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Evaluation of Ecofriendly Agents against Spiralling Whitefly, *Aleurodicus dispersus* Russell on Brinjal

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Experiments were conducted to assess the biological efficacy of various botanicals, fish oil rosin soap (FORS) and organic salt against spiralling whitefly, *Aleurodicus dispersus* Russell on brinjal. Two field trials were carried out at Kinathukadavu, Coimbatore district, Tamil Nadu during 2011-2012 (Field trial - 1) and Eastern Block, TNAU, Coimbatore, Tamil Nadu during 2012-2013 (Field trial - 2). Neem seed kernel extract (NSKE) 5% recorded significantly maximum mortality of *A. dispersus* at 10 days after treatment (DAT) in both field trial - 1 (79.10 per cent) and field trial - 2 at TNAU, Coimbatore, Tamil Nadu (84.46 per cent) compared to other treatments. Organic salt recorded (74.60 per cent) mortality in field trial - 1, whereas in field trial - 2 azadirachtin 0.03% (77.66 per cent) and neem oil 3% (78.16 per cent) at 10 DAT. CTCRI cassava extract recorded significantly minimum mortality at 10 DAT in field trial - 1 (63.11 per cent), whereas CTCRI cassava extract (68.41 per cent) and organic salt (69.34 per cent) recorded lowest mortality of *A. dispersus* population in field trial - 2.

Key words: *Aleurodicus dispersus*, botanicals, fish oil rosin soap, organic salt, bioefficacy, mortality, brinjal

The spiraling whitefly, *Aleurodicus dispersus* Russell (Homoptera: Aleyrodidae) is a highly polyphagous pest, which has extensive host range covering 481 plants (Srinivasa, 2000). Nymphs and adults suck the sap from the leaves causing damage to several crops particularly cassava, brinjal, chillies, mulberry, guava, banana, papaya, coconut, groundnut, etc. in peninsular India (Mani and Krishnamoorthy, 1999; Mani, 2010). A loss of 80 per cent in fruit yield was recorded in guava attacked by *A. dispersus* in four continuous months in Taiwan (Wen *et al*., 1995). Geetha (2000) reported that heavy incidences of the whitefly caused yield reductions up to 53 per cent in cassava. Management of polyphagous, invasive pests like *A. dispersus* is more difficult because of the multitude of host plants that grow wild in nature and support the buildup of the pests. Wen *et al*. (1995) reported that among ecofriendly agents, 50 per cent neem oil 200x mixed with Triton 3000x gave the best control of *A. dispersus*. Kavitha Kirubavathy *et al*. (1999) reported that the neem products *viz*., 2% and 3% neem oil (NO), 2% neem seed kernel extract (NSKE) and neem oil (2%) + NSKE (3%) were effective in suppressing the nymphal and adult *A. dispersus* population. Application of tobacco extract (4%) was effective in minimizing the *A. dispersus* (Muralikrishna, 1999). Researchers are now concentrating to identify effective and safe chemicals with less hazards to the environment and non-target organisms. The present study was hence conducted with the principal objective to assess the biological efficacy of various botanicals, FORS and an organic salt against *A. dispersus* on brinjal.

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Materials and Methods

Field experiments were conducted in two locations *viz*., field trial - 1 at Kinathukadavu, Coimbatore district, Tamil Nadu during 2011-2012 and field trial - 2 at Research farm (Eastern Block), Tamil Nadu Agricultural University (TNAU), Coimbatore, Tamil Nadu, India during 2012- 2013. Brinjal seedlings (var. Pusa Purple Round) were transplanted in 4 x 5 m plots at a spacing of 60×60 cm. Unless otherwise indicated, each treatment of a trial was applied to four replicated plots arranged in a randomized block design (RBD) . All the recommended agricultural practices were followed while raising the crop. Observations on *A. dispersus* population were recorded in three leaves (top, middle and bottom) of 5 tagged plants per plot or replication. Pre-treatment observations on *A. dispersus* population were made 24 hours before spraying, while post treatment observations were made 3, 5, 7, 10 and 15 days after treatment (DAT). Second spray was given during the last count of first spray i.e. 15 days after first spray. The botanicals, FORS and organic salt were applied with 1.0 per cent Teepol.

