Efficacy of botanicals extracts mixture with panchagavya against shoot and fruit borer, *Earias vittella* (Fab.) on bhendi under *in vitro* condition

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ABSTRACT

Shoot and fruit borer, *Earias vittella* (Fab.) is a commonly encountered and economically important insect pest of Bhendi. Bhendi producers typically apply botanicals as mixture with panchagavya to mitigate *E.vittella* populations; however, there is limited information available on the compatibility and efficacy of commonly used botanicals extract mixture with panchagavya**.** This study assessed five binary botanical extracts mixture with panchagavya used *in vitro* which included botanical extracts containing panchagavya, neem leaf extract per cent, *Prosophis* leaf extract 5%, *Calotropis* leaf extract per cent, Pungam oil per cent and NSKE per cent. Fruit disc no-choice method was performed in a laboratory using bhendi fruit to determine the antifeedant activity and per cent mortality of botanicals extracts mixture with panchagavya agains *E. vittella*. The results indicated that all binary mixtures recorded visibly the highest per cent of antifeedant activity in NLE (5%) + panchagavya (3%) (65.11%) on par with NSKE (5%) (64.84%) and the highest mortality was recorded in panchagavya (3%) + NSKE (5%) (83.33%), followed by pungam oil (3%) + panchagavya 3 per cent (66.67%) and NLE (5%) + panchagavya (3%) (53.33%). The results indicated that these botanicals extracts mixture with panchagavya give good results for the management of *E. vittella*.

Keywords: Bioassays, Botanicals extract mixture, antifeedant, *E. vittella*, invitro.

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INTRODUCTION

Vegetables constitute an important item of our food, supplying vitamins, carbohydrates and minerals needed for a balanced diet. Their value is important specially in under developed and developing countries like India, where malnutrition abounds (Masood Khan *et al.*, 2001). Among them vegetable crops grown in India, Bhendi *Abelmoschus esculentus* (L.) Moench or okra or lady's finger belongs to the family Malvaceae and its origin is Africa.

Among the various biotic and abiotic stresses that constrained the successful cultivation of bhendi crop, one of the important limiting factors in the cultivation of okra is insect pests. More than a hundred insect species have been reported as pests of bhendi (Santoshkumar *et al*., 2013). There are a few insect pests such as leaf hopper, aphid, white fly, shoot & fruit borer and spider mite, which cause much damage in bhendi. Among them, shoot and fruit borer (*Earias vittella* Fab.) is considered a major pest which causes severe damage to crop (Shitole and Patel, 2009). *E. vittella* alone is reported to cause 13.8 to 41.6 per cent net yield loss in bhendi (Rai *et al*., 2010).

Besides, the use of chemical insecticides is not advisable in bhendi crops which might lead to serious problems of residue deposition in fruits. It has now become necessary that locally available botanicals extract with panchagavya combination be used for the management of *E. vittella*. Therefore, some botanicals extract with panchagavya combination were tested against Shoot and

fruit borer *E. vittella* on bhendi to find out antifeedent activity and per cent moetaity

METRIALS AND METHODS

Preliminary antifeedent and mortality activities of panchagavya alone and in combination with plant extract were studied with fruit disc no choice method. The following were the treatments: T1- Panchagavya (3%) + Neem leaf extract (5%),cT2- Panchagavya (3%) + *Prosophis* leaf extract (5%), T3- Panchagavya (3%) + *Calotropis* leaf extract (5%), T4- Panchagavya (3%) + Pungam oil (3%), T5- Panchagavya (3%) + NSKE (5%), T6- Panchagavya (3%) (alone), and T7- control.

The experiment was conducted by following the fruit disc no-choice method of Muthu *et al*. (2015). In each plastic petri dish, a wet filter paper was placed to avoid early drying of the test materials. There were 10 number of 3rd instar larvae (pre starved in 12 hours) introduced into each petri dish containing five discs of bhendi fruit treated with prepared extracts. Three replications were maintained for each treatment. The following formula was used to work out the per cent antifeedent activity and per cent mortality (Pazhanisamy, 2015).

$$\text{Antifeedent activity} = \frac{\text{Consumption in Control} - \text{Consumption in treated}}{\text{Consumption in control}} \times 100$$

