Panchagavya combination against Spodoptera litura

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Evaluation of aqueous botanical extracts with panchagavya combination against tobacco caterpillar, *Spodoptera litura* Fab.

Sathya, S., Pazhanisamy, M. and Archunan, K.

ABSTRACT

Spodoptera litura (Fab.) is a commonly encountered and economically important insect pest of Black Gram. Black Gram producers typically use botanicals as mixture with panchagavya to mitigate *S. litura* population. The compatibility and efficacy of commonly used botanicals extracts mixture were evaluated with panchagavya *in vitro* which include botanical extracts containing *Cleistanthus collinue* leaf extract (5%) combination with panchagavya @ 5%, neem oil 3% + panchagavya 5%, pungam oil 3%+ panchagavya 5%, *Ocimum sanctum* extract 5% + panchagavya 5%, *Calotrophis gigantea* extract 5%+ panchagavya 5% has been studied for the pest management. Leaf disc with no choice method performed in a laboratory using Black gram to determine the per cent mortality of botanicals extract mixture with panchagavya against *S. litura.* The results indicated that all binary mixtures recorded visibly the highest per cent mortality in Neem oil 3% + panchagavya 3% followed by *Cleistanthus collinue* Extract 5%+ panchagavya 5%, Pungam oil 3% + panchagavya 5% and *Ocimum* 5% extract + panchagavya 5%. The botanicals extracts mixture with panchagavya was found to show the maximum percentage mortality against *S. litura*

Keywords: *In vitro* study, Botanical extracts, Panchagavya, *S. litura,* Percent mortality.

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INTRODUCTION

Pulses are rich in proteins and are the second most important constituent of Indian diet after cereals. Among the different pulses, black gram is a rich source of protein which is one of the essential nutrients of human diet. Black gram contributes 10% to the national pulse production and is widely distributed throughout tropical Asia, Australia, and the Pacific islands (Akibode *et al*., 2011).Black gram is attacked by many important insect pests that cause serious damage and reduction in yield. In India quantitative available losses (7-35%) Caused by insect pests complex in black gram vary with different agro-climatic conditions (Khajuria *et al*., 2015). On an average 2.5 to 3.0 million tonnes of pulses are lost annually due to pest problems (Mohapatra *et al*., 2018).

The annual yield loss due to insect pests ranges from 15.62 to 30.96 % with an average of 24.03 % in black gram (Duraimurugan and Tyagi, 2014). *S. litura* alone causes yield losses upto 70% in black gram, as reported by Kitturmathu (2007). Additionally, in the process of developing any pest management programme for a specific agro-ecosystem, information on abundance and distribution of pest in relation to weather parameters is a basic requirement (Patel and Shekh, 2006). Various insecticides are used to combat this pest but continuous use of insecticides results in the development of resistance in *S. litura* (Prasad and Gowda, 2006). It has now become necessary that locally available botanicals extract with panchagavya combination tested against *S. litura* on Black gram to find out per cent mortality.

MATERIALS AND METHODS

The bioefficacy of panchagavya alone and in combination with botanical extracts were studied with leaf disc no choice method. Different treatments *viz.*, T_1 -Neem oil 3% + panchagavya 3%, T_2 - *Ocimum sanctum* 5% extract + panchagavya 5%, T_3 - Vasambu Extract 5% + panchagavya 5%, T_4 - Pungam Oil 3% + panchagavya 5%, T_5 - *Cleistanthus collinue* Extract 5%+ panchagavya 5%, T_6 – *Calotrophis gigantea* 5%+ panchagavya 5%, T_7 –Panchagavya and T_8 – Control. The experiment was conducted under laboratory conditions and maintaining the mass culturing of *S. liutra* with three lifecycles and theird instar larvae were tested in petri dish using a blackgram leaf disc. A wet filter paper was placed to avoid early drying of the test materials. Three replications were maintained for each treatment. The following formula was used to work out the per cent mortality (Pazhanisamy, 2015). The laboratory data collected were transformed into angular as per the standard requisites (Gomez and Gomez, 1984).

$$\text{Per cent mortality} = \frac{\text{Observed mortality in treatment}}{\text{No. of larvae released /treatment}} \times 100$$

