Indian J.Sci.Res. 16 (1): 120-122, 2017

ISSN: 0976-2876 (Print)
ISSN: 2250-0138(Online)

DIAFENTHIURON (A NOVEL INSECTICIDE) FOR MANAGEMENT OF WHITEFLY, *Bemisia tabaci*

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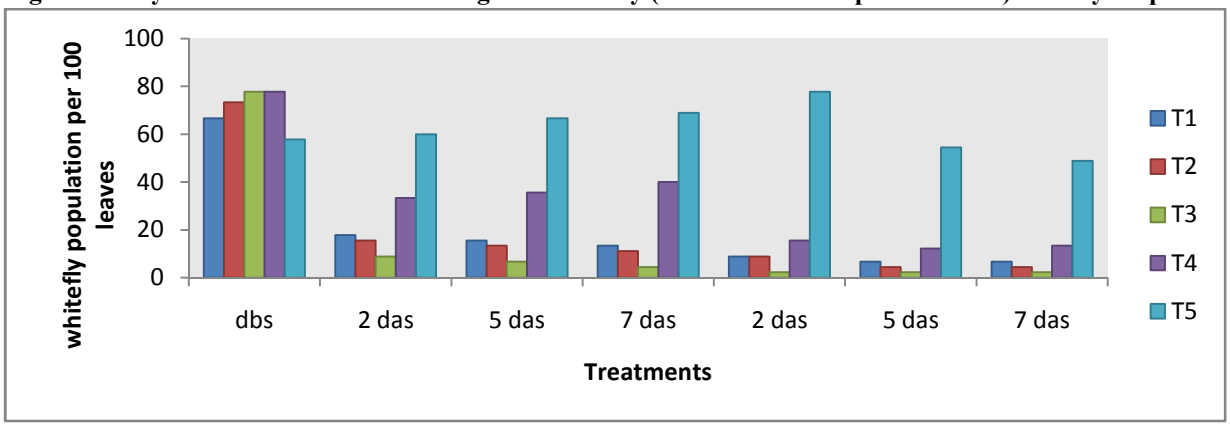
ABSTRACT

A combination of two different groups of chemical insecticides was tested at Central Potato Research Institute Campus, Modipuram (Meerut) against whitefly and other sucking insect pests which occur simultaneously on potato crop. Diafenthiuron is a new insecticide with novel mode of action of inhibiting mitochondrial ATPase and acaricidal action. Hence, Diafenthiuron was considered an important component in Integrated Pest Management Programs. Diafenthiuron 50 SC belongs to the class U toxin tested as alternate foliar sprays under field conditions. Results obtained indicated that whitefly could effectively be controlled by three foliar sprays first and third of diafenthiuron @ 350 g. a.i./ha.

The management of whitefly (*Bemisia tabaci*) (Hemiptera: Aleyrodidae) has been a problem in agricultural and horticultural crops since long (Brown et al, 1995) and broad spectrum insecticides such as organophosphates, carbamates and pyrethroids have been used since long to control whiteflies (Palumbo et al, 2001). *Bemisia tabaci* is a species complex of about 41 biotypes (De Barro *et al.,* 2011) out of which 5 (H, P, K, G, B) have been reported from India. It is vector of Apical Leaf Curl Virus (ALCV) in agricultural ecosystems. The significance of whitefly as a vector in potato seed production due to apical potato leaf curl virus disease cannot be ignored. Hence efforts were made to manage this insect at Central Potato Research Institute Campus Modipuram (Meerut) with chemicals of different class. Diafenthiuron is a thiourea derivative and it is very useful entry in the available chemical insecticides against whitefly. The compound has low mammalian toxicity with a relatively mild effect on natural enemies and pollinators. In the presence of sunlight diafenthiuron is phytochemically converted to a carboiimideinhibits mitochondrial respiration, derivative enhancing its insecticidal activity (Steinemannet al., 1990). Insecticides applications, in general, are more effective than the natural plant products, or the release of natural enemies. Keeping this in view, the present study was designed determine the efficacy of novel insecticide. Further, the developments of insecticide resistance in whitefly transmission of disease have necessitated the need to identify biotypes and to develop sound IPM program.

Fig.1:Efficacy of insecticidal treatments against whitefly (Number/100 compound leaves) in early crop



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METHODOLOGY

The crop was planted with variety KufriBahar on 20th September in early and 20th October, in main crop season of potato crop. The trial was laid out in randomized block design. There were eight treatments: T1- Diafenthiuron 50 SC @ 250g ai/ha; T2 - Diafenthiuron 50 SC @ 300g ai/ha; T3 - Diafenthiuron 50 SC @ 350g ai/ha; T7 - Seed treatment with imidacloprid (200 SL) @ 0.04% (4ml/10lit) and foliar spray with imidacloprid 200 SL @ 60g a.i/ha at emergence of the crop followed by second spray with thaimethoxam 25 WG @ 100g ai/ha ; T8 - Control (untreated). Each treatment was replicated for three times. Insecticides were sprayed on foliage twice at 15 day interval. Pre and post treatment observations on whitefly numbers were recorded per 100 compound leaves (/100 c l) basis on five randomly selected plants from each plot in each replication on three leaves ie. Upper, middle and lower of a plant were taken for counting number of whitefly.

