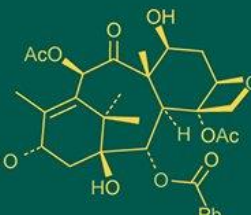
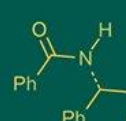
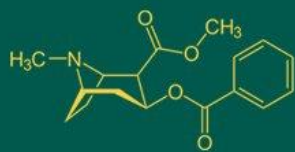


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Assessment of the bio-efficacy of new insecticides on sucking pests in chilli

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Abstract

A field experiment was conducted during 2023-24 at the Agriculture Farm of Institute of Agriculture (Palli Siksha Bhavana), Visva-Bharati, West Bengal, to assess the bio-efficacy of novel insecticides against major sucking pests viz., aphids, thrips, mites, and whiteflies infesting chilli (*Capsicum* spp.), using the chilli variety 'Bullet'. Seven insecticidal treatments, namely Diafenthiuron 25% + Pyriproxyfen 5% SE at 562.5, 750, and 937.5 ml/ha respectively; Diafenthiuron 50% WP at 600 gm/ha; Pyriproxyfen 10% EC at 500 ml/ha; Clothianidine 3.5% + Pyriproxyfen 8% SE at 1250 ml/ha; and Beta-Cyfluthrin 8.49% + Imidacloprid 19.81% w/w OD at 200 ml/ha, along with an untreated control, were evaluated in a Randomized Block Design with three replications. All insecticidal treatments significantly reduced pest populations compared to the control. The application of Diafenthiuron 25% + Pyriproxyfen 5% SE @ 937.5 ml/ha was found to be the most effective, recording the lowest populations of thrips, whiteflies, aphids, and mites at 3, 7, and 14 days after both the first and second sprays. This treatment was immediately followed by Diafenthiuron 25% + Pyriproxyfen 5% SE @ 750 ml/ha, which was at par with the same at 937.5 ml/ha. This treatment also resulted in the highest green chilli yield (88.37 q/ha), followed by Diafenthiuron 25% + Pyriproxyfen 5% SE @ 750 ml/ha (81.40 q/ha) and Pyriproxyfen 10% EC @ 500 ml/ha (76.30 q/ha), whereas the untreated control recorded the lowest yield (31.83 q/ha). The findings indicate that although Diafenthiuron 25% + Pyriproxyfen 5% SE @ 937.5 ml/ha yielded better results in terms of population reduction of sucking pests, however Diafenthiuron 25% + Pyriproxyfen 5% SE @ 750 ml/ha is a promising option for the effective management of sucking pests, conservation of natural enemies and achieving higher yields in chilli cultivation.

Keywords: Chilli, sucking pests, novel insecticides, bio-efficacy

Introduction

Capsicum, a genus belonging to the Solanaceae family, commonly known as the nightshade family, is responsible for producing chillies, an integral part of culinary traditions worldwide. The fruits of *Capsicum* are prized not only for their aromatic and flavourful characteristics but also for their vivid colours, making them popular in both green and ripe dried forms. The widespread use of chilli peppers as spices has transformed them into staple ingredients in various global cuisines, enhancing the taste and appearance of countless dishes.

Nutritionally, chillies are a rich source of essential vitamins, particularly vitamins A and C, which play a vital role in maintaining overall health. The vibrant red hue of chillies is attributed to two primary pigments: capsanthin and its isomer capsorubin, which is often associated with quality and freshness in chilli products.

Beyond their culinary appeal, chillies possess significant medicinal properties. The compound capsaicin, which imparts pungency to chillies, is noted for its anti-cancer attributes and is a crucial ingredient in pharmaceutical formulations used for treating heart ailments and as a component in topical pain relief balms. This dual utility in both food and medicine underscores the importance of chillies in everyday life.

