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EFFICACY OF PONGAMIA OIL SOAP AGAINST *EARIAS VITELLA AND HELICOVERPA ARMIGERA* IN OKRA

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ABSTRACT

Field evaluation of pongamia oil soap against *Earias vitella* and *Helicoverpa armigera* infesting okra was carried out during 2018-19 at the Instructional farm in College of Agriculture, Padannakkad. The treatments consisted of 0.6, 1 and 2% pongamia oil soap, Neem oil soap (0.6%); soap solution (0.5%); quinalphos (0.05%) and control (water). Fourteen days after the third application the shoot damage was found lowest in quinalphos 25EC 0.05% (7.32) followed by pongamia oil soap 2% (12.86) and fruit damage was found lowest in quinalphos 25EC 0.05% (6.41) followed by pongamia oil soap 2% (9.60). The reduction in fruit and shoot damage may be due to the feeding deterrency of pongamia oil which remained effective for seven days and thereafter declined.

Key words: *Earias vitella*, *Helicoverpa armigera*, okra, pongamia oil soap, neem oil soap, quinalphos, soap solution, fruit damage, shoot damage, feeding deterrency

Okra (*Abelmoschus esculentus* (L). is one of the most important vegetable crops. With more than 60% India is the leading producer (Australian Government Department of Agriculture, 2023). According to Sharma et al. (2010), the okra shoot and fruit borer (*Earias vitella)* alone resulted in an estimated loss of 69% in the marketable yield in India. Ecologically safe approaches such as biopesticides, botanicals, etc., must be used (Khade et al., 2014). Pongamia oil is a thick yellowish red/brown non-edible fixed oil, extracted from the seeds of *Pongamia pinnata.* This exhibits insecticidal and antifeedent properties against several agriculturally important pests due to the bioactive compounds such as karanjin and pongamol (Mathur et al*.,* 1990). It is safe to non-target organisms including humans and other mammals (Tripathi et al., 2012). Hence, the present study evaluates the efficacy of a new product made of pongamia oil - pongamia oil soap at different concentrations in combating.

MATERIALS AND METHODS

Field efficacy of pongamia oil soap against *E. vitella* and *Helicoverpa armigera* on okra during rabi and summer of 2018-19 was evaluated at the Instructional farm in College of Agriculture, Padannakkad. The treatments applied were: T_1: Pongamia oil soap 0.6% (6g/ l); T_2: Pongamia oil soap 1% (10g/ l); T_3: Pongamia oil soap 2% (20g/ l); T_4: Neem oil soap 0.6% (6g/ l); T_5: Soap solution 0.5% (5ml/ l); T_6: Quinalphos 25 EC @ 0.05% (Standard check) and T_7: Control (Water). The experiment was in randomized block design (RBD) with four replications (32 plants/ treatment) and a plot size of 2.4 x 1.8 m. The variety Arka Anamika was raised with all recommended practices (KAU, 2016) except plant protection measures. Altogether, three sprays starting from 30 days after sowing (DAS) at 25 days interval were applied by using high volume knapsack sprayer during evening hours. A total of 16 plants were randomly tagged for observations. Data on % fruit and shoot damage were recorded at 7 and 14 days after spraying. The data was analyzed after arc sine transformation and pooled analysis was done.

