The Journal of Plant Protection Sciences, **1**(1) : 66-68, 2009

journal homepage: www.aappbckv.org/journal

Evaluation of plant products aganist sorghum shoot fly, *Atherigona soccata* Rondani

Shrinivas Mudigoudra and Shekharappa

Senior Scientist (Entomology), Sorghum Research Scheme University of Agricultural Sciences, Dharwad-580 005, Karnataka, India

Keywords: Plant products, evalution, sorghum fruit fly

A B S T R A C T

A field experiment was conducted to evalute the efficacy of different plant products against sorghum shoot fly during Kharif 2005 at University of Agricultural Sciences, Dharwad. The different plant products used in the study were, *Vitex negundo*, NSKE, *Adathoda vesica, Pongamia glabra, Vinca rosea, Butea monosperma, Aloevera* @ 5% concentration and were compared with carbofuran 3 G @ 30 kg. ha^{-1} to know its efficacy on shoot fly in sorghum ecosystem. The results clearly indicated that NSKE (5%) recorded less eggs of shoot fly (0.40egg/plant), per cent dead heart (14.97%) and maximum grain yield of 13.22 $q.ha^{-1}$ among different plant products. The next best plant product was found to be *V. negundo* @ 5% in recording less incidence of shoot fly and obtaining higher grain yield. However, both the treatments were found next best only to carbofuran 3 G.

Introduction

Sorghum [*Sorghum bicolor* (Linn.) Moench] is an important cereal crops of the world. The crop is vulnerable to over 150 insect species from sowing to final harvest (Sharma, 1985). Among the insect pest the shoot fly (*Atherigona soccata* Rondani) is one of the most important and destructive pest at the seedling stage, which causes yield losses of 75.6 percent in grain and 68.6 per cent in fodder as reported by Pawar *et al*. (1984). However, it is very common to see harrowing of sorghum crop due to heavy infestation of fruit fly. The present recommendation of soil application of carbofuran 3G at 30 kg. ha^{-1} is an expensive proposition in view of high cost of insecticide (Anon, 1992).

Due to insect resistance, resurgence, hazardous to natural enemies and environmental pollution, the chemicals don't have any ground in the present pest management strategies. On the other hand these plant products are available locally and farmers can prepare them easily without any cost. Hence, the study was undertaken to evaluate the effectiveness of a different plant products in the management of sorghum shoot fly.

Material and Methods

The field experiment was conducted during *kharif* 2004 at Main Agricultural Research Station, University of Agricultural Sciences, Dharwad. Experiment was laid out in the Randomized Block Design with ten treatments in three replications with a plot size of 4.0×2.25 m. leaving a gangway of 1 m all around the plots. The sorghum cultivar, CSH-16 with a spacing of 45×15 cm was sown during first week of August 2004 by following recommended package of practices for shoot fly control. The treatments were applied with knapsack sprayer using a spray fluid of 500 L. ha^{-1}. The spray was taken at 10 DAE, when the shoot fly infestation commenced. The bioefficacy of different plant products were evaluated in comparison with insecticide as well as untreated control.

Preparation of plant products

Seed extracts

For seed kernel extract (NSKE and *Pongamia glabra*), 50 g of smashed seeds were soaked overnight in one Lit. of distilled water, squeezed through muslin cloth and diluted with distilled water to get a 5 percent concentration of the suspension.

Leaf extracts

Fresh plant materials were collected and brought to the laboratory, washed thoroughly (3-4 times) with tap water and finally with distilled water. Later, they were chopped into small pieces with a sharp knife. Five grams of chopped material was mascerated in pestle and mortar and extracted with a small quantity of distilled water. The extract was squeezed through muslin cloth and made up to 100 ml with distilled water. The filtrate was stored in clean reagent bottles for further use. The

concentration of the suspension so prepared works out to 5 percent.

The above procedure was followed for the leaf extraction of *Vitex negundo*, *Adathoda vesica* Nees, *Vinca rosea*, *Pongamia glabra* Vent., *Butea monospoerma* Koen. and *Aloe vera*. All the plant products were evaluated at 5 percent concentration. Observations on number of eggs per plant, percent deadhearts and grain yield was recorded.