India stands as the leading producer of chillies, contributing 20.49 million tonnes and accounting for 42% of the global production, according to FAO (2021). Other major chilli-producing countries include China, Ethiopia, Thailand, Pakistan, and Bangladesh. In India, major chilli-producing states are Andhra Pradesh, Telangana, Madhya Pradesh, Karnataka and West Bengal. The extensive cultivation of chillies in India and other countries highlights their economic significance and the need for robust crop management practices. The chilli crop, however, faces considerable challenges due to pest infestations, both in the field and

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during storage. Approximately 293 distinct species of insects and mites have been documented to affect chilli plants (Girish *et al.*, 2019; Ghose *et al.*, 2022b) ^[4, 2, 3]. Of these, 51 insect species—including two mite species from 27 families and nine orders—are identified as the principal pests causing substantial damage to chilli crops, with yield losses estimated to range from 50% to 90%. Notable among these pests are the yellow mite (*Polyphagotarsonemus latus* (Banks)) and chilli thrips (*Scirtothrips dorsalis* Hood), which not only cause direct damage but also indirectly harm the crop by transmitting viral diseases (Butani, 1976; Reddy and Puttaswamy, 1983; Girish *et al.*, 2019; Tukaram *et al.*, 2017) ^[1, 9, 4, 14]. Thrips alone are responsible for up to 50% yield reduction and are vectors of the chilli leaf curl disease (Samota and Choudhary, 2017) ^[10].

To mitigate these losses, the use of pesticides in vegetable crop production is significant, with approximately 13-14% of all pesticides applied to vegetables. Specifically, 5.13% of pesticides are utilised in chilli cultivation to address pest-related issues (Kodandaram *et al.*, 2016) ^[5]. The emergence of novel pesticide molecules offers promising solutions for farmers, particularly when pest populations reach or exceed the economic threshold level (ETL), necessitating urgent intervention. These new-generation pesticides are designed to target specific pest species with greater efficacy, thereby minimising the risk of resistance development and reducing collateral damage to non-target organisms, including beneficial insects and natural enemies. Their advanced formulations often allow for lower application rates and enhanced persistence, resulting in sustained pest control and reduced frequency of sprays aligning with the goals of sustainable agriculture. The adoption of such molecules is especially crucial in crops like chilli for developing effective and economically viable pest management strategies, which face considerable losses due to sucking insect-pests.

Considering these challenges, the present investigation was undertaken to assess the bio-efficacy of selected novel insecticides against sucking insect pests infesting chilli. This research aims to provide insights into efficient pest control measures that can enhance yield and quality, thereby supporting the livelihoods of chilli growers and ensuring the sustainability of chilli production.

Materials and Methods

The bio-efficacy of different new-generation insecticides obtained from by M/s GSP Crop Science Pvt. Ltd., Ahmedabad, namely; Diafenthiuron 25% + Pyriproxyfen 5% SE at rates of 562.5 ml/ha, 750 ml/ha, and 937.5 ml/ha; Diafenthiuron 50% WP at 600 gm/ha; Pyriproxyfen 10% EC at 500 ml/ha; Clothianidine 3.5% + Pyriproxifen 8% SE at 1250 ml/ha; Beta-Cyfluthrin 08.49% + Imidacloprid 19.81% w/w OD at 200 ml/ha; alongside an untreated control, was evaluated against sucking pests of chilli (aphids, thrips, mites, and whitefly) at the Agriculture Farm of the Institute of Agriculture (Palli Siksha Bhavana), Visva-Bharati, Sriniketan, Birbhum, West Bengal during the Rabi seasons of 2023 and 2024. The study employed a Randomized Block Design (RBD) featuring eight treatments with three replications each.

Chilli variety 'Bullet' was transplanted on 1st December 2023 and 4th December 2024 according to standard cultivation practices. Sowing occurred in plots measuring 25 m², with row-to-row and plant-to-plant spacings set at 60 × 60 cm² and 45 × 45 cm², respectively. Each treatment was

applied three times: beginning with the initial detection of pest infestation, followed by second and third applications at 15-day intervals.

Observations of thrips and whitefly populations were made from the top, middle, and lower leaves of each plant (three leaves per five plants), while aphids and mites were assessed from the apical portions of leaves on five randomly selected and tagged plants. Pest population data were collected one day prior to and at 3, 7, and 14 days after each spray application. Green chilli yield (kg/plot) was recorded during each harvest, and total yield was subsequently converted to quintals per hectare (q/ha). Population data were transformed as required and analyzed using OPSTAT to determine variations among the different treatments.