Table 1. Efficacy of insecticidal treatments against whitefly (Number/100 compound leaves) in early crop
DBT: Days before treatment; DAT: Days after treatment; figures in parentheses are square root transformed value. Dia- diafenthiuron; ST- Seed treatment; imida-imidacloprid; thai- thaimethoxam

	Spray	First spray				Second spray				Increased
	Treatment	DBT	2 DAT	5 DAT	7 DAT	2 DAT	5 DAT	7 DAT	Mean	%
1.	T1 dia 50 SC @250g ai/ha	69.99 (8.41)	21.11 (4.65)	18.88 (4.41)	16.66 (4.12)	11.10 (3.41)	10.00 (3.11)	7.77 (2.81)	19.74 (4.48)	74.04 (8.66)
2.	T2 dia 50 SC @300g ai/ha	75.55 (8.72)	18.89 (4.37)	17.77 (4.29)	14.44 (3.88)	8.89 (3.10)	5.55 (2.47)	5.55 (2.47)	18.26 (4.14)	77.78 (8.87)
3.	T3 dia 50 SC @ 350g ai/ha	83.33 (9.17)	11.11 (3.41)	(8.88) (3.10)	6.66 (2.64)	2.22 (1.58)	2.22 (1.58)	2.22 (1.58)	13.82 (3.17)	84.13 (9.22)
4.	T7 ST with imida(200SL) @ 0.04 %+ foliar spray imida @ 60g a.i/ha at emergence of the crop + spray with thai @100g ai/ha	75.55 (8.49)	38.88 (6.27)	43.33 (6.57)	47.77 (6.93)	18.88 (4.37)	14.44 (3.82)	17.78 (4.26)	37.28 (6.18)	57.91 (7.67)
5.	T8- control	67.77 (8.26)	70.00 (8.39)	77.77 (8.84)	79.90 (8.97)	77.77 (8.87)	61.10 (7.85)	45.55 (6.81)	65.79 (8.36)	0.00
	S.Em± LSD (0.05)	0.278 0.84^{NS}	0.287 0.87**	0.303 0.92**	0.252 0.76**	0.255 0.77**	0.271 0.82**	0.361 1.09**	0.089 0.27**	0.025 0.07**

RESULTS AND DISCUSSION

Highest whitefly control was provided by Difenthiuron 50 SC @ 350 g ai/ha (12.34) as compared to control (59.25) in mean population. The highest reduction was recorded in Difenthiuron 50 SC @ 350 g ai/ha (84.13%) in comparison to rest of insecticide. In early crop season Difenthiuron (134.44 q/ha) provided highest yield followed by Imidacloprid (116.66 q/ha) and lowest in control (93.33 q/ha).

After 7 day of first spraying the population of whitefly was 16.66, 14.44, 6.66, 47.77, 79.90 in Difenthiuron 50 SC @ 250 g ai/ha, Difenthiuron 50 SC @ 300 g ai/ha, Difenthiuron 50 SC @ 350 g ai/ha, Imidacloprid 200 SL @ 60 g a.i/ha and untreated plots respectively. After 7 day of second spraying the population of whitefly was 7.77, 5.55, 2.22, 17.78 and 45.55 in Difenthiuron 50 SC @ 250 g ai/ha, 300 g ai/ha, 350 g ai/ha, Imidacloprid 200 SL @ 60 g a.i/ha and untreated plots. In early crop season Difenthiuron (134.44 q/ha) provided highest yield followed by Imidacloprid (116.66 q/ha) and lowest in control (93.33 q/ha). This insecticide gave good control of whitefly due to their different mode of actions coupled with absence of cross resistance to the conventional chemistries (Prabhaker *et al.,* 1997). Furthermore, previous reports demonstrated extreme effectiveness of diafenthiuron against whitefly (Naveed *et al.,* 2008; Reghuraman and Gupta., 2005; Shah *et al*., 2007; Barrania and telab. ,2014) on different crops.

CONCLUSION

This study revealed that Diafenthiuron was very effective against whitefly on potato. In early crop season all the treatments were observed to increase the potato yield as well. Present observation points out that Diafenthiuron can be a new component of the integrated management of whitefly on potato and can be a new valuable tool in the resistance management programs.

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