Results and Discussion

Number of eggs per plant

The data on number of eggs per plant on 14 DAE indicated that NSKE (5%) recorded 0.40 eggs per plant and found significantly superior over other treatments except in Carbofuran 3G (30 kg.ha^{-1}), which was on par with NSKE (5%) by recording 0.53 eggs per plant. It was found next best to *V. negundo* (5%) and seed extract of *P. glabra* (5%) was considered next best in reducing oviposition by shoot fly by recording 0.73 egg per plant. Leaf extract of *P. glabra* (5%) was found inferior in reducing egg laying by the pest (1.00 eggs plant). Highest eggs were recorded by untreated control (1.13 eggs per plant) (Table 1).

At 21 DAE, again NSKE (5%) found superior in reducing the shoot fly oviposition by recording 0.60 eggs per plant, 0.87 eggs per plant was recorded in Carbofuran 3G (30 kg ha^{-1}) and was at par with NSKE (5%). Leaf extract of *P. glabra* (5%) found inferior (1.47 eggs/plant) among the treatments tested and was at par with the untreated control (1.67 eggs per plant), which recorded highest eggs per plant (Table 1).

Table 1
Effect of plant products on oviposition of shoot fly

Sl. No.	Treatments	Number of eggs / plant		Mean
		14 DAE	21 DAE	
1.	*Vitex negundo* (5%)	0.73bc (1.31)*	1.00bcd (1.41)*	0.87^{de}
2.	NSKE (5%)	0.40d (1.18)	0.60d (1.26)	0.50^{f}
3.	*A. vesica* (5%)	0.87ab (1.39)	1.20abc (1.49)	1.04^{bcd}
4.	*P. glabra* (seed extract) (5%)	0.73ab (1.36)	1.13bc (1.46)	0.93^{cde}
5.	*Vinca rosea* (5%)	0.87ab (1.39)	1.13bc (1.46)	1.00^{bed}
6.	*P. glabra* (leaf extract) (5%)	1.00ab (1.41)	1.47ab (1.57)	1.24^{ab}
7.	*B. monosperma* (5%)	0.87ab (1.39)	1.20abc (1.48)	1.04^{bcd}
8.	*Aloe vera (5%)*	0.93ab (1.39)	1.33abc (1.52)	1.13^{bc}
9.	Carbofuran 3G at 30 kg/ha	0.53cd (1.23)	0.87cd (1.36)	0.70^{cf}
10.	Untreated Control	1.13a (1.46)	1.67a (1.63)	1.40^{a}
	SE m ±	0.04	0.05	0.03
	CD at 5%	0.13	0.15	0.07

* - Figures in the parenthesis are (vx +1) transformed values.
Means followed by same alphabet in a column do not differ significantly (P = 0.05) by DMRT.
DAE - Days After Emergence.

Percent dead-heart

NSKE (5%) sustained least shoot fly damage (up to 14.92 percent) and was found superior over other treatments, that were at par with Carbofuran 3G (30 kg.ha^{-}) (10.83 percent deadhearts) and 19.97 percent deadhearts was recorded for *V. negundo* (5%). Remaining plant extracts were on par with each other and found superior over untreated control (34.36%) at 21 DAE (Table 2).

On 28 DAE, Carbofuran 3G (30 kg.ha^{-1}) recorded significantly least deadhearts (15.68%). Again NSKE (5%) was found next best in recording least percent of deadhearts (25.93%). *B. monosperma* (5%) and *Aloe vera* was found inferior in reducing shoot fly infestation by recording 38.41 and 37.95 percent deadhearts respectively but superior to untreated control (64.67%), which recorded highest percent deadhearts (Table 2).

