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Bioefficacy of some indigenous products in the management of okra fruit borers

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A B S T R A C T

A field experiment was conducted in kharif, 2003 at Main Agricultural Research Station, University of Agricultural Sciences, Dharwad to evaluate the bioefficacy of some indigenous products against okra fruit borers, *Earias vittella* Fabricius and *Helicoverpa armigera* Hubner. Different indigenous products like NSKE (5%), GCKE, sweet flag extract (5%), garlic extract (5%), cow dung (10%) and cow urine (10%) were tried individually and in combinations along with endosulfan (0.07%) and untreated control. Repeated sprays of GCKE recorded least number of eggs (1.40 eggs/plant) followed by NSKE (5%) alternated with cow dung 10 per cent (1.71 eggs/plant). Repeated sprays of cow dung and cow urine used individually were not effective against the borers and recorded higher fruit damage of 55.70 and 52.10 per cent, respectively. GCKE was significantly superior in reducing the fruit borer damage to the tune of 64.83 per cent with higher fruit yield of 35.87 q.ha^{-1}. The highest incremental benefit: cost ratio was noticed in endosulfan treatment (15.00) followed by treatment involving NSKE alternated with cow urine 10% (13.00), repeated sprays of GCKE (10) and NSKE alternated with cow dung 10% (7.90).

Introduction

Okra, *Abelmoschus esculentus* L. Moench is one of the popular and commercially cultivated vegetable crops. There are many constraints in the production of the crop, of which fruit borers such as *Earias vittella* Fabricius, *E. insulana* Boisduval and, *Helicoverpa armigera* Hubner cause both quantitative and qualitative losses. The failure of modern tactics has compelled the scientific community to go back to the traditional and indigenous products for tackling the pest problem. Indigenous agriculture is the agriculture system that has developed over time with cropping pattern and status of pest, based on traditional knowledge and experience of the native people (Warren, 1986). Pradhan *et al*. (1962) discovered the antifeedent properties of neem, *Azadirachta indica* against locust swarms. Cow urine and cow dung were reported to be effective for insect control as reported by Peries (1985) and Rankin (1986), respectively. Lakshmanan (2001) reported effectiveness of garlic bulb extract alone or in combination with other plant extracts in managing lepidopteran pests viz., *E. vittella*, *Chilo partellus* Swinhoe, *H. armigera* and *S. litura*. There is a vast potential in the traditional methods practiced in rural India that can be included for combating the pest problems. In view of this the present studies were planned to evaluate the performance of indigenous products.

Material and Methods

Experiment was conducted to evaluate indigenous technologies on okra fruit borers, *E. vittella* and *H. armigera* during kharif 2003 at the Main Agricultural Research Station (MARS), University of Agricultural Sciences, Dharwad. The field experiment was laid out in randomized block design with three replications. The variety Arka Anamika was used for the present study. Plots of 3 x 2.25 m were made for each treatment and the crop was sown keeping 45 x 30 cm between rows and between plants, respectively. Nine indigenous sprays were tested along with a standard chemical check, endosulfan 35EC and untreated check against the fruit borers. The treatments were imposed 30 days after crop emergence. The treatments consisting of only one indigenous material were repeated at an interval of 10 days while the treatments consisting of two indigenous materials were alternated at an interval of 10 days and were imposed four times.

Five plants were randomly selected for each treatment for recording number of eggs and larvae of both the fruit borers separately per plant, a day before, 3 and 7 days after each spray. Average egg and larval populations were worked out. At the time of harvest number of fruits damaged per plant and total number of fruits per plant were recorded to calculate the fruit damage. The fruits were harvested as and when they

reached the picking size and then converted the yield on hectare basis. The data were subjected for statistical analysis and also worked out monitory benefits.

Results and Discussion

The mean value of egg population indicated in table 1 showed that among indigenous sprays repeated sprays of GCKE recorded least number of eggs of *H. Armigera* (1.40 eggs/ plant) followed by NSKE (5%) alternated with cow dung 10 per cent (1.71 eggs/plant). However, endosulfan (0.07%) was significantly superior over the other treatments in reducing the egg load of *H.Armigera* (0.94 eggs/plant). Among indigenous sprays GCKE recorded least larval population of *H. Armigera* (0.49 larvae/plant) followed by NSKE (5%) alternated with cow urine (10%) and cow dung 10 per cent (0.53 and 0.55 larvae/plant). The data on mean egg population of *E. vittella* presented in table 1 *indicated* that GCKE (0.57 eggs/plant) and NSKE alternated with cow dung (10%) (0.57 eggs/plant) were significantly superior among indigenous sprays followed by NSKE alternated with cow urine 10 per cent (0.60 eggs/plant) while the mean larval population of *E. vittella* suggested that repeated sprays of GCKE recorded significantly least number of larvae (0.49 larvae/plant) which was on par with NSKE 5% alternated with cow dung 10 per cent and cow urine 10 per cent in recording 0.47 and 0.50 larvae/plant, respectively.

