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Bio-efficacy of Different Doses of Noval Insecticide Against Sap Feeder Insect Pests Infesting Pomegranate

Suresh Kumar Jat[1], Lekha[2] and Mahendra Choudhary[*3]
Agriculture University, Kota (Rajasthan)

ABSTRACT

Field experiments were conducted to evaluate the bio-efficacy of novel insecticide, Cyantraniliprole 10.26% OD 200, 250, 300, 400 g/ha along with two standard checks i.e., Lambda-cyhalothrin 4.9% CS and Fipronil 5% SC @ 2000 ml/ha against sap feeder insect pests infesting pomegranate at KVK, Jhalawar during the years 2021 and 2022. The pomegranate variety Sindhuri was transplanted in a Randomized Block Design with seven treatments with three replications. Cyantraniliprole 10.26% OD was equally effective @ 400 and 300 g/ha to control major sap feeder insects like aphid, thrips and whitefly on pomegranate crop and better than other standard treatments. The mean maximum yield of pomegranate was recorded in the treatment of Cyantraniliprole 10.26% OD@ 400 g/ha which was 98.20 q/ha and 109.20 q/ha during respective year in comparison to control.

Key Words: Bio efficacy, Noval insecticides, Sap feeder, Pomegranate

INTRODUCTION

Pomegranate (*Punica granatum* L.) is one of the important fruit crops in India, cultivated in arid and semi-arid regions of Gujarat, Maharashtra, Karnataka, Uttar Pradesh, Andhra Pradesh and Tamil Nadu (Balikai *et al,* 2011). The adaptability of the crop to extremes of temperature (-12 to + 44°C), suitability to marginal lands with poor fertility, rocky lands with shallow depth etc., pave the way for its potential production in various ecosystem (Pal *et al,* 2014). Till date 91 insects, 6 mites and 1 snail has been reported as pest on pomegranate crop in India (Balikai *et al,* 2011 and Gurjar *et al*, 2023). Among this pest complex, damage due to sucking pests viz., thrips, mealy bugs, aphids and whitefly is major in India. Yield loss incurred due to pest problem results in the reduced income, poverty, food insecurity and loss of biodiversity. Earlier the management measures for these pests included the use of broad-spectrum pesticides. Concerns for health hazards, disruption of the natural ecosystem, increasing in the chances of pest resurgence and development of resistance in pests due to indiscriminate use of pesticides, stimulated the need of using eco-friendly pesticides. In present study, the bio-efficacy of novel insecticide, Cyantraniliprole 10.26% OD against sucking pests of pomegranate was carried out for the evaluation of bio-efficacy on pomegranate against sap feeder insect pests.

MATERIALS AND METHODS

The experiment to evaluate the bio-efficacy of novel insecticide, Cyantraniliprole 10.26% OD against sap feeder insect pests infesting pomegranate ten-year-old orchard at different doses was conducted at KVK, Jhalawar during the years 2021 and 2022. The pomegranate variety Sindhuri was transplanted in a Randomized Block Design with seven treatments including one untreated control with three replications. Other package and practice were followed as per university recommendation. Cyantraniliprole 10.26% OD was evaluated at different doses *i.e.,* @ 200, 250, 300, 400 g/ha along with two standard checks i.e., Lambda-cyhalothrin 4.9% CS and Fipronil 5% SC @ 2000

Corresponding Author's Email - entomahendra07@gmail.com
1Agriculture University, Kota
2 Agriculture University, Jodhpur
3ICAR-CAZRI, Jodhpur

Table 1. Bio-efficacy of different doses of novel insecticide, Cyantraniliprole 10.26% OD against aphids in pomegranate during 2021.

