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Evaluation of Chlorpyriphos 20 EC Against Psyllid *Diaphorina Citri* Kuwayama in Citrus

KEYWORDS: Chlorpyriphos 20 EC, psyllid, Diaphorina citri Kuwayama, Citrus

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ABSTRACT *Experiment conducted to test the bioefficacy of chlorpyriphos 20 EC against psyllid , Diaphorina citri Kuwayama in citrus showed that end of two rounds application of chlorpyriphos 20 EC @ 250, 500, 750, 1000 ml/ha, Dursban 20 EC 500 ml/ha and dimethoate 30 EC 500 ml/ha spray at 14 days interval registered low mean numbers of nymphs 1.83 (86.66% reduction over control), followed by chlorpyriphos 20 EC 750 ml/ha 1.99 (85.73% reduction), chlorpyriphos 20 EC 500 ml/ha 2.40 (82.92% reduction), Dursban 20 EC 500 ml/ha 2.73 (80.49% reduction). Dimethoate 30 EC 500 ml/ha 3.66 (73.67% reduction) and chlorpyriphos 20 EC 250 ml/ha 3.82 (72.56% reduction) were less effective as against control (13.91). Chlorpyriphos 20 EC 1000 ml/ha recorded the maximum yield of 1.75 kg/tree followed by chlorpyriphos 20 EC 750 ml/ha (1.73 kg/tree).*

INTRODUCTION

Citrus (*Citrus spp*) is the most important fruit crop of Central India. It suffers heavily on account of the serious damage caused by insect pests. More than 250 insect species attack citrus from nursery to fruit bearing stage (Butani, 1979).

The Asian citrus psyllid, *Diaphorina citri* Kuwayama (Homoptera: Psyllidae) is a major insect pest attacking new flushes of citrus in all seasons (Dorge *et al.*, 1968). However, subsequent build up of psyllid population in summer months (May–August) could be effectively controlled by spraying broad spectrum organophosphate insecticides such as chlorpyriphos or dimethoate (Boina *et al.*, 2009). In Tamil Nadu, chlorpyriphos 20 EC has not been recommended for citrus. (Anonymous, 2013).

MATERIALS AND METHODS

A field trial was conducted at Theethipalayam in Coimbatore district, Tamil Nadu during summer season (February - March 2014) in Rangpur lime (5 year old trees) to evaluate chlorpyriphos 20 EC against citrus psyllids. The trial was laid out in randomized block design (RBD) with seven treatments and three trees constituted a single treatment and each treatment was replicated thrice. Control plots were maintained with water spray with a pneumatic knapsack sprayer using 500 litres of spray fluid per hectare. Two rounds of sprays were given at 14 days interval.

Treatments

The insecticides used in the present investigation and their dosages are as follows

Insecticide	Dose (%)	Product (ml/ha)
Chlorpyriphos 20 EC	0.01	250
Chlorpyriphos 20 EC	0.02	500
Chlorpyriphos 20 EC	0.03	750
Chlorpyriphos 20 EC	0.04	1000
Dursban 20 EC (standard check)	0.02	500
Dimethoate 30 EC	0.03	500
Untreated check	-	-

Method of insect assessment

The numbers of nymphs were recorded prior to insecticide application and 3, 5, 7, 10 and 14 days after spraying on five terminal shoots (15 cm length) each at north, south, east, west direction + Top portion of terminal shoot from three trees selected per treatment. Fruit yields were recorded 20 days after treatment during the season and expressed as kg/tree.

RESULTS

Among the insecticidal treatments tested, chlorpyriphos 20 EC at1000 ml/ha recorded low mean number of nymphs 1.83, followed by chlorpyriphos 20 EC 750 ml/ha (1.99), chlorpyriphos 20 EC 500 ml/ha (2.40), Dursban 20 EC 500 ml/ha (2.73). The least effective treatments were; dimethoate 30 EC 500 ml/ha (3.66) and chlorpyriphos 20 EC 250 ml/ha (3.82) (Table 1). Higher dose of chlorpyriphos 20 EC 1000 ml/ha recorded 86.86 per cent reduction over control at end of second spray which was superior over other treatments followed by chlorpyriphos 20 EC 750 ml/ha (85.73 per cent) and chlorpyriphos 20 EC 500 ml/ha (82.92 per cent). Based on per cent reduction over control the order of relative efficacy was, chlorpyriphos 20 EC 1000 ml/ha > chlorpyriphos 20 EC 750 ml/hachlorpyriphos 20 EC 500 ml/ha > Dursban 20 EC 500 ml/ha > dimethoate 30 EC 500 ml/ha > chlorpyriphos 20 EC 250 ml/ha.

