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Evaluation of cow urine and vermiwash against insect pests of brinjal*

Brinjal (*Solanum melongena* L.) also known as egg plant is considered as king of vegetables. The crop is attacked by number of insect pests right from nursery stage until harvesting. Patel *et al*. (1970) recorded 16 pest species on brinjal crop in Gujarat of which shoot and fruit borer, *Leucinodes orbonalis* Guen., leaf hopper, *Amrasca biguttula biguttula* (Ishida), whitefly, *Bemisia tabaci* Genn., aphid, *Aphis gossypii* Glover, thrips, *Thrips tabaci* Linn. and mite, *Tetranychus cinnabarinus* Boisduval have been recorded as major pests. Attack of these pests reduces its yield and quality of fruits. To combat these pests, chemical control is generally most popular among farming community, but it has many drawbacks. This situation warranted environmentally friendly pest control strategies to mitigate the problems created by chemical control. The use of bio-rational products such as cow-urine and vermiwash is one of the alternatives to chemical pesticides in suppressing the insect pests. Use of cow-urine (Sapre and Varma, 2006; Gupta and Yadav, 2006) and vermiwash (Subsashri, 2004; Pareet 2006 and Meenatchi *et al*., 2010) have been evaluated against insect pests by few workers in past and found encouraging results. No sincere attempt has been made in the past by any worker in Gujarat to assess the impact of cow-urine and vermiwash in suppressing insect pests of brinjal. Hence, the present investigation was intended to fulfill the lacunae and the results obtained are dealt here.

In order to evaluate the impact of cow urine and vermiwash (at 20, 30, 40, and 50% concentration) in suppressing insect pests of brinjal, a field experiment was conducted at Agronomy farm, B. A. College of Agriculture, Anand Agricultural University, Anand (Gujarat) during *kharif* 2011. Vermiwash and cow-urine required for the experiment were obtained from the Agronomy farm and Livestock Research Station farm of Agriculture and Veterinary College of Anand Agricultural University, Anand, respectively. The experiment was laid out in Randomized Block Design replicated thrice. There were total nine treatments including untreated control (check). Gross and net plot sizes were 4.8 x 4.5 and 3.6 x 2.7 m, respectively. Seedlings of brinjal (ABH-1) were transplanted at a spacing of 90 x 60 cm during first week of August 2011. All the recommended agronomical practices except plant protection were followed as and when required. Considering the pest population in experimental area, two sprays were applied on need basis.

Five plants were randomly selected from net plot area of each plot and tagged for recording the observations. The observations on sucking pests and shoot damage due to *L. orbonalis* were recorded prior as well as 5, 7, 10 and 15 days after each spray. For recording the population of sucking pests, 3 leaves (top, middle and bottom canopy of plant) on each tagged plant were critically observed and counted the total number of sucking pests. Based on this, mean number of each sucking pest per leaf was calculated. Similarly, the observations on shoot and fruit incidence was assessed by counting the total number of shoots and damaged shoots on each tagged plant and percentage of damaged shoots were worked out. At the time of harvest, harvested brinjal fruits were observed for the damage caused by fruit borer and per cent fruit damage was worked out. Yield of marketable fruits was recorded plot-wise during each picking. Incremental Cost Benefit Ratio (ICBR) was worked out to know the economics of each treatment.

Mean population of aphid, *A. gossypii* worked out for two sprays indicated that the plots treated with cow urine 50 % registered minimum (1.40 aphids/leaf) population of aphids followed by vermiwash 50 % (1.81 aphids/leaf). Cow urine applied at 30 and 40 % concentration proved equally effective against aphids infesting brinjal, but proved significantly superior over its lower (20 %) concentration. Similarly, vermiwash applied at 30 and 40 % concentration proved equally effective against the pest, but the higher (40 %) concentration of vermiwash proved significantly better than its lower (20 %) concentration in reducing the aphid population. Among the various treatments, cow urine and vermiwash with 20 % concentration proved inferior against *A. gossypii* infesting brinjal, but proved significantly better than untreated control.

Data on leaf hopper, *A. biguttula biguttula* population worked out for two sprays revealed that among the various concentrations of cow urine and vermiwash, cow urine 50% registered significantly least (3.95 hoppers/leaf) population of the pest. Vermiwash at 40 and 50% as well as cow urine at 30 and 40% concentration performed equally effective against leaf hoppers and were at par with each other. Vermiwash and cow urine at 20 % concentration proved least effective against leafhoppers.

Mean number of whitefly, *B. tabaci* calculated based on two sprays indicated that least numbers (3.74 whiteflies/ leaf) were registered in plots treated with cow urine 50% followed by vermiwash 50% (4.21 whiteflies/leaf). These treatments exhibited significantly lesser incidence of whitefly than rest of the treatments except cow urine 40%. Vermiwash sprayed at 20, 30 and 40% concentrations performed equally effective against whitefly infesting brinjal.

Plots treated with cow urine 50% registered minimum (9.26%) numbers of damaged shoots due to *L. orbonalis* followed by vermiwash 50% (11.47 %). Both the treatments differed significantly from rest of the treatments (Table 1). Cow urine at 30 and 40 % concentration proved significantly superior over cow urine applied at 20 %. Significantly least percentage (10.36%) of damaged fruits was registered in plots sprayed with cow urine 50% over rest of the treatments. Cow urine 40% and Vermiwash 50% were also found to be better treatments next to cow-urine 50% in minimizing the incidence of *L. orbonalis* on fruits. Vermiwash and cow urine sprayed at 20 and 30% concentration proved equally effective against the pest.

