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Evaluation of efficacy of Newer Molecules against spiraling Whitefly *Aleurodicus dispersus* (Russel) in Guava, *Psidium guajava* L.

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ABSTRACT: The Spiralling whitefly, *Aleurodicus dispersus* Russell, is a polyphagous pest native to the Caribbean region and Central America has turned out to be cosmopolitan in distribution as well creating devastation to the farming community. The field experiment was conducted on different biorational and insecticides against spiralling whitefly (*Aleurodicus disperses* Russel) in guava at Regional Horticultural Research and Extension Centre, Dharwad, Karnataka during 2018-19 and 2019-20. All the treatments were significantly superior over untreated check. The results indicated that the less population of spiralling whitefly was reported in Thiamethoxam 25 WG @ 0.2g/L treated plot (3.82 spiralling whiteflies/three leaves) followed by Acetamiprid 20 SP @ 0.2g/L. Overall, chemical control by Thiamethoxam 25 WG was the most effective against whiteflies populations in Guavain both seasons.

Keywords: Guava, Whiteflies, Pest management, New molecules, Botanicals.

INTRODUCTION

Guava (*Psidium guajava* L) is an important fruit crop of the tropical and subtropical regions of the India. It is the fourth most important fruit after mango, banana and citrus. It can be known as the 'Apple of Tropics' for its rich vitamin C and mineral content and also familiar as 'Poor Man's Fruit'. It is mostly consumed as mature green or fresh ripens fruit. In addition, the ripen guava fruit is used for the preparation of jam, jellies, cheese, ketchup, puree, powder, nectar and juice for commercial purpose. During 2022-23, guava production in India is estimated to have amounted to 5.59 million metric tonnes. The cultivation area of guava was about 359 thousand hectares. Guava production has recently been threatened by various biotic stresses including the spiralling whiteflies, *Aleurodicus dispersus* Russell, under the family Aleyrodidae of the order Hemiptera (Khushk, 2009). Spiralling whitefly, *Aleurodicus dispersus* (Russell) (Aleyrodidae: Homoptera) is an introduced polyphagous pest of vegetables, fruit trees, ornamentals and shade trees (Rajeshwari *et al*., 2019). In Taiwan and India, there were yield decreases of up to 80% for guava fruits (Wen *et al*., 1995). About 80 species of insect pests have been observed on guava, but in South India spiralling white fly, *Aleurodicus dispersus* (Russel) had been identified as pest of regular occurrence and causing serious damage. Spiralling whitefly has extensive host range covering 481 plants belonging to 295 genera from 90 families of vegetables, fruits and ornamentals trees (Srinivasa, 2000). Important hosts reported so far are citrus, avocado, guava, plantain, banana, coconut, soybeans, cassava and stone fruit (John *et al*., 2007).

In India, the pest was first reported in Western Ghats of Kerala, which might have been accidentally introduced through propagation materials from Maldives by free entry ports without plant quarantine. On guava first severe incidence of *A. disperses* was recorded at around Bangalore and Coimbatore in 1996 (Mani and Krishnamoorthy 2000). This pest causes direct and indirect damage to the plant. They suck cell sap from the leaf causing the reduction associated with growth vigour of the plant and decline of yield. Indirectly the whitefly leads to decrease of yield by transmitting viral pathogens and through secretion of wax and honeydew which reduces the photosynthetic area of the plant (Arifunnahar *et al*., 2018). To maximize the yield, different management aspects for *A. dispersus* include cultural, biological and chemical methods. Among these, during sensitive crop growth stages the chemical control management is recommended to manage the whitefly populations. However, guava being frequently harvested crop, application of chemical insecticides may warrant sufficient waiting periods. Some chemicals such as tobacco extract (4%), neem oil (2%), fish oil rosin soap (4%) and detergent soap solution (5%), malathion (0.1%) and carbaryl (0.1%), dichlorvos (0.08%), triazophos (0.08%) were found to be effective in suppressing the nymphal and adult whitefly population (Geetha, 2000; Mallapanavar, 2000).

Lamda-cyhalothrin has been found effective against pupae and adults of *A. dispersus* (Yao *et al*., 2008). Gundappa *et al*. (2013) research findings clearly showed that in integrated management of *A. dispersus*, botanical based formulations *viz*., neem, pongamia will serve as effective management interventions at low population levels. The present investigation was under taken to find out the bio-efficacy of insecticide molecules to manage the *A. dispersus* populations with best insecticidal formulation.