RESULTS AND DISCUSSION

The pooled data on shoot and fruit infestation by *E. vitella* and *H. armigera* during rabi and summer season revealed that fourteen days after the third spray, treatment with quinalphos 25 EC @ 0.05% showed the lowest shoot (7.34) and fruit damage (6.41) (Table 1). This is followed by pongamia oil soap 2% (12.86, 9.60). Similar findings were reported by Rahman et al. (2013) on quinalphos 25EC compared to that of neem leaf extract. Eswarareddy and Shrinivasa (2004) reported that spraying of neem oil 2% was highly effective in reducing damage by *Leucinodes orbonalis* followed by pongamia oil 2% after three applications during summer season. Neem oil soap 0.6% (23.80, 15.89) and pongamia oil soap 0.6% (25.89, 14.06) had the same effect on reducing shoot and damage throughout both seasons suggesting that pongamia oil soap has benefits that are comparable to those of neem oil soap at the same concentrations. The findings of Sahana and Tayde (2017) stated that infestation of brinjal shoot and fruit was lowest in spinosad treatment while the next effective treatments were neem oil 3% and pongamia oil 3%. Soap solution 0.5% (42.76, 30.63) did not exhibit any deterrent effect as it was similar to control. According to Kushwaha and Painkra (2016) shoot and fruit damage caused by *L. orbonalis* was lower in cypermethrin 25EC which was on par with neem oil 4% water emulsion and was followed by NSKE 5% and pongamia oil 5% water emulsion. Shoot infection peaked during the crop's vegetative and early reproductive stages, and it gradually declined as the season progressed. By the end of the season, fruits were found to be heavily infested. Early in the season, fruit damage was caused by *E. vitella*, whereas fruit damage later in the season was caused by the fruit borer *H. armigera*. This study derives support from Sreedevi (2011) who stated that the incidence of *E. vitella* started from the vegetative stage and continued till fruit formation stage. The results of this study indicate that pongamia oil soap 2% can be recommended for the control of shoot and fruit borer in an IPM program.

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AUTHOR CONTRIBUTION STATEMENT

Conceived and designed the analysis (A.T., K.M.S.); Performed work, collected data, and wrote the manuscript (A.T.); Corrected the paper (K.M.S.). All authors have read and agreed to publish of the manuscript.

CONFLICT OF INTEREST

The authors declare that they have no conflicts of interest.

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Table 1. Pooled analysis of shoot damage (%) and fruit damage (%) caused by *E. vitella* (rabi and summer 2018 and 2019)

Treatments	Damaged shoots% (Mean of observations of 16 plants)						Damaged fruits% (Mean of observations of 16 plants)			
	First spray		Second spray		Third spray		Second spray		Third spray	
	7 DAA	14 DAA	7 DAA	14 DAA	7 DAA	14 DAA	7 DAA	14 DAA	7 DAA	14 DAA
Pongamia oil soap 0.6%	33.33^{b}	39.84^{b}	27.34^{b}	29.17^{b}	23.39^{b}	25.89^{b}	8.67^{b}	10.24^{b}	11.85^{b}	14.06^{b}
Pongamia oil soap 1%	29.95^{bc}	34.90^{b}	23.18^{b}	25.26^{b}	17.86^{c}	19.95^{c}	7.14^{c}	8.47^{bc}	10.42^{bc}	11.04^{c}
Pongamia oil soap 2%	25.52^{c}	31.25^{b}	13.07^{c}	16.72^{c}	10.42^{d}	12.86^{d}	5.43^{d}	6.82^{c}	8.75^{c}	9.60^{c}
Neem oil soap 0.6%	35.94^{b}	38.28^{b}	23.39^{b}	28.02^{b}	21.15^{b}	23.80^{bc}	8.67^{b}	9.71^{b}	13.11^{b}	15.89^{b}
Soap solution 0.5%	47.92^{a}	52.03^{a}	38.85^{a}	44.06^{a}	40.10^{a}	42.76^{a}	13.33^{a}	15.10^{a}	30.63^{a}	30.63^{a}
Quinalphos 25 EC 0.05%	18.18^{d}	17.97^{c}	8.70^{c}	10.89^{d}	5.63^{e}	7.34^{d}	3.96^{e}	4.10^{d}	5.31^{d}	6.41^{d}
Control	48.96^{a}	51.30^{a}	37.86^{a}	42.14^{a}	37.66^{a}	41.41^{a}	13.85^{a}	13.65^{a}	30.05^{a}	31.72^{a}
CD(T x S)	8.52	8.02	8.37	10.54	8.64	8.21	2.13	1.14	2.65	2.26

DAA – Days after Application; CD – Critical difference; T- Treatment; S – Season; Means superscripted by similar letters are not significantly different at 5 % level of DMRT (p = 0.05)

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