Among the indigenous sprays repeated sprays of GCKE and NSKE (5 %) alternated with cow urine (10 %) were significantly superior in recording least fruit damage (14.50 % and 15.80%, respectively) with higher reduction of damage (64.83 and 63.26 %, respectively) and were at par with each other. Repeated sprays of cow dung and cow urine were not effective against the borers and recorded higher fruit damage of 55.70 and 52.10 per cent, respectively. The present findings are in accordance with Sadawarte and Sarode (1997) reported that sole application of cow dung (5%) and cow urine (5%) were found ineffective against *H. armigera*. GCKE was significantly superior in reducing the fruit borer damage to the tune of 64.83 per cent with higher fruit yield of 35.87 $q.ha^{-1}$ which was followed by NSKE 5 % sprays alternated with cow urine and cow dung (34.33 $q.ha^{-1}$ and 27.33 $q.ha^{-1}$, respectively). The present finding is in accordance with Rahudkar (1993) who reported that GCKE was found to be highly effective against cotton bollworms. Repeated sprays of cow dung and cow urine were not effective against the borers and recorded 55.70 and 52.10 per cent damage, respectively. The possible reason for GCKE being more effective may be due to the fact that it was used repeatedly while NSKE (5%) was used in alternation with cow dung and cow urine, the later two being ineffective in controlling the fruit borers. GCKE was significantly superior in recording highest yield of 35.87 $q.ha^{-1}$ which was followed by NSKE 5% alternated with cow urine 10% (34.33 $q.ha^{-1}$). The present finding is in accordance with Senguttuvan and Rajendran (1998) who reported that mean yield of okra was maximum (3123 kg ha^{-1}) in NSKE treated plots (Table 2). Among the indigenous sprays, the highest B:C ratio was noticed in NSKE alternated with cow urine 10% (13.00) followed by repeated sprays of GCKE (10) and NSKE alternated with cow dung 10% (7.90). The remaining treatments resulted in lower incremental benefit: cost ratio ranging from 3.40 to 1.60.

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Table 1
Effect of indigenous sprays against *H. armigera and E. vittella on* okra

Treatments	No. of *H. armigera* /plant		No. of *E. vittella* /plant		Fruit damage (%)	Reduction of damage over control (%)
	eggs	larvae	eggs	larvae		
1. Cow dung 10%	2.36^{d}	0.99^{e}	1.11^{e}	1.09^{e}	55.70^{d}	24.26
2. Cow urine 10%	2.35^{d}	1.00^{e}	1.03^{e}	1.01^{e}	52.10^{d}	27.60
3. Garlic 10% - cow dung 10%	1.84^{c}	0.77^{d}	0.79^{d}	0.81^{d}	25.10^{bc}	52.80
4. Garlic 10% - cow urine 10%	1.84^{c}	0.78^{d}	0.82^{d}	0.78^{d}	35.20^{c}	42.90
5. NXKE 5% - cow dung 10%	1.69^{bc}	0.55^{bc}	0.57^{b}	0.50^{b}	36.50^{c}	41.67
6. NSKE 5% - cow urine 10%	1.71^{bc}	0.53^{b}	0.60^{bc}	0.47^{b}	15.80^{ab}	63.26
7. Sweet flag extract 2% - cow dung 10%	2.01^{c}	0.71^{cd}	0.79^{d}	0.69^{d}	36.60^{c}	41.62
8. Sweet flag extract 2% - cow urine 10%	2.01^{c}	0.71^{cd}	0.76^{cd}	0.67^{cd}	36.20^{c}	41.96
9. Garlic 2% + Chilli 3% (kerosene extracts)	1.40^{a}	0.49^{b}	0.57^{b}	0.49^{b}	14.50^{ab}	64.83
10. Engosulfan 35EC @ 0.07%	0.94^{a}	0.26^{a}	0.36^{a}	0.23^{a}	12.40^{a}	67.65
11. Untreated check	3.87^{e}	1.44^{f}	1.75^{f}	1.71^{f}	80.40^{e}	-

— Indicates the sprays are alternated
Means followed by the same alphabet do not differ significantly by DMRT (0.05)

Table 2
Effect of indigenous sprays on okra fruit yield and economics

Treatments	Fruit yield (q.ha^{-1})	Monetary returns over control (Rs. ha^{-1})	Protection cost (Rs. ha^{-1})	B:C Ratio
1. Cow dung 10%	18.30^{f}	1192	800	1.50
2. Cow urine 10%	19.20^{ef}	1912	800	2.40
3. Garlic 10% - cow dung 10%	21.22d^{ef}	3528	2200	1.60
4. Garlic 10% - cow urine 10%	26.13^{cd}	7456	2200	3.40
5. NXKE 5% - cow dung 10%	27.33^{b}	8416	1070	7.90
6. NSKE 5% - cow urine 10%	34.33^{b}	14016	1070	13.00
7. Sweet flag extract 2% - cow dung 10%	24.39^{cde}	6064	2880	2.10
8. Sweet flag extract 2% - cow urine 10%	26.07^{cd}	7408	2880	2.60
9. Garlic 2% + Chilli 3% (kerosene extracts)	35.87^{b}	15248	1504	10.00
10. Engosulfan 35EC @ 0.07%	43.10^{a}	21032	1432	15.00
11. Untreated check	16.81^{f}	0.00	-	-

— Indicates the sprays are alternated
Means followed by the same alphabet do not differ significantly by DMRT (0.05)
Garlic – Rs 20/kg, Neem seeds – Rs 6/kg, Sweet flag – Rs 120/kg, Chilli – Rs 6/kg, Kerosene – Rs 18/l, Endosulfan 35 EC – Rs 220/l, Labour cost – Rs 40 / day and Selling price of okra – Rs 8/kg
* The yields were low owing to dry spell during the crop period