Sr. No.	Treatment	Dose		Number of aphids/ 5 cm twig							Per cent ROC @ 10 days after 2nd spray
					First spray			Second spray			
		g a.i./ha	Formulation (ml or g/ha)	Pre count	3 DAS	7 DAS	10 DAS	3 DAS	7 DAS	10 DAS	
T_1	Cyantraniliprole 10.26% OD	60	200	10.55* (3.39)**	9.22 (3.20)	8.45 (3.07)	11.36 (3.51)	10.66 (3.41)	9.75 (3.28)	8.78 (3.13)	49.51
T_2	Cyantraniliprole 10.26% OD	75	250	11.45 (3.53)	7.33 (2.89)	4.92 (2.43)	8.33 (3.05)	6.22 (2.69)	5.17 (2.48)	4.11 (2.26)	76.37
T_3	Cyantraniliprole 10.26% OD	90	300	11.55 (3.54)	6.11 (2.67)	3.89 (2.21)	6.86 (2.80)	3.67 (2.15)	2.25 (1.80)	1.36 (1.54)	92.18
T_4	Cyantraniliprole 10.26% OD	120	400	10.89 (3.45)	5.94 (2.63)	3.78 (2.19)	6.75 (2.78)	3.44 (2.11)	2.11 (1.76)	1.22 (1.49)	92.98
T_5	Lambda-cyhalothrin 4.9% CS	25	500	11.75 (3.57)	8.89 (3.14)	7.95 (2.99)	10.67 (3.42)	9.47 (3.24)	8.97 (3.16)	8.45 (3.07)	51.41
T_6	Fipronil 5% SC	100	2000	10.94 (3.45)	9.05 (3.17)	8.14 (3.02)	11.03 (3.47)	9.78 (3.28)	9.45 (3.23)	8.61 (3.10)	50.49
T_7	Untreated control	-	-	11.72 (3.57)	12.36 (3.66)	13.75 (3.84)	15.11 (4.01)	15.75 (4.09)	16.61 (4.20)	17.39 (4.29)	-
	S. Em±			-	0.05	0.04	0.08	0.06	0.05	0.04	-
	CD at 5 %			NS	0.15	0.12	0.23	0.19	0.15	0.12	-

**Original values; **Square root transformed values; DAS – Days After Spray, NS – Non significant; ROC – Reduction Over untreated Control*

Table 2. Bio-efficacy of different doses of novel insecticide, Cyantraniliprole 10.26% ODagainst aphids in pomegranate during 2022.

Sr. No.	Treatment	Dose		Number of aphids/ 5 cm twig							Per cent ROC @ 10 days after 2nd spray
					First spray			Second spray			
		g a.i./ha	Formulation (ml or g/ha)	Pre count	3 DAS	7 DAS	10 DAS	3 DAS	7 DAS	10 DAS	
T_1	Cyantraniliprole 10.26% OD	60	200	8.75* (3.12)**	8.03 (3.00)	7.25 (2.87)	10.33 (3.36)	9.22 (3.20)	7.95 (2.99)	7.59 (2.93)	50.13
T_2	Cyantraniliprole 10.26% OD	75	250	9.22 (3.19)	6.45 (2.73)	5.08 (2.47)	7.22 (2.87)	5.69 (2.59)	4.22 (2.29)	3.22 (2.05)	78.84
T_3	Cyantraniliprole 10.26% OD	90	300	8.56 (3.09)	4.78 (2.40)	3.00 (2.00)	5.89 (2.62)	3.56 (2.13)	1.64 (1.62)	0.92 (1.39)	93.96
T_4	Cyantraniliprole 10.26% OD	120	400	9.44 (3.23)	4.56 (2.36)	2.89 (1.96)	5.78 (2.60)	3.41 (2.10)	1.50 (1.58)	0.78 (1.33)	94.88
T_5	Lambda-cyhalothrin 4.9% CS	25	500	8.94 (3.15)	7.53 (2.92)	6.78 (2.79)	9.75 (3.28)	8.67 (3.11)	7.53 (2.92)	7.06 (2.84)	53.61
T_6	Fipronil 5% SC	100	2000	9.75 (3.28)	7.81 (2.97)	7.00 (2.83)	10.11 (3.33)	8.89 (3.14)	7.67 (2.94)	7.20 (2.86)	52.69
T_7	Untreated control	-	-	9.61 (3.25)	10.05 (3.32)	11.69 (3.56)	13.22 (3.77)	13.89 (3.86)	14.64 (3.95)	15.22 (4.03)	-
	S. Em±			-	0.03	0.08	0.06	0.08	0.04	0.05	-
	CD at 5 %			NS	0.09	0.24	0.20	0.24	0.13	0.14	-