Results and Discussion

Effect on Aphid population

The pooled data (2023-2024) revealed that all insecticidal treatments significantly reduced the population of *Aphis gossypii* on chilli compared to the untreated control. Pre-treatment aphid population was statistically non-significant (NS), indicating uniform infestation across treatments before spray. Among the treatments, Diafenthiuron 25% + Pyriproxyfen 5% SE at 937.5 g/ha recorded the lowest aphid population (3.23, 3.20 and 3.13 aphids/10 cm apical shoot at 3, 7 and 14 DAS, respectively), resulting in 83.68%, 84.63% and 86.03% population reduction over control. This was closely followed by Diafenthiuron 25% + Pyriproxyfen 5% SE @ 750 g/ha which was statistically at par with Diafenthiuron 25% + Pyriproxyfen 5% SE @ 937.5 g/ha. The standalone Diafenthiuron 50% WP @ 600 g/ha showed moderate efficacy (63.48-68.77% reduction). Beta-Cyfluthrin + Imidacloprid recorded the lowest suppression among treated plots (53.53-56.77% reduction) after the first spray.

Further after the second spray a similar trend was observed. The highest dose of Diafenthiuron 25% + Pyriproxyfen 5% SE (937.5 g/ha) again proved superior, recording the lowest aphid population (2.97, 2.83 and 2.83 aphids/10 cm apical shoot at 3, 7 and 14 DAS, respectively) with maximum population reduction (87.39%, 88.30% and 88.20%). This treatment was immediately followed by Diafenthiuron 25% + Pyriproxyfen 5% SE at 750 g/ha being statistically at par. The untreated check showed a continuous increase in aphid population throughout the observation period.

The pooled results clearly indicate that Diafenthiuron 25% + Pyriproxyfen 5% SE, particularly at 937.5 g/ha and 750 g/ha, was most effective in suppressing *Aphis gossypii* infestation in chilli. The combination molecule demonstrated superior and consistent performance across both sprays and all observation intervals.

Effect on whitefly population

The pre-treatment whitefly population ranged from 3.12 to 3.54 per three leaves.

The differences were non-significant (NS), indicating uniform infestation across treatments prior to spraying and ensuring validity of treatment comparison. A pronounced reduction in whitefly population was observed after both the sprays across all the treatments. The most effective treatment being Diafenthiuron 25% + Pyriproxyfen 5% SE @ 937.5 g/ha recording 1.00, 0.72 and 0.50 whiteflies/three leaves at 3, 7 and 14 DAS with a maximum reduction of 77.82%, 86.15% and 92.31%, respectively. This was closely followed by Diafenthiuron 25% + Pyriproxyfen 5% SE @

750 g/ha (74.50%, 82.11% and 89.23%) showing at par results. Other effective treatments in descending order were Diafenthiuron 50% WP (77.82-86.15%); Pyriproxyfen 10% EC (68.51-86.15%); Clothianidine + Pyriproxyfen (64.52-87.69%) and Beta-cyfluthrin + Imidacloprid (64.52-81.23%). Whereas, whitefly population in untreated control increased steadily from 3.30 before spray to 6.50 whiteflies per three leaves at 14 DAS after second spray, confirming heavy infestation pressure.

The pooled data clearly indicate that Diafenthiuron 25% + Pyriproxyfen 5% SE, particularly at 937.5 g/ha, was the most effective treatment against *Bemisia tabaci* comparable with Diafenthiuron 25% + Pyriproxyfen 5% SE at 750 g/ha providing consistent and significantly superior suppression after both sprays.

Effect on Thrips population

The pre-treatment thrips population ranged from 6.14 to 6.74 per three leaves and was non-significant (NS). All the treatments significantly reduced thrips population compared to untreated control at 3, 7 and 14 DAS. The untreated check confirmed heavy infestation pressure through the first and second spray. The highest suppression was recorded with Diafenthiuron 25% + Pyriproxyfen 5% SE @ 937.5 g/ha (70.00%, 78.82% and 85.71% reduction at 3, 7 and 14 DAS) (Table-3) which was closely followed and statistically comparable with Diafenthiuron 25% + Pyriproxyfen 5% SE @ 750 g/ha (66.00-83.30% reduction). Moderate control was observed with Diafenthiuron 50% WP and Beta-cyfluthrin + Imidacloprid. The least reduction after first spray was recorded in Pyriproxyfen 10% EC. A marked improvement in control was observed after the second spray which depicted a similar trend as the first spray.