Table 1. Efficacy of chlorpyriphos 20 EC against psyllids on citrus

Treatment	Dose ($ml.ha^{-1}$)	Number of nymphs per 15 cm twig *							Reduction over control (%)
		PTC	Post treatment count (Days after II spray)						
			3DAS	5DAS	7DAS	10DAS	14DAS	Mean	
Chlorpyriphos 20 EC	250	7.33	4.83 (2.31)^{c}	3.60 (2.02)^{d}	2.87 (1.84)^{d}	3.43 (1.98)^{c}	4.52 (2.26)^{c}	3.82	72.56

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Chlorpyriphos 20 EC	500	6.37	3.53 (2.00)[ab]	2.06 (1.59)[bc]	0.83 (1.13)[bc]	2.23 (1.64)[ab]	3.33 (1.95)[ab]	2.40	82.92
Chlorpyriphos 20 EC	750	6.03	3.17 (1.91)[a]	1.53 (1.42)[ab]	0.53 (1.02)[ab]	1.77 (1.50)[a]	2.93 (1.85)[a]	1.99	85.73
Chlorpyriphos 20 EC	1000	5.97	3.01 (1.87)[a]	1.33 (1.35)[a]	0.33 (0.91)[a]	1.67 (1.47)[a]	2.80 (1.82)[a]	1.83	86.86
Dursban 20 EC (standard check)	500	6.67	3.87 (2.09)[b]	2.43 (1.71)[c]	1.13 (1.26)[c]	2.57 (1.75)[b]	3.67 (2.04)[b]	2.73	80.49
Dimethoate 30 EC	500	7.57	4.60 (2.26)[c]	3.33 (1.96)[d]	2.60 (1.76)[d]	3.20 (1.92)[c]	4.36 (2.20)[c]	3.66	73.67
Untreated check	-	12.83	13.23 (3.63)[d]	13.57 (3.68)[e]	14.00 (3.74)[e]	14.23 (3.63)[d]	14.57 (3.81)[d]	13.91	-

Mean of three replications*
PTC – Pre treatment count DAS - Days after spraying
Values in parentheses are square root transformed
Means in a column with the same superscripts are not significantly different (DMRT, P=0.05.)

Yield of citrus

Chlorpyriphos 20 EC 1000 ml/ha recorded the maximum yield of 1.75 kg/tree followed by chlorpyriphos 20 EC 750 ml/ha (1.73 kg/tree) (Table 2). The fruit yield in other treatment were; chlorpyriphos 20 EC 500 ml/ha (1.40 kg/tree), Dursban 20 EC 1000 ml/ha (1.38 kg/tree), dimethoate 30 EC 500 ml/ha (1.10 kg/tree) and chlorpyriphos 20 EC 250 ml/ha (1.00 kg/tree).

DISCUSSION

The investigation on the field trial inferred that, chlorpyriphos 1000 ml/ ha (1.83 nymphs / 15 cm twig), chlorpyriphos 750 ml/ ha (1.99 nymphs/ 15 cm twig) and chlorpyriphos 500 ml/ha (2.40 nymphs/ 15 cm twig) registered the lowest nymphal population with the reduction of 86.86, 85.73 and 82.92 per cent over control. The high mortality of citrus psyllid by residual effect of contact insecticides like chlorpyriphos, triazophos and quinalphos could be due to their more penetrable potential into the plant tissues and subsequent translaminar action (Sharma,,2008). These results were also in accordance with the findings of Qureshi and Stansly (2010) who observed that single round of spray chlorpyriphos (2.8 kg a.i. ha^{-1}) reduced adult psyllids 10-fold over six months compared to untreated trees.

The adults per tap sample averaged 1.34 in untreated trees compared to 0.03 in trees treated with fenpropathrin (0.34 kg a.i. ha^{-1}) followed by chlorpyriphos (2.8 kg a.i. ha^{-1}) in citrus. Dimethoate 500 ml/ha recorded high nymphal population of 3.66 /15 cm twig compared to other treatments. Prakash Patil *et al.* (2014) also observed 4.2 nymphs per 5 cm twig with dimethoate 30 EC 0.06 % On the contrary, Bindra *et al.* (1973) reported that monocrotophos, fenthion, dimethoate, fenitrothion were effective against citrus psylla nymphs and adults. Maheswari and Sharma, 1978; Batra, 1990 and Dadmal *et al.* (2002) also recorded dimethoate showing the highest mortality of citrus psylla.

Fruit yields in citrus showed that there was increase in chlorpyriphos 20 EC treated trees, as against the untreated control (Table 2). The increase in citrus fruit yield ranged from 1.75, 1.73 and 1.40 kg/tree. Significant increase in yield was recorded with the increased doses of chlorpyriphos 20 EC. Triazophos 40 EC 0.06% recorded higher yield of 18.16 t/ha in sweet orange (Sidhu *et al.*, 2011).

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