RESULTS AND DISCUSSION

Bioefficacy of panchagavya alone and its combination mixture of plant products against *S. litura* under laboratory conditions revealed substantial reductions in all treatments of *S.litura* population (Table 1). The highest per cent mortality was recorded with neem oil 3% + panchagavya 5% followed by *C. collinue* leaf extract 5% + panchagavya 5% and pungam oil 3% + panchagavya 5% at 24 HAT. At 72 HAT, the highest mortality was observed in *C. collinus* leaf extract @ 5% followed by neem oil 3% + panchagavya 5%, *O. Sanctum* + panchagavya 5%, *C. gigantea* + panchagavya 5%. In overall the maximum mean per cent mortality was by *C. collinus* 5% + panchagavya 5%, pungam oil 3% + panchagavya 5%, *O. Sanctum* extract 5%+ panchagavya 5%, *C. gigantea* extract 5% + panchagavya 5%. This result was in agreement with that of Ahirwar *et al.* (2011) who reported that the leaf extract of *C. collinus* to be effective against rice caseworm. Similarly, Pazhanisamy and Archunan (2019) observed the highest mortality of shoot and fruit borer in bhendi as recorded in panchagavya (3%) + NSKE (5%), followed by pungam oil (3%) + panchagavya 3% and NLE (5%) + panchagavya (3%). Among these results of *in vitro* studies indicated that neem oil @ 3% + panchagavya @ 5% caused followed by *C. collinue* leaf extract @ 5% + panchagavya @ 5% and pungam oil @ 3% + panchagavya @ 5% at 72 HAT after the treatment. Similiar results were reported effect by Bharathi (2005). Panchagavya + NSKE was found to relatively higher mortality of *S. litura* larvae followed by panchagavya + *Vitex negundo* and *Calotrophis* in groundnut and soybean. Sajjan (2006) reported maximum larval **mortality** of 98.89, 95.45 and 95.45 per cent with application of panchagavya (5%) + NSKE (5%), NSKE (5%) + cow urine (10%) and panchagavya (3%) + NSKE (5%) respectively at the end of the 5th day. While treatment with only panchagavya 3% and 5% alone and cow urine 10% alone were less effective by recording least larval mortality (0.00, 16.34% and 13.01%, respectively). Bharathi *et al.* (2007) observed that panchagavya alone @ 4.5 % showed the lowest per cent larval mortality against *S. litura* on soybean. Azadirachtin acts as a natural antifeedant and insect growth regulator. The antifeedant action affects the feeding and mating behaviour and post embryonic development by altering the mating process and fecundity whereas Hummel *et al.* (2012) the panchagavya exhibits enhance phagostimulant properties and cause feeding activity due to increase the per cent mortality of *S. litura*. The result showed that treatment of neem oil @ 3% + panchagavya @ 5% has relatively higher mortality and can be effective against *S. litura* in blackgram

Figure 1 Studies on the insecticidal activity of some aqueous herbal extracts combination with panchagavya against *S. litura* under laboratory conditions.

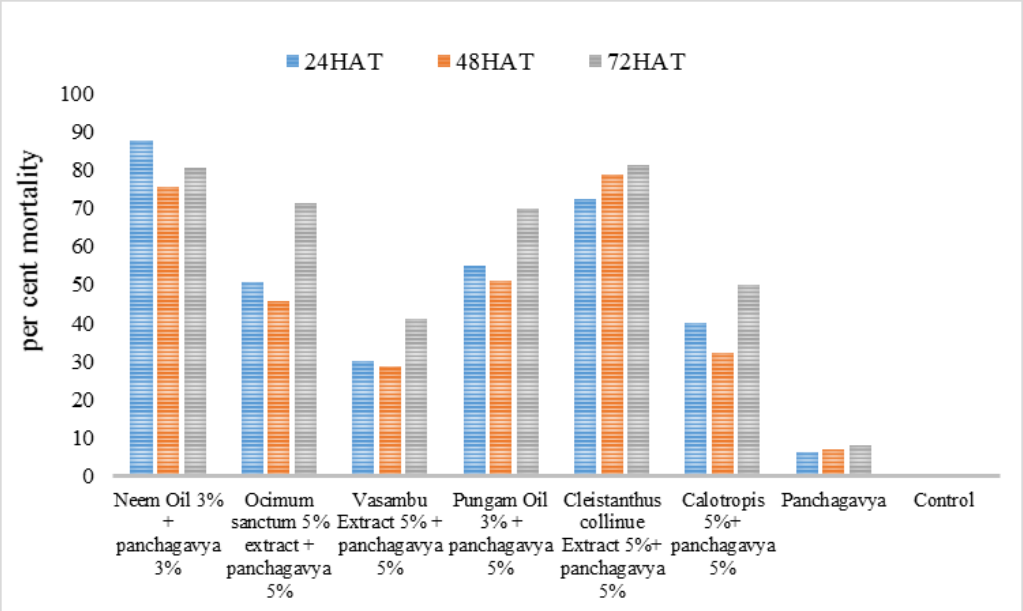

Table 1. Studies on the insecticidal activity of different aqueous botanical extracts combination with Panchagavya against *S. litura* under lab conditions

Treatments	Per cent mortality over control			Means per cent mortality
	24 HAT	48 HAT	72 HAT	
Neem Oil 3% + panchagavya 3%	87.66	75.45	80.53	81.21
Ocimum sanctum 5% extract + panchagavya 5%	50.66	45.66	71.23	55.85
Vasambu Extract 5% + panchagavya 5%	30.15	28.56	41.22	33.31
Pungam Oil 3% + panchagavya 5%	55.00	51.00	70.00	58.66
Cleistanthus collinue Extract 5%+ panchagavya 5%	72.35	78.90	81.23	77.49
Calotropis 5%+ panchagavya 5%	40.00	32.30	50.00	40.76
Panchagavya	6.50	7.20	8.00	7.20
Control	0	0	0	
Seed CD (0.01)	1.18	1.39	1.95	
	3.62	4.27	5.96	

***** Mean of three replications, Means in column followed by a common letter are not significantly different at the 5 per cent level (DMRT), HAT- Hour After Treatment

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