Effect on Mites population

The pooled data reflects that all insecticidal treatments significantly reduced the population of Chilli yellow mite (*Polyphagotarsonemus latus*) compared to the untreated control. However, among the treatments, Diafenthiuron 25% + Pyriproxyfen 5% SE at 937.5 g/ha proved most effective.

It recorded the lowest mite population after both sprays and achieved the highest percent reduction over control (up to 73.16% after first spray and 91.84% after second spray at 14 DAS). The same combination at 750 g/ha was the next best treatment, showing comparable and consistently high suppression. Moderate efficacy was observed with Pyriproxyfen 10% EC (500 ml/ha) and Diafenthiuron 50% WP (600 g/ha), both achieving substantial reduction after the second spray (above 83-88% at 14 DAS). Comparatively lower control was recorded with Clothianidine 3.5% + Pyriproxyfen 8% SE (1250 ml/ha) and Beta-Cyfluthrin 8.49% + Imidacloprid 19.81% OD (200 ml/ha), though they still performed significantly better than the untreated check which showed a continuous increase in mite population throughout the observation period.

Yield of chilli as influenced by different insecticidal treatments

The yield data (2023-2024) revealed all insecticidal treatments to yield significantly more chilli than the untreated check (31.83 q/ha). Diafenthiuron 25% + Pyriproxyfen 5% SE at 937.5 g/ha recorded the highest yield (88.37 q/ha) with the maximum yield increase (177.59%) over control. This was followed by the same combination at 750 g/ha (83.40 q/ha; 162.01% increase), indicating a dose-dependent response. However, both the treatments were significantly comparable with each other.

The present findings are in line with the earlier work done by Singh and Singh (2013) [11], Kumawat *et al.* (2015) [6], Latha and Hunumanthraya (2018) [7], Swami *et al.* (2018) [12], Pradeep and Korat (2018) [8] and Ghose *et al.* (2022a) [2, 3] who have also observed significant reduction in pest population due to application of various chemicals and formulations as compared to untreated control. Thumar *et al.* (2018) [13] reflected that diafenthiuron 25% + pyriproxyfen 5% SE (1000 and 1250 ml/ha) was found relatively more effective against sucking insect pests viz., aphids, leafhoppers, whiteflies and thrips. These two doses of diafenthiuron 25% + pyriproxyfen 5% SE also reflected on higher cotton seed yield.

Table 1: Pooled Efficacy of newer insecticidal molecules against Aphid (*Aphis gossypii*) infesting chilli during 2023 and 2024