Table 2
Evaluation of plant products against shoot fly and yield of sorghum

Sl. No.	Treatments	Per cent dead hearts		Grain yield (q.ha^{-1})
		21 DAE	28 DAE	
1.	*Vitex negundo* (5%)	19.97bc (26.51)**	30.50bc (33.44)**	12.08^{bc}
2.	NSKE (5%)	14.92cd (22.66)	25.93c (30.52)	13.22^{b}
3.	*A. vesica* (5%)	23.35b (28.86)	34.35bc (35.80)	10.56^{cde}
4.	*P. glabra* (seed extract) (5%)	21.28b (27.44)	32.84bc (34.90)	11.45^{cd}
5.	*Vinca rosea* (5%)	25.01b (29.99)	35.29bc (36.42)	10.11^{de}
6.	*P. glabra* (leaf extract) (5%)	25.61b (30.40)	34.20bc (35.77)	9.89^{de}
7.	*B. monosperma* (5%)	26.26b (30.82)	38.41b (38.31)	10.78^{cde}
8.	*Aloe vera* (5%)	26.77b (19.15)	37.95b (38.01)	9.67^{e}
9.	Carbofuran 3G at 30 kg/ha	10.83b (19.15)	15.68d (23.26)	17.00^{a}
10.	Untreated Control	34.36a (35.84)	64.47a (53.52)	6.33^{f}
	SE m ±	1.38	2.00	0.51
	CD at 5%	4.10	5.80	1.51

** - Figures in the parenthesis are Arc- sine transformed values.
Means followed by same alphabet in a column do not differ significantly (P=0.05) by DMRT.
DAE - Days After Emergence.

Grain yield

Sorghum grain yield obtained from the different plant products revealed that NSKE (5%) recorded highest grain yield of 13.22 q.ha^{-1}. The *V. negundo* was found on par with NSKE (5%) by recording 12.08 q.ha^{-1}. Significantly least grain yield was being observed in untreated control 6.33 q.ha^{-1}. The treatments *Aleo vera* (9.67 q.ha^{-1}) and leaf extract of *P. glabra* (5%) (9.89 q.ha^{-1}) found inferior among the tested ones (Table 2).

The supremacy of NSKE was found in confirmation with Subbarayadu (2002) who reported significantly least number of eggs per plant with neem at 5% and 3.75% at 14 DAE compared to neem at 0.5 percent and sorghum intercropped with pigeonpea at different row proportions. Reduction in egg laying and deadhearts by shoot fly on sorghum due to spraying of neem seed extract was also reported by Kulkarni and Bhuti (1981) and Singh and Batra (2001).

The findings were also in confirmation with Anonymous (2001) which reports that *Vitex negundo* spray recorded significantly least per cent dead hearts (25.3%) caused by shoot fly and *Pogamia pinnata* (5%) spray (32.0%) as compared to Carbofuran (30 kg.ha^{-1}) soil application followed by endosulfan spray (0.07%) at flowering (25.0%).

Literature Cited

Anonymous. 1992 *Annual Report (1991-92)*, All India Co-ordinated Research project on Sorghum Improvement, University of Agricultural Sciences, Dharwad, India, 58pp.

Anonymous. 2001 *Annual Report for 2001-02*, All India Co-ordinated Sorghum Improvement Project, NRC on Sorghum Hyderabad, India.

KulkarniKa Bhuti SG. 1981 Evaluation of plant origin repellants for sorghum shoot fly, *Atherigona soccata* Rond. *Sorghum Newsletter* **24** : 73.

Pawar VM Jadhav GD Kadam BS. 1984 Compatibility of Incol 50 SP with different fungicides on sorghum (CS-3541) against shoot fly, *Atherigona soccata* Rond. *Pesticides* **18** : 9-10.

Sharma HC. 1985 Strategies for pest control in sorghum in India. *Tropical Pest Management* **31** : 167-85.

Singh SP Batra GR. 2001 Effect of neem formulations on shoot fly *Atherigona soccata* (Rond.) oviposition and infestation in forage sorghum. *Haryana Agricultural University Journal of Research* **31** : 9-11.

Subbarayadu B Indira S Rana BS. 2002 Effect of integrated pest management modules on the incidence of sorghum shoot fly. *Journal of Research ANGRAU* **30** : 22-29.