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Efficacy of Botanicals and Organic Products against Blister Beetles, *Mylabris* spp. Infesting Okra

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A B S T R A C T

Field experiment was conducted during *kharif* 2016-17 to study the efficacy of the botanicals and organic products viz., Azadiractin 0.15 EC @ 3 ml/L, *Melia* formulation 5 EC @ 3ml/L, *Eupatorium* formulation 5 EC @ 3m/L, three organic products viz., fermented buttermilk @ 50 ml/L, cow urine @ 100 ml/L and panchagavya @ 100 ml/L along with a synthetic insecticide, cypermethrin 25 EC @ 0.4 ml/L and their effect on fruit yield of okra against blister beetle, *Mylabris* spp. at Palampur, Himachal Pradesh. It was found that chemical insecticide proved to be significantly superior and most efficacious treatment in reducing the beetle population by 74.86 per cent and resulted in 16.58 per cent increase in the fruit yield. Azadiractin, *Melia*, *Eupatorium* and organic products were found to be moderately effective with 43.64 to 59.68 per cent population reduction. Cow urine and fermented buttermilk were found to be least effective and also resulted in least amount of increase in the fruit yield of 6.57 and 6.33 per cent.

Introduction

Okra, *Abelmoschus esculentus* L. (Moench) or lady's finger is an economically important malvaceous vegetable crop grown in tropical, sub-tropical and also in the warmer parts of temperate regions in the world. Okra is an extensively grown vegetable all over the country. India ranks first in okra production with an area of 507 thousand hectare and production of 5853 thousand tonnes, thereby contributing 73.6 per cent share in world production. Area under okra crop in Himachal Pradesh is 2.76 thousand hectare with a production of 34.03 thousand tonnes (Anonymous 2015). One of the major biotic constraints of low productivity is the insect-pests cause severe damage from seedling to harvesting stage. In Himachal Pradesh, 26 insect and mite pests belonging to orders Lepidoptera, Hemiptera, Coleoptera, Thysanoptera, Isoptera and Acari infesting okra have been reported, among which, *Mylabris pustulata* Thunbergo, *Amrasca biguttula biguttula* Ishida and *Aphis gossypii* Glover are the major pests (Singh *et al.*, 2016). Blister beetle, *Mylabris* spp. is an important polyphagous pest of okra which attacks the plant at its reproductive stage. The adult beetles are brightly coloured and feed extensively on the reproductive parts of the plant *i.e.* flower petals, flower buds, anthers,

stigma and ovary resulting in drastic yield reduction (Shende, 2013). The flower infestation rate by *Mylabris* spp. varies from 28 to 60 per cent in different host plants. Badiyala (2010) reported 4.45 to 24.05 per cent flower damage by *Mylabris* spp. in okra crop. The management of blister beetle becomes difficult due to its wider host range, high mobility and robustness many chemical pesticides have been reported effective against this pest. Use of synthetic insecticides can be harmful in okra since the fruits are picked regularly at short intervals and also can pose many other problems. While using natural products of plant and animal origin can be a safer alternative for environmentally sound pest management strategies, because of their rapid degradation, lack of persistence and bioaccumulation in the environment and are less likely to harm non-target organisms. Present study has been taken by considering blister beetle as one of the important pest on okra in Himachal Pradesh.

Materials and Methods

Field experiment for the evaluation of natural products and synthetic insecticide was conducted with eight treatments including untreated check with three replication. Three botanical formulations *viz*., Azadirachtin, Melia, Eupatorium; three natural products *viz*., panchgavya, fermented buttermilk and cow urine and one synthetic insecticide, cypermethrin were evaluated (Table 1). An adjuvant (dhanuvit) was added to spray solutions for avoiding its wash-off due to rain.

Observations were taken one day before and after 1, 3 and 6 days of each spray. The observations pertaining to number of beetles on 10 randomly selected plants from each replication were recorded in different treatments and per cent reduction in blister beetle population over untreated check was calculated as per formula:

$$\text{Per cent reduction in population} = \left\{1 - \left(\frac{\text{Post treatment population in treatment}}{\text{Pre-treatment population in treatment}} \times \frac{\text{Pre-treatment population in check}}{\text{Post treatment population in check}}\right)\right\} \times 100$$

Yield data on different pickings was also recorded to work out cumulative yield per plot and converted to hectare basis (q/ ha). The data on per cent reduction in blister beetle population and yield obtained in different treatments were subjected to analysis of variance after transformation through CPCS-1 software as per the procedure suggested by Gomez and Gomez (1984).

Results and Discussion

Seven treatments including three botanicals, three organic products and one synthetic insecticide were evaluated for their efficacy against *Mylabris* spp. on okra. Results revealed that the highest population reduction (74.86 %) of adult *Mylabris* spp. over untreated check was recorded in cypermethrin followed by Azadirachtin (59.68 %). Panchgavya showed a reduction of 51.03 per cent.

Eupatorium and *Melia* were statistically at par with each other resulting in 46.37 and 43.64 per cent reduction in beetle population, respectively. It was found that cow urine and fermented buttermilk were least efficacious than other treatments with population reduction of 24.56 and 18.85 per cent, respectively (Table 2).

The yield in different treatments ranged from 61.76 to 69.35 q/ ha. Highest yield was obtained in cypermethrin 25 EC @ 0.4 ml/ L treated plots (69.35 q/ ha) followed by Azadirachtin 0.15 EC @ 3 ml/ L (68.05 q/ha). The next best treatment with respect to yield was panchgavya @ 100 ml/ L (66.94 q/ ha) followed by Melia @ 3 ml/ L (66.76 q/ha), Eupatorium @ 3 ml/ L (64.13 q/ ha) and cow urine @ 100 ml/ L (61.92 q / ha).