Treatment	Dose (gm or ml/ha)	Mean population of aphid/10 cm apical shoot						Percent population reduction of aphids over control						
		Before spray	First spray			Second spray			First spray			Second spray		
			3 DAS	7 DAS	14 DAS	3 DAS	7 DAS	14 DAS	3 DAS	7 DAS	14 DAS	3 DAS	7 DAS	14 DAS
Diafenthiuron 25% + Pyriproxyfen 5% SE	562.5	20.27 (4.56)*	4.91 (2.22)	4.60 (2.26)	4.67 (2.27)	4.50 (2.24)	4.47 (2.23)	4.60 (2.26)	75.25	77.90	79.17	80.89	81.52	80.83
Diafenthiuron 25% + Pyriproxyfen 5% SE	750	20.57 (4.59)	3.62 (1.91)	3.37 (1.97)	3.43 (1.98)	3.23 (1.93)	3.20 (1.92)	3.03 (1.88)	81.81	83.81	84.70	86.29	86.77	87.37
Diafenthiuron 25% + Pyriproxyfen 5% SE	937.5	19.60 (4.48)	3.23 (1.93)	3.20 (1.92)	3.13 (1.91)	2.97 (1.86)	2.83 (1.83)	2.83 (1.83)	83.68	84.63	86.03	87.39	88.30	88.20
Diafenthiuron 50% WP	600	19.80 (4.51)	7.23 (2.78)	7.10 (2.76)	7.00 (2.74)	6.80 (2.70)	6.73 (2.69)	6.70 (2.68)	63.48	65.89	68.77	71.13	72.19	72.08
Pyriproxyfen 10% EC	500	20.87 (4.62)	6.37 (2.62)	6.23 (2.59)	6.20 (2.59)	5.97 (2.54)	5.90 (2.53)	5.77 (2.50)	67.82	70.07	72.34	74.66	75.64	75.95
Clothianidine 3.5% + Pyriproxifen 8% SE	1250	19.33 (4.45)	6.03 (2.56)	5.90 (2.53)	5.80 (2.51)	5.70 (2.49)	5.53 (2.46)	5.37 (2.42)	69.54	71.66	74.13	75.80	77.14	77.62
Beta-Cyfluthrin 08.49% + Imidacloprid 19.81% w/w OD	200	21.03 (4.64)	9.20 (3.11)	9.00 (3.08)	8.93 (3.07)	8.80 (3.05)	8.70 (3.03)	8.50 (3.00)	53.53	56.77	74.13	62.64	64.04	64.58
Untreated check	-	19.42 (4.46)	19.80 (4.51)	20.82 (4.61)	22.42 (4.78)	23.56 (4.90)	24.20 (4.96)	24.00 (4.94)	--			--		
SEm (±)	--	NS	0.059	0.069	0.080	0.093	0.125	0.121	--			--		
CD (<i>n</i> = 0.05)	--	NS	0.184	0.215	0.249	0.291	0.389	0.378	--			--		

*Figure in parentheses represents the sq root transformed value.

Table 2: Pooled Efficacy of newer insecticidal molecules against White fly (*Bemesia tabaci*) during 2023 and 2024

Treatment	Dose (gm or ml/ha)	Mean population of White fly/three leaves							Percent population reduction of Whitefly over control					
		Before Spray	First spray			Second spray			First spray			Second spray		
			3 DAS	7 DAS	14 DAS	3 DAS	7 DAS	14 DAS	3 DAS	7 DAS	14 DAS	3 DAS	7 DAS	14 DAS
Diafenthiuron 25% + Pyriproxyfen 5% SE	562.5	3.44 (1.98) *	1.82 (1.51)	1.63 (1.46)	1.52 (1.42)	1.40 (1.38)	1.31 (1.35)	1.40 (1.38)	52.10	59.25	64.65	68.88	74.80	78.46
Diafenthiuron 25% + Pyriproxyfen 5% SE	750	3.30 (1.95)	1.70 (1.48)	1.52 (1.42)	1.40 (1.38)	1.15 (1.28)	0.93 (1.20)	0.70 (1.10)	55.26	62.00	67.44	74.50	82.11	89.23
Diafenthiuron 25% + Pyriproxyfen 5% SE	937.5	3.12 (1.90)	1.51 (1.42)	1.40 (1.38)	1.35 (1.36)	1.00 (1.22)	0.72 (1.10)	0.50 (1.00)	60.26	65.00	68.60	77.82	86.15	92.31
Diafenthiuron 50% WP	600	3.54 (2.00)	1.90 (1.55)	1.54 (1.43)	1.20 (1.30)	1.00 (1.22)	1.00 (1.22)	0.90 (1.18)	50.0	61.5	72.09	77.82	80.77	86.15
Pyriproxyfen 10% EC	500	3.13 (1.91)	1.94 (1.56)	1.70 (1.48)	1.62 (1.46)	1.42 (1.39)	1.00 (1.22)	0.90 (1.05)	48.94	57.50	62.32	68.51	80.77	86.15
Clothianidine 3.5% + Pyriproxifen 8% SE	1250	3.40 (1.97)	2.20 (1.64)	1.93 (1.56)	1.90 (1.55)	1.60 (1.45)	1.21 (1.30)	0.80 (1.14)	42.10	51.75	55.81	64.52	76.73	87.69
Beta-Cyfluthrin 08.49% + Imidacloprid 19.81% w/w OD	200	3.12 (1.90)	2.32 (1.68)	2.01 (1.58)	1.82 (1.52)	1.60 (1.45)	1.11 (1.26)	1.22 (1.31)	38.94	49.75	57.67	64.52	78.65	81.23
Untreated check	-	3.30 (1.95)	3.80 (2.07)	4.00 (2.12)	4.30 (2.19)	4.51 (2.24)	5.20 (2.39)	6.50 (2.64)	--			--		
SEm ($\pm$)	--	NS	0.059	0.069	0.080	0.093	0.125	0.121	--			--		
CD ($p = 0.05$)	--	0.034	0.184	0.215	0.249	0.291	0.389	0.378	--			--		