Maximum fruit yield (25,000 kg/ha) was registered in plots treated with cow-urine 50% followed by cow urine 40%

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Table 1. Impact of different treatments of cow-urine and vermiwash on incidence of pest complex infesting brinjal

Treatments	Mean*number of insects/leaf			Damage (%) by *L. orbonalis*		Fruit yield (kg/ha)	Increase in yield over control (kg/ha)	Gross income (₹/ha)	Cost of treatments (₹/ha)	Net realization (₹/ha)	ICBR
	Aphid	leafhopper	Whitefly	Shoots	Fruits						
Vermiwash @ 20 %	1.90^{de}	2.92^{de}	2.47^{c}	**24.26^{d}	26.71^{d}	16111^{cd}	1296	7776	4400	3376	1: 0.77
	(3.11)***	(8.03)	(5.60)	(16.88)	(20.20)						
Vermiwash @ 30 %	1.75^{d}	2.69^{cd}	2.42^{c}	23.54^{d}	24.17^{c}	17056^{bcd}	2241	13446	6400	7046	1: 1.10
	(2.56)	(6.74)	(5.36)	(15.95)	(16.76)						
Vermiwash @ 40 %	1.64^{bc}	2.59^{bc}	2.35^{bc}	22.98^{cd}	22.20^{b}	18123^{bcd}	3308	19848	8400	11448	1: 1.36
	(2.19)	(6.21)	(5.02)	(15.24)	(14.28)						
Vermiwash @ 50 %	1.52^{ab}	2.39^{b}	2.17^{ab}	19.80^{b}	20.88^{b}	21019^{bc}	6204	37224	10400	26824	1: 2.58
	(1.81)	(5.21)	(4.21)	(11.47)	(12.70)						
Cow urine @ 20 %	1.92^{e}	2.73^{de}	2.45^{c}	23.78^{d}	27.30^{d}	20463^{a-d}	5648	33888	800	33088	1: 41.36
	(3.19)	(6.95)	(5.50)	(16.26)	(21.04)						
Cow urine @ 30 %	1.73^{c}	2.60^{bc}	2.36^{c}	22.98^{c}	24.54^{c}	21296^{abc}	6481	38886	1000	37886	1: 37.89
	(2.49)	(6.26)	(5.07)	(15.24)	(17.25)						
Cow urine @ 40 %	1.61^{bc}	2.49^{bc}	2.27^{ab}	21.69^{c}	21.89^{c}	21716^{ab}	6901	41406	1200	40206	1: 33.51
	(2.09)	(5.70)	(4.65)	(13.66)	(13.90)						
Cow urine @ 50 %	1.38^{a}	2.11^{a}	2.06^{a}	17.72^{a}	18.78^{a}	25000^{a}	10185	61110	1400	59710	1: 42.65
	(1.40)	(3.95)	(3.74)	(9.26)	(10.36)						
Control	1.32^{f}	3.13^{e}	3.06^{d}	28.54^{e}	29.19^{e}	14815^{d}	-	-	-	-	-
	(1.24)	(9.30)	(8.86)	(22.83)	(23.79)						
S.Em.±	0.05	0.08	0.07	0.63	0.52	1898.99	-	-	-	-	-
C.D. at 5 %	0.16	0.23	0.20	1.77	1.45	5693.35	-	-	-	-	-
C.V. (%)	8.85	10.64	11.28	11.70	11.92	16.86	-	-	-	-	-

Market price of brinjal- ₹ 6/kg; Labour charge ₹ 100/day; Vermiwash ₹ 20/lit and Cow urine ₹ 2/ lit,

*Mean of two sprays, **Figures outside the parentheses are arcsine transformed values whereas those in parentheses are re-transformed values,

***Figures are $\sqrt{x + 0.5}$ transformed values whereas those in parentheses are re-transformed values,

Treatment means with letter(s) in common are not significant by DMRT at 5% level of significance

(21,716 kg/ha) and 30% (21,296 kg/ha). These treatments exhibited significantly higher yields over untreated check. Plots sprayed with vermiwash at 20, 30 and 40% concentration produced marketable fruit yield ranging from 16,111 to 18,123 kg/ha (Table 1).

From the above, it can be concluded that the sucking pets as well as shoot and fruit borer incidence in brinjal crop were found to be suppressed and consequently obtained the higher yields from the plots treated with cow urine and vermiwash at 50% concentration. Both the bio-products at 30 and 40% concentrations proved moderately effective against the pests. None of the earlier worker has evaluated the impact of cow urine and vermiwash against insect pests of brinjal. However, few workers have tested its impact against insect pests other than brinjal crop and documented their potential against various pests. Reduction in insect population on different crops by using cow urine has been reported by Gupta and Yadav (2006), Lal and Verma (2006) and Ahirwar *et al*. (2010). Similarly, the effectiveness of vermiwash against insect pests of brinjal (Pareet, 2006), chilli (Saumya *et al*., 2007) and soybean (Meenatchi, *et al*., 2010) has been documented in past. All these reports are in accordance with the above findings.

Economics (Table 1) of various treatments of cow urine and vermiwash revealed that maximum ICBR with highest net realization (₹ 59710/ha) was found in cow urine 50% (1:42.65) followed by cow urine 20% (1:41.36) and 30% (1:37.89). Cow urine 40% ranked next to cow urine 50% by exhibiting adequate net realization but failed to exhibit higher ICBR as it showed minimum (1:33.51) ICBR value amongst the different treatments of cow urine. Vermiwash 50% alone showed above 2.0 ICBR value.

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