Table.1 Details of natural products and insecticides evaluated

Common name	Trade name	Source	Dose
Azadirachtin	Neem Baan 0.15 EC	Ozone Biotech, Faridabad, Haryana	3 ml/ L
Cow urine (15 days old)	-	Biopesticide laboratory, Department of Organic Agriculture, CSKHPKV Palampur	100 ml/ L
Eupatorium	Eupatorium 5 EC	Biopesticide laboratory, Department of Entomology, CSKHPKV Palampur	3 ml/ L
Fermented buttermilk	-	Department of Organic Agriculture, CSKHPKV Palampur	50 ml/ L
Melia	Melia 5 EC	Department of Entomology, CSKHPKV Palampur	3 ml/ L
Panchgavya	-	Department of Organic Agriculture, CSKHPKV Palampur	100 ml/ L
Cypermethrin	Shancyper-25 EC	Darrick Insecticides Limited, Kathua, Jammu & Kashmir	0.4 ml/ L

Table.2 Per cent reduction in *Mylabris* spp. due to botanicals and organics in okra

Treatment	Per cent reduction of blister beetle population								
	1st spray				2nd spray				Overall mean
	1 DAS	3 DAS	6 DAS	Mean	1 DAS	3 DAS	6 DAS	Mean	
Azadirachtin 0.15 EC	65.38 (54.55)	63.33 (52.48)	52.94 (46.52)	60.55 (51.18)	70.37 (57.17)	63.16 (51.27)	42.86 (40.33)	58.80 (49.59)	59.68 (50.39)
Cow urine	31.64 (33.38)	26.82 (29.97)	13.90 (20.84)	24.12 (28.06)	34.18 (35.94)	22.97 (28.58)	17.86 (25.75)	25.00 (30.09)	24.56 (29.07)
Eupatorium 5 EC	57.88 (49.53)	56.19 (48.30)	38.80 (37.55)	50.95 (45.13)	51.32 (44.27)	36.59 (35.64)	37.42 (36.25)	41.78 (38.72)	46.37 (41.93)
Fermented buttermilk	24.18 (29.08)	19.68 (26.31)	13.03 (20.58)	18.96 (25.32)	22.93 (27.63)	19.30 (25.02)	13.95 (21.65)	18.73 (24.77)	18.85 (25.04)
Melia 5 EC	55.77 (48.18)	50.17 (45.08)	28.97 (31.12)	44.97 (41.46)	53.15 (46.37)	39.47 (40.22)	34.29 (35.89)	42.30 (40.83)	43.64 (41.15)
Panchgavya	57.93 (49.55)	56.19 (48.85)	35.57 (36.23)	49.90 (44.88)	59.43 (50.67)	59.64 (50.08)	37.41 (37.63)	52.16 (45.63)	51.03 (45.25)
Cypermethrin 25 EC	77.88 (61.76)	73.17 (58.44)	66.18 (54.48)	72.41 (58.23)	82.96 (66.01)	81.84 (64.48)	67.14 (55.22)	77.31 (61.90)	74.86 (60.06)
Mean	52.95 (46.58)	49.36 (44.20)	35.63 (35.33)	45.98 (42.04)	53.48 (46.87)	46.14 (42.18)	35.85 (35.89)	45.15 (41.65)	45.57 (41.85)

Values in parentheses are arc sine transformed values
DAS: Days after spray
CD (P= 0.05) = 2.64

Table.3 Effect of different treatments on fruit yield of okra

Treatment	Dosage	Fruit yield (q/ ha)*	Per cent increase in yield over untreated check
Azadirachtin 0.15 EC	3 ml/ L	68.05	14.99
Cow urine	100 ml/ L	61.92	6.57
Eupatorium 5 EC	3 ml/ L	64.13	9.79
Fermented buttermilk	50 ml/ L	61.76	6.33
Melia 5 EC	3 ml/ L	66.76	13.35
Panchgavya	100 ml/ L	66.94	13.58
Cypermethrin 25 EC	0.4 ml/ L	69.35	16.58
Untreated check	-	57.85	-
CD (5 %)		(1.93)	

***** Mean of 3 replications

Lowest yield (61.76 q/ ha) among all the treatments except the untreated check was registered in fermented buttermilk @ 50 ml/ L. Cypermethrin treated plots showed 16.58 per cent increase in yield over untreated check, which was highest among all the treatments. The second highest increase in yield was registered in Azadirachtin (14.99 %), followed by panchgavya (13.58 %), *Melia* (13.35 %), *Eupatorium* (9.79 %), cow urine (6.57 %) and fermented buttermilk (6.33 %) (Table 3).

Results depicted that the chemical insecticide, cypermethrin proved to be significantly superior and most efficacious treatment in reducing beetle population among all the treatments as already reported by Manzoor (2015). Botanicals *viz*., Azadirachtin, *Melia* and *Eupatorium* and organic product, panchgavya were found to be moderately effective, whereas least effective treatments were cow urine and fermented buttermilk. Same results were also reported by Devi *et al.*, (2013). Similar trend was observed in the efficacy of these treatments in terms of yield. The maximum per cent increase over control was achieved by cypermethrin treatment followed by Azadirachtin and minimum in fermented buttermilk. However, all the treatments gave significantly higher yield as compared to the untreated check. Natural and organic products resulted in moderate suppression of blister beetle and can be explored for utilization under organic farming. Due to frequent picking interval, the okra fruits treated with synthetic insecticides may not be safe for human consumption. Hence the use of natural products can be encouraged, but need based use of insecticide at the rate of recommended dose and timing will also keep up the socio-economic condition of the farmers.

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