*Figure in parentheses represents the sq root transformed value.

Table 3: Pooled efficacy of newer insecticidal molecules against Chilli Thrips (*Scirtothrips dorsalis*) during 2023 and 2024

Treatment	Dose (gm or ml/ha)	Mean population of Chilli thrips/three leaves							Percent population reduction of Thrips over control					
		Before spray	First spray			Second spray			First spray			Second spray		
			3 DAS	7 DAS	14 DAS	3 DAS	7 DAS	14 DAS	3 DAS	7 DAS	14 DAS	3 DAS	7 DAS	14 DAS
Diafenthiuron 25% + Pyriproxyfen 5% SE	562.5	6.74 (2.69)*	3.90 (2.09)	3.12 (1.90)	3.10 (1.89)	2.59 (1.76)	2.02 (1.59)	2.32 (1.67)	51.25	63.30	65.93	72.45	78.96	76.08
Diafenthiuron 25% + Pyriproxyfen 5% SE	750	6.52 (2.65)	2.72 (1.79)	2.00 (1.58)	1.52 (1.42)	1.30 (1.34)	0.51 (1.00)	0.61 (1.05)	66.00	76.47	83.30	86.17	94.69	93.90
Diafenthiuron 25% + Pyriproxyfen 5% SE	937.5	6.14 (2.58)	2.40 (1.70)	1.80 (1.52)	1.30 (1.34)	1.02 (1.23)	0.41 (0.95)	0.52 (1.01)	70.00	78.82	85.71	89.15	95.73	94.90
Diafenthiuron 50% WP	600	6.22 (2.59)	3.00 (1.87)	2.32 (1.68)	1.89 (1.55)	1.50 (1.41)	0.61 (1.05)	0.90 (1.18)	62.50	72.71	79.23	84.04	93.65	91.00
Pyriproxyfen 10% EC	500	6.61 (2.67)	4.53 (2.24)	3.80 (2.07)	3.52 (2.00)	3.02 (1.88)	2.78 (1.81)	2.68 (1.78)	43.38	55.29	61.32	78.87	71.04	73.20
Clothianidine 3.5% + Pyriproxifen 8% SE	1250	6.60 (2.66)	4.12 (2.15)	3.22 (1.93)	2.60 (1.76)	2.30 (1.67)	1.04 (1.24)	1.40 (1.38)	48.50	62.12	71.43	75.53	89.17	86.00
Beta-Cyfluthrin 08.49% + Imidacloprid 19.81% w/w OD	200	6.23 (2.59)	3.11 (1.90)	2.70 (1.79)	2.30 (1.67)	2.05 (1.60)	0.80 (1.14)	1.21 (1.31)	61.13	68.24	74.73	78.19	91.67	89.9
Untreated check	-	6.40 (2.63)	8.00 (2.92)	8.50 (3.00)	9.10 (3.10)	9.40 (3.15)	9.60 (3.18)	10.00 (3.24)	--			--		
SEm ($\pm$)	--	NS	0.149	0.181	0.211	0.228	0.259	0.264	--			--		
CD ($p = 0.05$)	--	0.054	0.465	0.564	0.658	0.711	0.807	0.822	--			--		

*Figure in parentheses represents the sq root transformed value.