MATERIAL AND METHODS

Field experiments were carried out at Regional Horticultural Research and Extension Centre, Dharwad, Karnataka during 20018-19 and 2019-20 to find out the effectiveness of different biorational insecticides against spiralling whitefly in guava. Experiments were laid out in Randomized Block Design with three replications and seven treatments. The treatment imposition was done at morning hours, at initiation of incidence of the pests. The first application of treatment was given when the sucking insect population reaches Economic Threshold Level and subsequent sprays were given at 15 days intervals. The number of nymphs and adult spiralling whiteflies population were recorded from three randomly selected leaves per plant. Observations were recorded at a day before spray (DBS), three, seven and fifteen days after each spray. Later pooled mean of two sprays was calculated. The data obtained from the field experiments were subjected to square root transformation and subjected to ANOVA.

RESULTS AND DISCUSSION

A. Effect of biorationals and insecticides on Spiralling whitefly (A. disperses) population after first spray

Whiteflies multiply rapidly in warm weather conditions and population build up very quickly in the conditions where natural enemies are absent and weather is congenial. The results (Table 1) indicated that the spiralling whitefly population ranged from 11.83 to 16.13/three leaves at a day before spray (DBS) indicating uniform distribution and it differ non significantly among the different treatments tested. At three days after first spray, Significantly minimum number of spiralling whiteflies/three leaves were recorded in the treatment Thiamethoxam 25 WG @ 0.2 g/L and was found to be effective in reducing the spiralling whitefly population with 4.35 spiralling whiteflies/three leaves which was followed by Acetamiprid 20 SP @ 0.2g/L (5.37 spiralling whiteflies/three leaves). After seven days after spraying, all the treatments were effective over controlling the population of spiralling whiteflies. Thiamethoxam 25 WG @ 0.2 g/L recorded least number of spiralling whiteflies/three leaves (3.15) followed by Acetamiprid 20 SP @ 0.2 g/l (4.89) and Difenthiuron 50 WP @ 0.5 g/l (6.02) and they were on par with each other. After Fifteen days spraying minimum number of spiralling whiteflies (4.00 spiralling whiteflies/three leaves) was recorded in Thiamethoxam 25 WG @ 0.2 g/L which was followed by Acetamiprid 20 SP @ 0.2 g/l (5.22).

B. Effect of biorational and insecticides on Spiralling whitefly (A. disperses) population after second spray

The data (Table 1) indicated that spiralling whitefly population at three days after second spraying showed significant differences among different treatments. At three days after spray, Thiamethoxam 25 WG @ 0.2 g/L recorded minimum number of spiralling whitefly population (4.59 spiralling whiteflies/three leaves) which was followed by Acetamiprid 20 SP @ 0.2 g/L (6.14) found to be on par with Difenthiuron 50 WP @ 0.5 g/L (6.62). Whereas, seven days after spraying, Thiamethoxam 25 WG @ 0.2 g/L recorded least population (3.03 spiralling whiteflies/three leaves) followed by Acetamiprid 20 SP @ 0.2 g/L (4.37). After 15 days of spraying same trend was observed that, lower spiralling whiteflies (3.79 spiralling whiteflies/three leaves) was noted in Thiamethoxam 25 WG @ 0.2 g/L followed by Acetamiprid 20 SP @ 0.2 g/L (6.14).