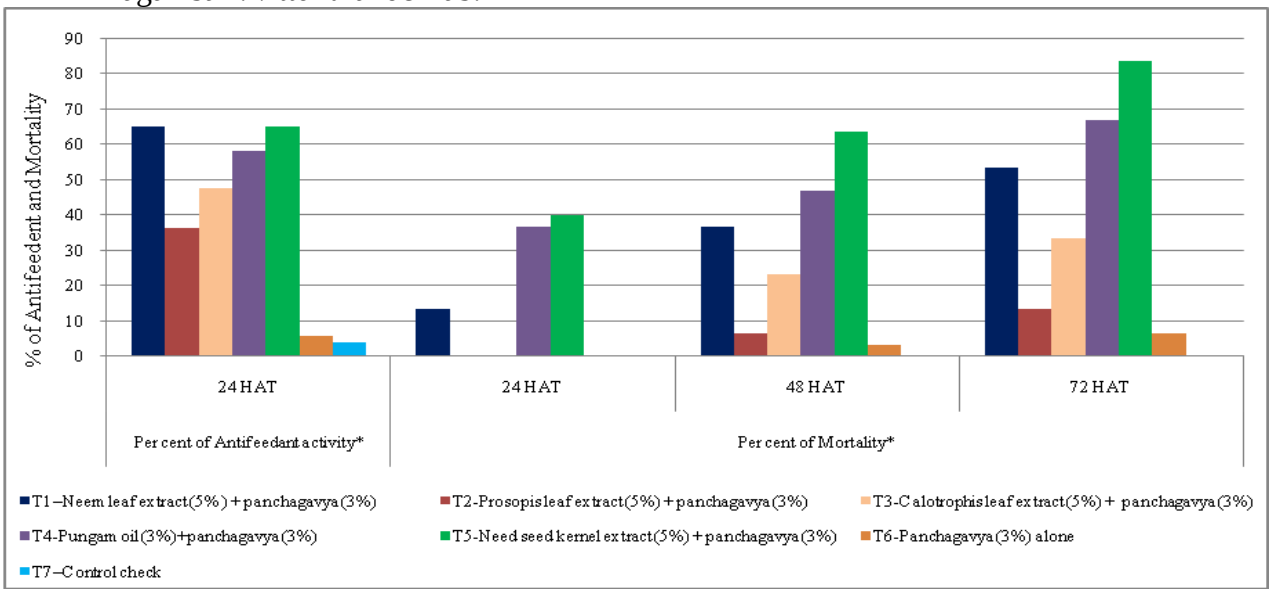
Per cent morality = (Observed mortality in treatment)/(Total number of larvae released per treatment) ×100

RESULTS AND DISSCUSSION

Bioefficacy of panchagavya alone and its combination of plant products against *E. vittella* under lab condition revealed substantial reductions in all treatments of *E. vittella* population (Table 1). Among the treatments, the highest per cent of antifeedant activity was recorded in NLE (5%) + panchagavya (3%) on par with NSKE (5%) followed by pungam oil (3%) + panchagavya (3%) and CLE 5%+ panchagavya compared to untreated check at 24 HAT. The present findings are in consonance with those of Bharati (2005) who reported high antifeedant property in NSKE in combination with panchagavya after 24 hours treatment. Similarly, Umamageswari *et al*. (2008) reported that neem (*A. indica)* exhibited deterring and repelling activities against *E. vittella* on bhendi.

Among the treatments, the highest mortality was recorded in panchagavya (3%) + NSKE (5%) followed by pungam oil 3% + panchagavya 3% and NLE 5% + panchagavya 3%. The least mortality was recorded on at PLE 5% + panchagavya 3% on par with panchagavya 3% alone at 72 HAT after the treatment (**Fig.** 1).

Fig.1. Studies on the efficacy of panchagavya alone and in combination with plant products against *E. vittella* under lab.



The combinations of panchagavya alone and in combination with plant products were moderate in action and long lasting. The panchagavaya was stimulated the plant product deterrent activities. It is evident from the results that NSKE, NLE, pungam oil, and C. gigentia with panchagavya contain potential insecticidal properties and therefore, hold promise for exploitation in the management of E. vittella on bhendi. The results are in conformity with Sajjan (2006) who recorded maximum larval mortality on *P. xylostella* at 5th day after treatment with panchagavya (5%) + NSKE (5%) followed by NSKE (5%) + cow urine (10%) and panchagavya (3%) + NSKE (5%), respectively. Similarly, Bharati (2005) reported that maximum larval mortality on *S. litura.* with panchagavya + NSKE. Mudigourda et al. (2009) reported that P+NSKE treated field recorded the very low incidence of sorghum shoot fly (*Atherigona soccata*) and the highest yield of 14.16 q/ha of sorgh.

The result made it clear that application of panchagavya (3%) + NSKE (5%) effectively suppressed *E. vittella* on bhendi.

Table 1. Activity of panchagavya alone and in combination with plant products against *E. vittella* under lab

Treatment	Per cent of Antifeedant activity*	Per cent of Mortality*		
	24 HAT	24 HAT	48 HAT	72 HAT
T1–Neem leaf extract (5%) + panchagavya (3%)	65.11^{a}	13.33^{b}	36.67^{a}	53.33^{a}
T2-*Prosopis* leaf extract (5%) + panchagavya (3%)	36.13^{c}	0.00^{c}	6.67^{c}	13.33^{bc}
T3-*Calotrophis* leaf extract (5%) + panchagavya (3%)	47.39^{b}	0.00^{c}	23.33^{b}	33.33^{b}
T4-Pungam oil (3%)+panchagavya (3%)	58.17^{ab}	36.67^{a}	46.67^{a}	66.67^{b}
T5-Need seed kernel extract (5%) + panchagavya (3%)	64.84^{a}	40.00^{a}	63.33^{a}	83.33^{a}
T6-Panchagavya (3%) alone	5.95^{d}	0.00^{c}	3.33^{c}	6.67^{bc}
T7–Control check	3.99^{d}	0.00^{c}	0.00^{c}	0.00^{c}
SE(d)	2.767	2.659	5.472	4.512
CD (0.05%)	6.021	5.795	11.923	9.831

*Mean of three replications

Figures in parentheses are arcsine (x + 0.5) transformed values, mean in column followed by common letter are not significantly different at the 5 per cent level (DMRT), HAT- Hour after treatment.

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