borigawtha, Rambhas and Raygadh villages of Waghai taluka (The Dangs). Fruit flies catches was observed more in DDVP + Lure + Jaggery (T1) as compared to other chemical insecticides in bitter gourd. Further, Cypermethrin + Lure + Jaggery (T3) showed comparatively higher performance whereas, Lamda cyhalothrin + Lure + Jaggery (T2) and Lure + Jaggery (T5) showed comparatively lower performance in managing fruit fly population on bitter gourd as compared to DDVP + Lure + Jaggery (T1).

**Keywords:** Lure, bait, fruit fly, bitter gourd

#### Introduction

Cucurbits, a common name given to a number of crops belonging to family *cucurbitaceae* which mostly possess trailing habit, are extensively grown all over the tropical and subtropical countries and include the largest number of summer and rainy season vegetables. Cucurbits in general are a good source of vitamin A and C and various vital minerals. Cucurbitaceous vegetables are consumed in various forms, *i.e.* salad, sweet, pickles, deserts and culinary purpose.

Cucurbitaceous crops are attacked by a number of insect pests and mites but fortunately, in India only fruit flies and few species of beetles are of economic importance; aphids and blister beetles though of regular occurrence, seldom cause severe damage, rest of the insect pests and mites are of minor importance (Butani and Jotwani, 1984) [3]. Fruit flies belonging to dipteran family *Tephritidae* (*Trypetidae*) are recognized as one of the most important group of pests of cucurbits. There are over 4000 species of fruit flies in the world (Norrbom *et al.*, 1998) [12], of which about 5 per cent occurs in India (Ramani, 1998) [13]. Senior-white (1924) listed 87 species of Tephritidae in India. The family is divided into three subfamilies viz; Dacinae, Tephritinae and *Trypetinae*. Melon fruit fly, *B. cucurbitae* damages over 81 plant species, but plants belonging to the family *Cucurbitaceae* are preferred most (Allwood *et al.*, 1999) [2]. Fruit flies have been identified as one the most serious pests owing to their polyphagous nature and huge economic losses varying from 30 to 100 per cent depending upon the crop and season (Dhillon *et al.* 2005) [6]. This pest is reported to cause 59.5% in bitter gourd (Lall and Sinha, 1959) [8]. More than 50% damage to cucurbits (Narayanan and Batra, 1960) and 60% infestation in bitter gourd (Gupta *et al.*, 1992) [7].

The fruits of cucurbits are picked up at shorter intervals for marketing and self-consumption. *B. cucurbitae* has become threat to the intensive agriculture. Several management techniques are being applied against this pest, because three of its life stages are hidden and the only adult stage is the usual target for its management. Therefore, it is difficult to rely on insecticides as a means management. Several researchers have worked on the effectiveness of different insecticides (malathion, dichlorvos, phosphamidon, cypermethrin, spinosad, endosulfan, carbaryl, quinalphos, carbofuran, dicotophos, trichlorfon, formathion, diflubenzuron, triazophos, fenthion, endosulfan neem oil, etc.) for the control of *B. cucurbitae* infesting cucurbits (Agarwal *et al.*, 1987; Bhatnagar and Yadava, 1992; Talpur *et al.*, 1994; Reddy, 1997; Borah, 1998 and Mishra and Singh, 1999; Sookar *et al.*, 2002; Nath *et al.*, 2007) [1, 4, 5, 9].

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11, 14, 15, 16]. Under this management option, *i.e.* soft insecticides with lures can be employed to keep the pest population below economic threshold in a particular crop over a period of time to avoid the crop losses without health and environmental hazards, which is the immediate concern of the farmers.

### Materials and methods

The research investigation consisting of 6 treatments in 3 repetition, T1 [DDVP + Lure (attractant) + Jaggery], T2 [Lamdacylhalothrin + Lure (attractant) + Jaggery], T3 [Cypermethrin + Lure (attractant) + Jaggery], T4 [Spinosad + Lure (attractant) + Jaggery], T5 [Lure (attractant) + Jaggery] and T6 [untreated control] was conducted at farmer's field of Jamanpada, Borigawtha, Rambhas and Raygadh villages of Waghai taluka (The Dangs), Gujarat during 2016-17 and 2017-18.

Different treatments were given by making traps from above mention treatment combination 6:4:1 [*i.e.* 6 (Jaggery): 4 (Lure): 1 (insecticides)] and hanged out into the field. For each treatment, in plot of 2 m x 2 m size 4 traps were hanged at equidistance. First application was given at 50 per cent fruit set and followed by another two application at one month interval. Numbers of flies trapped were counted after 48 hours of each application and the data were analysed statistically by using statistical method RBD.

### Results and Discussion

The results based on catches of fruit flies during 2016-17 and 2017-18 revealed that DDVP was found most effective against fruit fly as compared to the other chemicals. Results showed that the highest number of cucurbit fruit flies were