**Original values; **Square root transformed values; DAS – Days After Spray, NS – Non significant; ROC – Reduction Over untreated Control*

ml/ha against sap feeder insect pests infesting pomegranate. Each treatment was applied twice first when the sap feeder population crossed the ETL and second was after 10 days interval. Observation on pest population of aphids, thrips and whiteflies were recorded at before spray and 3, 7 and 10 d after each spray. Population of aphids, thrips and whiteflies were recorded from 5 cm shoot length per twig. Four twigs were randomly selected from each plant from four directions (East, West, South and North). Three plants from each plot were randomly selected for taking the observations and data recorded was represented as number per 5 cm twig. Per cent reduction of pest population over untreated control was calculated at 3, 7 and 10 days after each spray. Data recorded on pest population were transformed to square root before the statistical analysis.

RESULTS AND DISCUSSION

Bio-efficacy against Aphids (*Aphis punicae*).

The aphids (*Aphis punicae*) mean population was recorded before first spray and 3, 7 and 10 d after each spray during first and second seasons have been presented in Table 1 and 2. The data revealed that before first spray aphid population was uniform in various treatments since the difference in population was not significant. After spray all the treatments were found significantly effective in controlling the aphid population when compared to untreated control. Amongst the treatments Cyantraniliprole 10.26% OD@ 400 g/ha was more effective at each observation with low pest population which was at par with Cyantraniliprole 10.26% OD@ 400 g/ha during both the year. Next treatment in order of effectiveness was Cyantraniliprole 10.26% OD@ 200 g/ha followed by Lambda-cyhalothrin 4.9% CS 500 ml/ha, which was at par with Fipronil 5% SC @ 2000 ml/ha. The highest aphid population was recorded in untreated control. The per cent reduction in aphid population over control was also calculated and presented in Table 1 and 2. The higher population reduction over control was recorded with the treatment of Cyantraniliprole 10.26% OD@ 400 g/ha , which was 92.98 % and 94.88% in second spray 10 days after application during *Kharif* 2021 and 2022, respectively.

Bio-efficacy against Thrips (*Scirtothrips dorsalis*)

Thrips (*Scirtothrips dorsalis*) mean population was recorded before first spray and at different time intervals after each spray during first and second seasons have been presented in Table 3 and 4. The data revealed that before first spray the thripspopulation was uniform in various treatments since the difference in population was not significant. After spray all the treatments were found significantly effective in controlling the thripspopulation when compared to untreated control. Amongst the treatments Cyantraniliprole 10.26% OD@ 400 g/ha was more effective at each observation time with low pest population which was at par with Cyantraniliprole 10.26% OD@ 400 g/ha during both the year. Next treatment in order of effectiveness was Cyantraniliprole 10.26% OD@ 200 g/ha followed by Lambda-cyhalothrin 4.9% CS 500 ml/ha, which was at par with Fipronil 5% SC @ 2000 ml/ha. The highest aphid population was recorded in untreated control. The per cent reduction in thrips population over control was also calculated and presented in Table 3 and 4. The higher population reduction over control was recorded with the treatment of Cyantraniliprole 10.26% OD@ 400 g/ha , which was 92.84 % and 95.38% in second spray 10 days after application during *Kharif* 2021 and 2022, respectively.

Table 3. Bio-eficacy of different doses of novelinsecticide, Cyantraniliprole 10.26% ODagainst thrips in pomegranate during 2021.