All field applications were made using hand-held, single-nozzle, atomizing (air-assist) sprayer i.e. pneumatic knapsack sprayer. The spray nozzle was carried near ground level and directed at a right angle to the row. Each row was sprayed twice, once from each side. Spray volume was 400 litres per ha.

Furrow irrigation was applied every 2 -3 weeks in the absence of rain. All applications were made during the day; sprays were usually initiated early in the morning to take advantage of cool and calm conditions.

Statistical analysis of field data was done in randomized block design (RBD). The data were statistically analysed and standard error and critical differences determined (Gomez and Gomez, 1984) using AGRES Statistical Software Version 3.01 (AGRES, 1994). The per cent mortality of *A. dispersus* population were collected and corrected with that in control using Henderson and Tilton (1955) as follows:

Corrected per cent reduction = $1 - \frac{[T_a - C_a]}{[T_b - C_a]} \times 100$

where, T_a = Number of insects in the treatment after spraying, T_b = Number of insects in the treatment before spraying, C_b = Number of insects in the untreated check before spraying and C_a = Number of insects in the untreated check after spraying

Results and Discussion

Field trial - 1 at Kinathukadavu, Coimbatore district, Tamil Nadu

All of the botanicals, FORS and an organic salt caused substantial reductions in *A. dispersus* population (Table 1). The data from Table 1 revealed that the application of NSKE 5% noticed highest reduction in *A. dispersus* population (79.10 per cent) at 10 DAT followed by organic salt (74.60 per cent). Very low mortality of *A. dispersus* population was observed in CTCRI cassava extract (63.11 per cent) at 10 DAT. Moreover, there was highly significant difference between the seven treatments and between the five dates of observation and also between the first order interactions of dates of observation x treatments (Table 1).

Field trial - 2 at Eastern Block, TNAU, Coimbatore, Tamil Nadu

Analysis of the per cent corrected mortality data (Table 2) from the Field trial - 2 at Eastern Block, TNAU, Coimbatore, Tamil Nadu indicated that the

Table 1. Evaluation of ecofriendly agents against *A. dispersus* on brinjal (Field trial - 1)

Treatment	Dose (g per litre)	Per cent corrected mortality of *A. dispersus* population*				
		Days after treatment				
		3	5	7	10	15
Fish oil rosin soap (FORS)	2.00	43.62_{ab}	59.41_{bc}	64.69_{bc}	68.44_{cd}	59.04_{bc}
		(41.34)	(50.42)	(53.54)	(55.82)	(50.21)
Neem seed kernel extract (NSKE) 5%	50.00	54.14_{a}	65.18_{a}	73.25_{a}	79.10_{a}	66.82_{a}
		(47.37)	(53.84)	(58.86)	(62.79)	(54.83)
Neem oil 3%	2.00	40.58_{b}	48.75_{d}	60.72_{c}	70.82_{bc}	55.77_{cd}
		(39.57)	(44.28)	(51.19)	(57.31)	(48.31)
Organic salt (Lastraw)	5.00	49.13_{ab}	60.97_{ab}	69.55_{ab}	74.60_{ab}	51.75_{de}
		(44.50)	(51.34)	(56.51)	(59.74)	(46.00)
Azadirachtin 0.03% (Neem gold)	2.00	48.59_{ab}	63.47_{ab}	70.03_{ab}	72.46_{bc}	62.83_{ab}
		(44.19)	(52.81)	(56.81)	(58.35)	(52.44)
CTCRI cassava extract (Menma)	2.50	39.55_{b}	54.21_{c}	58.29_{c}	63.11_{d}	48.60_{e}
		(38.97)	(47.41)	(49.77)	(52.60)	(44.20)
Control	-	0.00_{c}	0.00_{e}	0.00_{d}	0.00_{e}	0.00_{f}
		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	SEd	5.3371	2.5327	3.3297	2.7364	2.2561
	CD (P = 0.05)	11.2130	5.3210	6.9956	5.7491	4.7399
Source of variation	Days		Treatments		Days x Treatments	
SEd	0.6746		0.7982		1.7849	
CD (p = 0.05)	1.3381		1.5833		3.5404	
Significance	**		**		**	

*Mean of four replications, figures in parentheses are arc sine transformed values; in a column, means followed by a common letter(s) are not significantly different by DMRT (P = 0.05)

spraying of NSKE 5% gave significantly high mortality to *A. dispersus* population (84.46 per cent) at 10 DAT. The second best treatment with maximum mortality was azadirachtin 0.03% (77.66 per cent) which was on par with neem oil 3% (78.16 per cent). Moreover, there was highly significant difference between the seven treatments and between the five dates of observation and also between the first order interactions of dates of observation x treatments (Table 2).