Table 4: Pooled efficacy of newer insecticidal molecules against Chilli yellow mite (*Polyphagotarsonemus latus*) during 2023 and 2024

Treatment	Dose (gm or ml/ha)	Mean population of mite							Percent population reduction of Mites over control					
		Before spray	First spray			Second spray			First spray			Second spray		
			3 DAS	7 DAS	14 DAS	3 DAS	7 DAS	14 DAS	3 DAS	7 DAS	14 DAS	3 DAS	7 DAS	14 DAS
Diafenthiuron 25% + Pyriproxyfen 5% SE	562.5	2.64 (1.77) *	1.52 (1.42)	1.30 (1.34)	1.22 (1.31)	0.91 (1.89)	0.42 (0.96)	0.63 (1.06)	53.94	63.89	67.89	77.25	90.67	87.14
Diafenthiuron 25% + Pyriproxyfen 5% SE	750	2.53 (1.74)	1.40 (1.38)	1.22 (1.31)	1.10 (1.26)	0.82 (1.14)	0.40 (0.95)	0.51 (1.01)	57.58	68.85	71.05	80.00	91.11	89.59
Diafenthiuron 25% + Pyriproxyfen 5% SE	937.5	2.52 (1.74)	1.23 (1.32)	1.11 (1.27)	1.02 (1.23)	0.70 (1.10)	0.31 (0.90)	0.40 (0.95)	62.73	69.17	73.16	82.50	93.11	91.84
Diafenthiuron 50% WP	600	2.45 (1.72)	1.61 (1.45)	1.53 (1.42)	1.50 (1.41)	1.22 (1.31)	1.03 (1.24)	0.82 (1.15)	51.21	57.50	58.33	69.50	77.11	83.27
Pyriproxyfen 10% EC	500	2.55 (1.75)	1.60 (1.45)	1.41 (1.38)	1.32 (1.35)	1.10 (1.26)	0.52 (1.01)	0.71 (1.10)	51.51	68.83	65.26	72.50	88.44	85.51
Clothianidine 3.5% + Pyriproxifen 8% SE	1250	2.62 (1.77)	1.90 (1.55)	1.62 (1.46)	1.60 (1.45)	1.43 (1.39)	0.60 (1.05)	1.02 (1.23)	42.42	55.00	57.89	64.35	86.67	79.18
Beta-Cyfluthrin 08.49% + Imidacloprid 19.81% w/w OD	200	2.54 (1.74)	2.02 (1.59)	1.71 (1.49)	1.51 (1.42)	1.30 (1.34)	0.63 (1.06)	0.91 (1.19)	39.79	52.50	60.26	67.50	86.00	81.43
Untreated check	-	2.51 (1.73)	3.30 (1.95)	3.60 (2.02)	3.80 (2.07)	4.00 (2.12)	4.50 (2.24)	4.90 (2.32)	--			--		
SEm ($\pm$)	--	NS	0.004	0.066	0.075	0.088	0.116	0.123	--			--		
CD ($p = 0.05$)	--	-	0.014	0.206	0.232	0.275	0.363	0.382	--			--		

*Figure in parentheses represents the sq root transformed value.

Table 5: Yield of chilli (pooled) as influenced by different insecticidal treatments (2023 and 2024)

Treatment	Dose (gm or ml/ha)	Yield (q/ha)	% Increase over yield
Diafenthiuron 25% + Pyriproxyfen 5% SE	562.5	59.97	88.38
Diafenthiuron 25% + Pyriproxyfen 5% SE	750	83.40	162.01
Diafenthiuron 25% + Pyriproxyfen 5% SE	937.5	88.37	177.59
Diafenthiuron 50% WP	600	68.33	114.66
Pyriproxyfen 10% EC	500	76.30	139.69
Clothianidine 3.5% + Pyriproxifen 8% SE	1250	66.47	108.82
Beta-Cyfluthrin 08.49% + Imidacloprid 19.81% w/w OD	200	60.13	88.90
Untreated check	-	31.83	-
SEm ($\pm$)	-	2.76	-
CD @ 5%	-	5.93	-