Sr. No.	Treatments	Dose		Number of thrips/ 5 cm twig							Per cent ROC @ 10 days after 2nd spray
		g a.i./ ha	Formulation (ml or g/ha)	Pre count	First spray			Second spray			
					3 DAS	7 DAS	10 DAS	3 DAS	7 DAS	10 DAS	
T_1	Cyantraniliprole 10.26% OD	60	200	11.47* (3.52)**	10.75 (3.43)	9.42 (3.22)	12.89 (3.73)	11.19 (3.49)	10.67 (3.41)	9.81 (3.29)	49.49
T_2	Cyantraniliprole 10.26% OD	75	250	12.15 (3.62)	6.03 (2.65)	3.72 (2.17)	7.22 (2.87)	4.94 (2.44)	3.22 (2.05)	1.61 (1.61)	91.71
T_3	Cyantraniliprole 10.26% OD	90	300	11.67 (3.55)	5.69 (2.59)	3.47 (2.11)	7.03 (2.83)	4.78 (2.40)	3.00 (2.00)	1.53 (1.59)	92.12
T_4	Cyantraniliprole 10.26% OD	120	400	12.50 (3.67)	5.44 (2.54)	3.19 (2.05)	6.78 (2.79)	4.53 (2.35)	2.75 (1.93)	1.39 (1.54)	92.84
T_5	Lambda-cyhalothrin 4.9% CS	25	500	11.21 (3.49)	8.75 (3.12)	6.78 (2.79)	9.33 (3.21)	8.58 (3.09)	7.44 (2.90)	6.53 (2.74)	66.37
T_6	Fipronil 5% SC	100	2000	12.78 (3.71)	9.08 (3.17)	7.22 (2.87)	9.72 (3.27)	8.89 (3.14)	7.67 (2.94)	6.78 (2.79)	65.09
T_7	Untreated control	-	-	11.45 (3.52)	12.55 (3.68)	13.42 (3.80)	15.33 (4.04)	17.33 (4.28)	18.33 (4.40)	19.42 (4.52)	-
	S. Em±			-	0.08	0.09	0.06	0.08	0.08	0.06	-
	CD at 5 %			NS	0.24	0.27	0.19	0.25	0.26	0.20	-

**Original values; **Square root transformed values; DAS – Days After Spray, NS – Non significant; ROC – Reduction Over untreated Control*

Table 4. Bio-efficacy of different doses of novel insecticide, Cyantraniliprole 10.26% OD against thrips in pomegranate during 2022.

Sr. No.	Treatment	Dose		Number of thrips/ 5 cm twig							Per cent ROC @ 10 days after 2nd spray
					First spray			Second spray			
		g a.i./ha	Formulation (ml or g/ha)	Pre count	3 DAS	7 DAS	10 DAS	3 DAS	7 DAS	10 DAS	
T_1	Cyantraniliprole 10.26% OD	60	200	10.19* (3.34)**	8.22 (3.03)	7.22 (2.87)	10.53 (3.39)	9.22 (3.20)	8.44 (3.07)	7.89 (2.98)	51.36
T_2	Cyantraniliprole 10.26% OD	75	250	9.44 (3.22)	3.89 (2.21)	2.08 (1.75)	5.70 (2.59)	4.22 (2.28)	2.20 (1.79)	1.11 (1.45)	93.16
T_3	Cyantraniliprole 10.26% OD	90	300	10.78 (3.43)	3.67 (2.16)	1.83 (1.68)	5.47 (2.54)	3.97 (2.23)	1.78 (1.65)	1.00 (1.41)	93.83
T_4	Cyantraniliprole 10.26% OD	120	400	9.83 (3.28)	3.45 (2.11)	1.67 (1.63)	5.22 (2.49)	3.78 (2.18)	1.58 (1.61)	0.75 (1.32)	95.38
T_5	Lambda -cyhalothrin 4.9% CS	25	500	10.58 (3.40)	6.56 (2.75)	4.64 (2.37)	8.33 (3.05)	6.22 (2.69)	5.42 (2.53)	4.97 (2.44)	69.36
T_6	Fipronil 5% SC	100	2000	9.33 (3.20)	6.72 (2.78)	4.83 (2.41)	8.47 (3.08)	6.70 (2.77)	5.89 (2.62)	5.25 (2.49)	67.63
T_7	Untreated control	-	-	10.09 (3.32)	10.78 (3.43)	11.33 (3.51)	13.56 (3.81)	14.67 (3.96)	15.33 (4.04)	16.22 (4.15)	-
	S. Em±			-	0.07	0.07	0.06	0.06	0.08	0.06	-
	CD at 5 %			NS	0.20	0.22	0.19	0.19	0.23	0.20	-