trapped with an average of 4.01 flies per trap in the treatment T1 (DDVP + Lure + Jaggery) which was significantly different from all other treatments as compared to untreated control (average 0.75 flies/ trap) in the year 2016-17 (Table 1). On the other hand, the lowest numbers of cucurbit fruit flies per trap were trapped with an average of 1.46 flies per trap in the treatment T5 (Lure + Jaggery). Results also showed that T3 (Cypermethrin + Lure + Jaggery) showed comparatively higher performance (average 3.40 flies/ trap) in controlling cucurbit fruit fly. The efficacy of insecticides treatments can be rated as DDVP + Lure + Jaggery (4.01) > Cypermethrin + Lure + Jaggery (3.40) > Spinosad + Lure + Jaggery (3.11) > Lamdacylhalothrin + Lure + Jaggery (2.21) > Lure + Jaggery (1.46) > untreated control (0.75) flies per trap. During 2017-18, similar trend was observed. The highest numbers of cucurbit fruit flies were trapped with an average of 3.83 flies per trap in the treatment T1 (DDVP + Lure + Jaggery) which was significantly different from all other treatments as compared to untreated control (average 0.71 flies). Similarly, lowest numbers of cucurbit fruit flies were trapped with an average of 1.71 flies per trap in treatment T5 (Lure + Jaggery). Results also showed that T3 (Cypermethrin + Lure + Jaggery) showed comparatively higher performance with an average of 3.11 flies which was at par with treatment T4 (Spinosad + Lure + Jaggery) with an average of 3.09 flies per trap in managing cucurbit fruit fly. The efficacy of chemical baits were in the order of DDVP + Lure + Jaggery (3.83) > Cypermethrin + Lure + Jaggery (3.11) > Spinosad + Lure + Jaggery (3.09) > Lamdacylhalothrin + Lure + Jaggery (2.41) > Lure + Jaggery (1.71) > untreated control (0.71) flies per trap.

**Table 1:** Effect of different chemical insecticides in combination with lures and bait against fruit fly in bitter gourd

Treatments		Numbers of Fruit fly catches/ 48 hours								
		2016-2017				2017-2018				Pooled Mean
		T1	T2	T3	Mean	T1	T2	T3	Mean	
T1	DDVP + Lure +Jaggery	4.15	3.96	3.93	4.01	3.86	4.00	3.64	3.83	3.92
T2	Lamda cyhalothrin + Lure +Jaggery	2.00	2.63	2.00	2.21	2.23	2.87	2.14	2.41	2.31
T3	Cypermethrin + Lure +Jaggery	3.31	3.45	3.45	3.40	3.27	2.87	3.19	3.11	3.26
T4	Spinosad + Lure +Jaggery	3.06	3.15	3.12	3.11	2.86	3.16	3.24	3.09	3.10
T5	Lure +Jaggery	1.49	1.48	1.41	1.46	1.61	1.48	2.04	1.71	1.59
T6	Untreated control	0.71	0.84	0.71	0.75	0.71	0.71	0.71	0.71	0.73
SEm ±		0.16	0.15	0.19	0.10	0.14	0.19	0.20	0.15	0.09
CD		0.49	0.46	0.58	0.27	0.43	0.58	0.61	0.48	0.27
CV		13.32	11.74	15.76	13.64	11.67	15.21	16.15	14.52	14.09

T1,T2,T3= average of 4 traps, first application (T1) was given at 50 per cent fruit set and followed by another two application (T2 and T3) at one month interval

Two years pooled (2016-17 and 2017-18) results showed that the highest number of cucurbit fruit flies were trapped (average 3.92 flies per trap) in the treatment T1 (DDVP + Lure + Jaggery) which was significantly different from all other treatments as compared to untreated control (average 0.73 flies/ trap). However, the lowest number of cucurbit fruit fly was trapped with an average of 1.59 flies in the treatment T5 (Lure + Jaggery). Results also revealed that T3 (Cypermethrin + Lure + Jaggery) showed relatively higher performance (average 3.26 flies/ trap) which was at par with treatment T4 (Spinosad + Lure + Jaggery) as compared to untreated control (average 0.73 flies/ trap) in managing cucurbit fruit fly. The efficacy of chemical baits was in the order of DDVP + Lure +Jaggery (3.92) > Cypermethrin + Lure + Jaggery (3.26) > Spinosad + Lure + Jaggery (3.10) > Lamda cyhalothrin + Lure + Jaggery (2.31) > Lure + Jaggery

(1.59) > untreated control (0.73) flies per trap. These results indicated that DDVP + Lure +Jaggery (T1) was effective in managing the fruit flies during both the years of investigation as compared to other chemical insecticides.

Thus, from the above results on evaluation of chemical insecticides + lures + bait against fruit fly, it was found that fruit flies catches was observed more in DDVP + Lure + Jaggery (T1) as compared to other chemical insecticides in bitter gourd. Further, Cypermethrin + Lure + Jaggery (T3) showed comparatively higher performance whereas, Lamdacylhalothrin + Lure + Jaggery (T2) and Lure + Jaggery (T5) showed comparatively lower performance in managing fruit fly population on bitter gourd as compared to DDVP + Lure + Jaggery (T1). In past, Nath *et al.* (2007) <sup>[11]</sup>. Reported that the schedule consisting of NSKE 5%, bait spray (Malathion 50 g + molasses 500 g + 50 L water) and

cypermethrin applied one after another *i.e.*, first, second and third spray, respectively resulted in minimum fruit damage by the fruit fly. Similarly, Agarwal *et al.* (1987) <sup>[1]</sup>. Reported that the Fenthion, Dichlorovos, Phosphamidon and Endosulfan are effectively used for the control of melon fly. Thus, the present finding is in concurrence with above reports. In contrast, Sookar *et al.* (2002) <sup>[15]</sup>. Revealed that the Spinosad bait formulation was found most effective in capturing the fruit flies as compared with other treatments. DDVP was effective due to their higher volatile content than other insecticides.

### Conclusion

Among the selected combination of insecticides with lure, higher fruit flies catches was observed in DDVP + Lure + Jaggery as compared to other chemical insecticides in bitter gourd. So, this can be effectively utilized in managing fruit flies.

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