The results presented here are in accordance with Kavitha Kirubavathy *et al*. (1999) who reported that NSKE 2% were found to be effective in suppressing the nymphal and adult *A. dispersus* population. Spraying of neem oil (2%) reduces the *A. dispersus* population (Ranjith *et al*., 1996; Asia Mariam, 1999 and Geetha, 2000). Geetha (2000) observed that spraying of TNAU neem formulation caused maximum adult mortality (92.66 per cent) which was on par with phosalone (92.65 per cent). Spraying of FORS (4%) and detergent soap solution (5%) reduces the *A. dispersus* population (Ranjith

Table 2. Evaluation of ecofriendly agents against *A. dispersus* on brinjal (Field trial - 2)

Treatment	Dose (g per litre)	Per cent corrected mortality of *A. dispersus* population*				
		Days after treatment				
		3	5	7	10	15
Fish oil rosin soap (FORS)	2.00	52.76$_{b}$	63.56$_{c}$	66.87$_{c}$	71.05$_{c}$	58.31$_{c}$
		(46.58)	(52.87)	(54.86)	(57.45)	(49.79)
Neem seed kernel extract (NSKE) 5%	50.00	61.41$_{a}$	76.87$_{a}$	80.08$_{a}$	84.46$_{a}$	69.63$_{a}$
		(51.60)	(61.25)	(63.49)	(66.78)	(56.56)
Neem oil 3%	2.00	49.39$_{c}$	57.87$_{d}$	67.06$_{c}$	78.16$_{b}$	58.13$_{c}$
		(44.65)	(49.53)	(54.97)	(62.14)	(49.68)
Organic salt (Lastraw)	5.00	46.75$_{d}$	54.79$_{e}$	60.40$_{d}$	69.34$_{d}$	53.09$_{d}$
		(43.14)	(47.75)	(51.00)	(56.38)	(46.77)
Azadirachtin 0.03% (Neem gold)	2.00	52.72$_{b}$	66.18$_{b}$	70.24$_{b}$	77.66$_{b}$	64.73$_{b}$
		(46.56)	(54.44)	(56.94)	(61.79)	(53.56)
CTCRI cassava extract (Menma)	2.50	48.22$_{cd}$	58.01$_{d}$	61.93$_{d}$	68.41$_{d}$	57.02$_{c}$
		(43.98)	(49.61)	(51.90)	(55.80)	(49.04)
Control	-	0.00$_{e}$	0.00$_{f}$	0.00$_{e}$	0.00$_{e}$	0.00$_{e}$
		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	SEd	1.0542	1.1084	1.0792	0.7328	0.9679
	CD (P = 0.05)	2.2149	2.3287	2.2673	1.5397	2.0336
Source of variation	Days		Treatments			Days x Treatments
SEd	0.4095		0.4846			1.0836
CD (p = 0.05)	0.8123		0.9612			2.1492
Significance	**		**			**

* Mean of four replications, figures in parentheses are arc sine transformed values; in a column, means followed by a common letter(s) are not significantly different by DMRT (P = 0.05)

et al., 1996; Asia Mariam, 1999 and Geetha, 2000). FORS has been reported to be effective against *Bemisia tabaci* (Gennadius) (Venugopal Rao *et al*., 1990 and Natarajan *et al*., 1991).

The presented results indicate considerable potential for use of botanicals to control *A. dispersus* population on brinjal, especially in low-technology regions. In any case, additional testing with yield assessments and economic analyses must be conducted before ultimate conclusions are drawn. The experimental results proved that the biopesticides can be used as an alternative control method in combating the pest. Its wide application could be taken up after exploring its toxicity and field trials.

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