The overall mean population of spiralling whiteflies observed that Thiamethoxam 25 WG @ 0.2 g/L was recorded significantly lower population 3.82 whiteflies/three leaves with highest yield (20.24 t/Ha) and B:C ratio (5.73) followed by Acetamiprid 20 SP @ 0.2 g/l (5.37) with yield (16.26 t/ha) and B:C ratio (5.17) (Table 2). Whereas, moderate population was recorded in Difenthiuron 50 WP @ 0.5 g/l (6.48) with yield (12.84 t/ha) and B:C ratio (3.97) and highest population was recorded in control (18.02). On the basis of the mean pooled data results revealed that all the treatments were significantly effective over the control in reducing the whitefly population. The present study is in agreement with Alam *et al*. (1998) reported that nuvacron and shobicron were effective for the control of adult guava whitefly for one month but the effect of shobicron went down for nymph. Prasad and Singh (1992) reported that monocrotophos and dimethoate were found to be superior in controlling the whitefly population up to 15 days after application. Pushpalatha and Balikai (2015) who reported that, spinosad was very effective reducing the spiralling whitefly population. Kambrekar and Awaknavar (2004) reported that dimethoate 30 EC (0.025%) recorded less population of spiralling whitefly. Neem soap, neem guard and Dichlorovas with pongamia oil was found to be effective in reducing the nymphal population (Gundappa *et al*., 2013). The fungi *L. lecanii* exhibited promising levels of control (> 70% mortality of the *A. disperses* population) on cassava. The application of Chita 48EC @ 1.00ml/l of water could be the most effective insecticides in managing this pest followed by Ripcord 10EC @ 1.00 ml/L of water (Khan, 2017). Rajeshwari *et al*. (2019) studied the effectiveness of different biorational insecticides against mealy bug (*Maconellicoccus hirsutus* Green) and spiralling whitefly (*Aleurodicus disperses* Russel) and their safety to natural enemies in guava and reported that Spinosad 45 SC @ 0.2 ml/l proved to be the highly effective treatment for controlling spiralling whiteflies. The application of the insecticides Diazinon 60EC and Malathion 50EC against *A. dispersus* resulted in a significant reduction of the pest in guava (Khalil *et al*., 2019).

Table 1 : Pooled Population of spiraling whiteflies on guava, 2018-19 and 2019-20.

Treatments	Dose (ml/L)	No of spiraling whiteflies per 3 leaf after 1st spray				No of spiraling whiteflies per 3 leaf after 2nd spray			Total mean
		1 DBS	3 DAS	7 DAS	15 DAS	3 DAS	7 DAS	15 DAS	
Azadirachthin 10,000ppm	1 ml/L	12.25	8.86 (3.05)	7.47 (2.82)	8.87 (3.05)	8.43 (2.98)	7.44 (2.81)	8.65 (3.02)	8.29
Difenthiuron 50 WP	0.5g/L	16.13	6.90 (2.71)	6.02 (2.55)	6.62 (2.65)	6.68 (2.68)	5.86 (2.52)	6.79 (2.65)	6.48
Thiamethoxam 25WG	0.2g/L	13.33	4.35 (2.19)	3.15 (1.90)	4.00 (2.12)	4.59 (2.25)	3.03 (1.86)	3.79 (2.07)	3.82
Acetamiprid 20SP	0.2g/L	12.55	5.77 (2.50)	4.89 (2.31)	5.22 (2.37)	6.14 (2.58)	4.73 (2.27)	5.46 (2.42)	5.37
FORS	5g/L	11.83	9.64 (3.18)	7.29 (2.78)	11.12 (3.41)	9.35 (3.14)	9.36 (3.14)	10.98 (3.39)	9.62
Triazophos 40EC	1.5ml/L	14.46	9.97 (3.23)	8.36 (2.96)	9.31 (3.13)	8.93 (3.07)	8.40 (2.98)	10.21 (3.27)	9.20
Control	-	13.53	14.64 (3.89)	15.73 (4.02)	17.49 (4.32)	18.17 (4.32)	20.61 (4.59)	21.50 (4.69)	18.02
SEm+		NS	0.12	0.17	0.14	0.11	0.14	0.16	
CD @ 5%			0.34	0.51	0.42	0.31	0.41	0.45	

Table 2: Pooled fruit yield of guava as influenced by different treatments during 2018-19 and 2019-20.

Sr. No.	Treatments	Dose (ml/L)	Yield (t/ha)	B : C
1.	Azadirachthin 10,000ppm	1 ml/L	9.79	2.66
2.	Difenthiuron 50 WP	0.5g/L	12.81	3.97
3.	Thiamethoxam 25WG	0.2g/L	20.24	5.73
4.	Acetamiprid 20SP	0.2g/L	16.26	5.17
5.	FORS	5g/L	9.78	2.66
6.	Triazophos 40EC	1.5ml/L	11.34	3.41
7.	Control	-	7.39	1.83
	SEm ±		0.73	
	C. D. @ 5%		2.14	
	C. V. (%)		10.16	

CONCLUSIONS

The present study revealed the effectiveness of various biorational insecticides against spiralling white fly. Thiamethoxam 25 WG @ 0.2 g/L proved to be the highly effective treatment among all the treatments tested for the control of spiralling white fly with highest yield per hectare and Benefit:Cost ratio followed by Acetamiprid 20 SP @ 0.2 g/L and Difenthiuron 50 WP @ 0.5 g/L.

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Conflict of Interest. None.

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