Conclusion

The present findings clearly demonstrate that both Diafenthiuron 25% + Pyriproxyfen 5% SE @ 937.5 ml/ha followed by Diafenthiuron 25% + Pyriproxyfen 5% SE @ 750 ml/ha being at par with each other emerged as the most effective treatments in suppressing the sucking insect-pests infesting chilli. The observed superiority can be explained based on their mode of action, physiological targets, and compatibility in resistance management. The combination of diafenthiuron and pyriproxyfen provides dual mode of action, targeting both active and developmental stages of sucking insect-pests. Diafenthiuron (a thiourea derivative) acts primarily as a mitochondrial respiration inhibitor (electron transport inhibitor), disrupting ATP synthesis. This leads to paralysis and death of motile stages (nymphs and adults). Pyriproxyfen is an insect growth regulator (IGR) and juvenile hormone analogue. It interferes with moulting, metamorphosis, and reproductive development, thereby reducing egg hatchability and population build-up. Thus, the combination provides both quick knockdown (via diafenthiuron) and long-term population suppression (via pyriproxyfen), explaining the maximum reduction observed. Further, the use of such combinations supports resistance management strategies, reducing selection pressure on a single biochemical pathway. The study thus reinforces the

importance of newer insecticidal molecules with diversified modes of action for effective management of sucking insect-pests of chilli under field conditions.

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References

- Butani DK. Pest and diseases of chillies and their control. Pesticides. 1976;10:38-41.
- Ghose M, Bhattacharya S, Mandal SK. Comparative susceptibility of commercial cultivars of bell pepper (*Capsicum annum* var. *grossum* Sendt.) to major insect pests in West Bengal. Int J Farm Sci. 2022;12(4):139-144.
- Ghose M, Bhattacharya S, Mandal SK. Evaluation of pesticides against chilli mite (*Polyphagotarsonemus latus* Banks) of bell pepper (*Capsicum annum* var. *grossum* Sendt.) under the Gangetic basin of West Bengal. Ann Entomol. 2022;40:105-112.

4. Girish R, Srinivasa N, Shruthi HR. Occurrence and status of pests infesting chilli (*Capsicum annuum* L.). J Entomol Zool Stud. 2019;7(5).
5. Kodandaram MH, Rai AB, Yengkhom BK, Singh B. An overview of insecticides and acaricides with new chemistries for the management of sucking pests in vegetable crops. Veg Sci. 2016;43(1):1-12.
6. Kumawat M, Sharma US, Lal J, Nagar R. Bio-efficacy of some insecticides against insect pests of chilli. Indian J Appl Entomol. 2015;29(2):132-137.
7. Latha S, Hunumanthraya L. Integrated management of insect and mite pests of chilli under hill zone of Karnataka. J Entomol Zool Stud. 2018;6(2):2770-2773.
8. Pradeep MS, Korat DM. Impact of pesticidal sprays in reducing sucking pests population on chilli. Int J Curr Microbiol Appl Sci. 2018;6:478-486.
9. Reddy DNR, Puttaswamy. Pest infesting chilli (*Capsicum annuum* L.) in the transplanted crop. Mysore J Agric Sci. 1983;17:246-251.
10. Samota RG, Jat BL, Choudhary MD. Efficacy of newer insecticides and bio-pesticides against thrips, *Scirtothrips dorsalis* Hood in chilli. J Pharmacogn Phytochem. 2017;6(4):1458-1462.
11. Singh AP, Singh RN. Management of yellow mite, *Polyphagotarsonemus latus* (Acari: Tarsonemidae) in chilli. Indian J Agric Sci. 2013;83(11):1250-1252.
12. Swami H, Lekha, Singh V, Kumar K. Bio-efficacy of pyriproxyfen 10% EC against thrips, *Thrips tabaci* and jassids, *Amrasca biguttula biguttula* (Ishida) infesting chilli crop. J Pharmacogn Phytochem. 2018;7(3):2937-2940.
13. Thumar R, Borad P, Pathan N, Bharpoda T, Chaudhary H. Bio-efficacy of diafenthiuron 25% + pyriproxyfen 5% SE against sucking insect pests of Bt cotton. J Entomol Zool Stud. 2018;6(5):1024-1029.
14. Tukaram CV, Karnatak AK, Srivastava RM. Bioefficacy of newer insecticide molecules against pest complex of chilli. Octa J Environ Res. 2017;5(2):129-139.