**Original values; **Square root transformed values; DAS – Days After Spray, NS – Non significant; ROC – Reduction Over untreated Control*

Bio-efficacy against whitefly (*Siphoninus phillyreae*)

The data revealed that before first spray whitefly population was uniform in various treatments since the difference in population was not significant. After spray all the treatments were found significantly effective in controlling the whitefly population when compared to untreated control. Amongst the treatments Cyantraniliprole 10.26% OD@ 400 g/ha was more effective at each observation time with low pest population which was at par with Cyantraniliprole 10.26% OD@ 400 g/ha during both the year. Next treatment in order of effectiveness was Cyantraniliprole 10.26% OD@ 200 g/ha followed by Lambda-cyhalothrin 4.9% CS 500 ml/ha,which was at par with Fipronil 5% SC @ 2000 ml/ha. The highest whitefly population was recorded in untreated control. The per cent reduction in whitefly population over control was also calculated and presented in Table 5 and 6. The higher population reduction over control was recorded with the treatment of Cyantraniliprole 10.26% OD@ 400 g/ha , which was 91.91 % and 93.94% in second spray 10 days after application during *Kharif* 2021 and 2022, respectively.

The result of effectiveness of different insecticidal treatments against pomegranate sap feeders showed that all the treatments were significantly superior over control in terms of population reduction. The findings of present investigation indicated that Cyantraniliprole 10.26% OD@ 400 g/ha was more effective during each observation with low pest population. Observation recorded at 10 days after 2nd spray revealed that lowest population of 1.22 aphids and 0.78/5 cm twig was recorded in Cyantraniliprole 10.26% OD@ 400 g/haand it was found at par with Cyantraniliprole 10.26% OD@300 g/ha (1.36 aphids and 0.92/5 cm twig), respectively during *Kharif*2022 and 2023. Highest population of aphids /5 cm twig i.e. 17.39 and 15.22, respectively during both the year was recorded inuntreated control. Whereas, the reduction in population of thrips over untreated control recorded at 10 days after 2nd spray revealed that highest reduction in the population of thrips over untreated control was recorded in Cyantraniliprole 10.26% OD@ 400 g/ha(92.84 %) which was found similar with Cyantraniliprole 10.26% OD@ 300 g/ha(92.12 %) during 2022 and during 2023 the maximum reduction of thrips population over untreated control was recorded in

Cyantraniliprole 10.26% OD@ 400 g/ha(95.38 %) which was found similar with Cyantraniliprole 10.26% OD@ 300 g/ha (93.83 %). In whitefly observation recorded at 10 days after 2nd spray revealed that lowest population of 0.53 whiteflies/ 5 cm twig was recorded in Cyantraniliprole 10.26% OD@400 g/hawhich was at par with Cyantraniliprole 10.26% OD@ 300 g/ha(0.61 whiteflies/5 cm length of twig). Highest population of whiteflies/5 cm twig i.e. 6.55 was recorded inuntreated control during 2021. Thereafter, during 2022 data recorded at 10 days after 2nd spray revealed that lowest population of 0.36 whiteflies/5 cm twig length was recorded in Cyantraniliprole 10.26% OD@400 g/ha which was at par with Cyantraniliprole 10.26% OD@ 300 g/ha (0.42 whiteflies/5 cm twig). Highest population of whiteflies/5 cm twig length i.e. 5.94 was recorded inuntreated control.

The results are in close agreement with the findings of Bhut *et al* (2013) and Thilagam *et al* (2020) reported that two sprays of chlorantraniliprole proved most effective followed by flubendiamide, novaluron, thiodicarb, endosulfan and malathion. Whereas, Kambrekar *et al* (2015) observed that emamectin benzoate 5 SG @ 0.25 g/ l ha gave highest reduction in the fruit damage followed by spinosad 45 SC 0.20 ml/l. Kumar and Gupta (2018) found rynaxypyr, spinosad, emamectin benzoate and cyazypyr effective; and quinalphos (infestation) and flubendiamide were moderately effective. Rajeshwari *et al* (2019) evaluated different insecticides, and observed that the treatment with Spinosad 45 SC @ 0.2 ml/l was found to be significantly superior in recording a minimum population of thrips (0.92 thrips/three leaves) and aphids (7.54 aphids/three leaves) respectively. Solankar *et al* (2021) observed that the treatment of Cyantraniliprole 10.26 % OD @ 0.9 ml and combination treatment of Lambda-cyhalothrin 4.9 CS (each at 0.3ml) + Propineb 50 WP (1gm) with soluble fertilizer (00:52:34) (5 g/l) were found equally effective for the control of sucking pests viz. aphids and thrips on pomegranate followed by treatment of Flubendiamide 19.92 %+ Thiacloprid 19.92 SC at @ 0.4 ml/ l of water. Gaikwad *et al* (2023) showed that the most effective spray treatment forthe reduction in the population of thrips was Cyantraniliprole 10 OD, followed by Spinosad 45 SC and flonicamide 50 WG, indicating that these insecticides were comparable to one another and somewhat more effective than the other spray treatments.

Table 5. Bio-efficacy of different doses of novel insecticide, Cyantraniliprole 10.26% ODagainst whiteflies in pomegranate during 2021.

Sr. No.	Treatment	Dose		Number of whiteflies / 5 cm twig							Per cent ROC @ 10 days after 2nd spray
		g a.i./ha	Formulation (ml or g/ha)	Pre count	First spray			Second spray			
					3 DAS	7 DAS	10 DAS	3 DAS	7 DAS	10 DAS	
T_1	Cyantraniliprole 10.26% OD	60	200	4.95* (2.44)**	4.22 (2.28)	3.89 (2.21)	5.42 (2.53)	4.95 (2.44)	4.31 (2.30)	3.61 (2.15)	44.89
T_2	Cyantraniliprole 10.26% OD	75	250	5.47 (2.54)	2.56 (1.89)	1.70 (1.64)	3.47 (2.11)	2.61 (1.90)	2.11 (1.76)	1.45 (1.56)	77.86
T_3	Cyantraniliprole 10.26% OD	90	300	5.89 (2.62)	1.86 (1.69)	0.86 (1.36)	2.44 (1.86)	1.53 (1.58)	1.03 (1.42)	0.61 (1.27)	90.69
T_4	Cyantraniliprole 10.26% OD	120	400	4.78 (2.40)	1.78 (1.66)	0.78 (1.33)	2.25 (1.80)	1.45 (1.56)	0.94 (1.39)	0.53 (1.24)	91.91
T_5	Lambda -cyhalothrin 4.9% CS	25	500	5.75 (2.60)	3.22 (2.05)	2.39 (1.84)	4.58 (2.36)	4.00 (2.24)	3.67 (2.16)	3.22 (2.05)	50.84
T_6	Fipronil 5% SC	100	2000	5.81 (2.61)	3.44 (2.11)	2.66 (1.91)	4.67 (2.38)	4.11 (2.26)	3.75 (2.18)	3.30 (2.07)	49.62
T_7	Untreated control	-	-	4.89 (2.42)	5.17 (2.48)	5.36 (2.52)	5.89 (2.62)	6.08 (2.66)	6.33 (2.71)	6.55 (2.75)	-
	S. Em±			-	0.05	0.06	0.02	0.05	0.03	0.01	-
	CD at 5 %			NS	0.14	0.19	0.06	0.15	0.09	0.05	-

**Original values; **Square root transformed values; DAS – Days After Spray, NS – Non significant; ROC – Reduction Over untreated Control*

Table 6. Bio-efficacy of different doses of novel insecticide, Cyantraniliprole 10.26% OD against whiteflies in pomegranate during 2022.

Sr. No.	Treatment	Dose		Number of whiteflies / 5 cm twig							Per cent ROC @ 10 days after 2nd spray
				Pre count	First spray			Second spray			
		g a.i./ha	Formulation (ml or g/ha)		3 DAS	7 DAS	10 DAS	3 DAS	7 DAS	10 DAS	
T_1	Cyantraniliprole 10.26% OD	60	200	3.86* (2.21)**	3.67 (2.16)	3.28 (2.07)	4.44 (2.33)	3.83 (2.20)	3.47 (2.11)	3.21 (2.05)	45.96
T_2	Cyantraniliprole 10.26% OD	75	250	4.00 (2.23)	1.94 (1.72)	1.14 (1.46)	2.67 (1.91)	2.19 (1.79)	1.61 (1.62)	1.22 (1.49)	79.46
T_3	Cyantraniliprole 10.26% OD	90	300	3.67 (2.16)	1.28 (1.51)	0.53 (1.24)	2.00 (1.73)	1.31 (1.52)	0.72 (1.31)	0.42 (1.19)	92.93
T_4	Cyantraniliprole 10.26% OD	120	400	3.83 (2.19)	1.19 (1.48)	0.47 (1.21)	1.89 (1.70)	1.25 (1.50)	0.61 (1.27)	0.36 (1.17)	93.94
T_5	Lambda -cyhalothrin 4.9% CS	25	500	4.06 (2.25)	2.86 (1.96)	2.33 (1.83)	3.67 (2.16)	3.28 (2.07)	3.00 (2.00)	2.81 (1.95)	52.69
T_6	Fipronil 5% SC	100	2000	3.89 (2.21)	2.95 (1.99)	2.44 (1.86)	3.78 (2.19)	3.39 (2.09)	3.11 (2.03)	2.89 (1.97)	51.35
T_7	Untreated control	-	-	3.97 (2.23)	4.39 (2.32)	4.72 (2.39)	5.03 (2.45)	5.33 (2.52)	5.64 (2.58)	5.94 (2.63)	-
	S. Em±			-	0.03	0.02	0.03	0.03	0.02	0.02	-
	CD at 5 %			NS	0.08	0.06	0.10	0.10	0.06	0.07	-

**Original values; **Square root transformed values; DAS – Days After Spray, NS – Non significant; ROC – Reduction Over untreated Control*

Table 7. Effect of different doses of novel insecticide on fruit yield of pomegranate during 2021 and 2022.

Sr. No.	Treatment	Dose		Fruit yield (t/ha) 2021	Fruit yield (t/ha) 2022
		g a.i./ha	Formulation (ml or g/ha)		
T_1	Cyantraniliprole 10.26% OD	60	200	5.76	6.82
T_2	Cyantraniliprole 10.26% OD	75	250	9.11	10.05
T_3	Cyantraniliprole 10.26% OD	90	300	9.31	10.53
T_4	Cyantraniliprole 10.26% OD	120	400	9.82	10.92
T_5	Lambda-cyhalothrin 4.9% CS	25	500	7.56	8.73
T_6	Fipronil 5% SC	100	2000	7.14	8.23
T_7	Untreated control	-	-	3.89	4.62
	S. Em±			0.37	0.41
	CD at 5 %			1.13	1.27

CONCLUSION

The treatment Cyantraniliprole 10.26% OD @ 120 g a.i./ha and @ 90 g a.i./ha were found superior and at par in reducing aphids and whiteflies. Doses of Cyantraniliprole 10.26% OD @ 120 g a.i./ha, @ 90 g a.i./ha and @75 g a.i./ha were found superior and at par in reducing thrips in pomegranate and also recorded higher yield. On the basis results it can be concluded thatCyantraniliprole 10.26% OD @ 90 g a.i./ha can be recommended to control aphids and whiteflies whereas, Cyantraniliprole 10.26% OD @ 75 g a.i./ha can be recommended to control thrips infestation on pomegranate.

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