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Evaluation of Newer Insecticides Against Sucking Pests in Blackgram

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ABSTRACT

A field experiment was conducted to evaluate the efficacy of newer insecticides against sucking pests in blackgram during rabi 2011-12 at RARS, Lam, Guntur, Andhra Pradesh. Among the different insecticides tested as foliar sprays, spiromesifen 240 SC 0.096% was most effective against whiteflies followed by buprofezin 10 EC @ 0.01% and acetamiprid 20 SP 0.004% in blackgram. While, Spinosad 45 SC @ 0.0135% was found promising followed by fipronil 5 SC @ 0.005% against thrips. Among the neonicotinoids, thiacloprid 21.7 SC 0.027 % was found effective against both thrips and whiteflies. The seed yield and B:C ratio were highest from experimental plots treated with spiromesifen 240 SC 0.096% (1188 kg/ha) followed by buprofezin 10 EC @ 0.01% (1146 kg/ha) and spinosad 45 SC @ 0.0135% (1104 kg/ha).

Key words : Blackgram, Foliar application, Insecticides, Thrips, Whiteflies.

Pulses occupy a unique position in the agricultural economy of India being the major source of proteins in Indian dietary, Moreover, their role in improving the fertility of the soil by microbial fixation of atmospheric nitrogen, further enhances their importance and utility. Among the pulses, blackgram is an important pulse crop in Indian agriculture and stands fourth in production and acreage. Though India has the distinction of being the world's largest producer of pulses, the average productivity is very low because of the abiotic and biotic stresses. On an average, 2.5 to 3.0 million tonnes of pulses are lost annually due to pest problems (Rabindra *et al.,* 2004).

Among the pests, sucking pests such as thrips and whiteflies are the important pests during vegetative stage of crop growth witch not only reduces the pant vigour but also act as vectors for deadly viral diseases such as leaf curl and yellow vein mosaic disease (YMV). The chemical control technology is very effective and efficient among farming communities. When chemical control of these pests is warranted, information about the effectiveness of new and existing insecticide molecules is needed which is very scanty in blackgram. Hence, the present study was aimed to evaluate the efficacy of different new molecules against sucking pests in blackgram.

MATERIAL AND METHODS

A field experiment was conducted to evaluate the efficacy of new insecticides against sucking pests in blackgram at RARS, Lam, Guntur during *rabi,* 2011-2012. The experimental plot was laid out in a randomized block design with eleven treatments each replicated thrice. The balckgram variety LBG 623 was sown with a spacing of 30 x 10 cm with a net plot size of 4 x 5m and all the agronomic practices were followed as per the recommendations of ANGRAU. Sprays were imposed two times during vegetative stage of the crop at 15 days interval. Pre treatment counts were taken at 3, 5 and 7 days after spraying. The population of thrips and whitefly nymphs was recorded from three trifoliate leaves per plant from 5 randomly selected plants per plot. The data were expressed in per cent reduction in pest population over control and the data was subjected to statistical analysis after using proper transformation (Gomez and Gomez, 1984). The plot yield in each treatment was recorded and expressed as kg/ha and the benefit cost ratio was calculated for all the insecticidal treatments. One blanket spray was given at 45 days after sowing in all the treatments uniformly with selective insecticide i.e. flubendiamide 39.35 % SC against Maruca pod borer to prevent the yield losses due to pod borers.

RESULTS AND DISCUSSION

Efficacy of foliar sprays against thrips in blackgram

The data pertaining to the overall mean efficacy of different treatments against thrips after two sprays revealed that spinosad 45 SC 0.0135% (70.53%) was the most effective treatment to restrain thrips population followed by fipronil 5 SC 0.005% (61.53%) and were found significantly superior over the rest of treatments. The results are concurrent with Jadhav *et al.* (2004), Ramesh and Ukey (2005), Mahalingappa *et al.* (2008) and Prasad and Ahmed (2002) who reported the superior efficacy of spinosad and fipronil against thrips in different crops. All the neonicotinoids except acetamiprid were found moderately effective against thrips which recorded around 40.0 per cent reduction in population over untreated check. The other treatments were found less effective against thrips. However, all the treatments were found significantly superior over the untreated control. All the insecticides showed their maximum efficacy at 5 days after spraying only against thrips and which declined slightly by 7 days after spraying (Table 1).

Table 1. Efficacy of different insecticides against thrips in blackgram during *rabi* 2011-12.

Treatment	Mean per cent reduction in thrips over control			Mean Efficacy
	3 DAS	5 DAS	7 DAS	
T1: Imidacloprid 200 SL 0.06%	40.67 (39.64)^{c}	44.80 (42.04)^{cd}	43.33 (41.19)^{e}	42.94 (40.96)^{c}
T2: Thiamethoxam 25 WG 0.005%	41.22 (39.96)^{c}	48.36 (44.08)^{c}	40.91 (39.78)^{c}	43.50 (41.28)^{c}
T3: Acetamiprid 20 SP 0.004%	25.63 (30.43)^{f}	28.80 (32.47)^{e}	17.86 (25.01)^{f}	24.10 (29.41)^{e}
T4: Fipronil 5 SC 0.005%	62.39 (52.20)^{b}	62.41 (52.21)^{b}	59.79 (50.67)^{b}	61.53 (51.69)^{b}
T5: Thiacloprid 21.7 SC 0.027%	38.30 (38.26)^{cd}	41.27 (39.99)^{cd}	39.58 (39.00)^{c}	39.72 (39.09)^{c}
T6: Spriromesifen 240 SC 0.096%	33.87 (35.61)^{de}	37.83 (37.97)^{d}	32.98 (35.07)^{d}	34.89 (36.22)^{d}
T7: Buprofezin 10 EC 0.01%	26.03 (30.69)^{f}	27.04 (31.35)^{e}	23.33 (28.90)^{e}	25.47 (30.32)^{e}
T8: Spinosad 45 SC 0.0135%	70.64 (57.22)^{a}	72.69 (58.33)^{a}	68.25 (55.73)^{a}	70.53 (57.15)^{a}
T9: Triazophos 40 EC 0.06%	28.55 (32.32)^{ef}	30.37 (33.46)^{e}	24.86 (29.92)^{e}	27.93 (31.92)^{e}
T10: Azadirachtin 3000 ppm	23.47 (28.99)^{f}	27.20 (31.45)^{e}	24.99 (30.01)^{e}	25.22 (30.16)^{e}
T- test	S	S	S	S
SEm $\pm$	1.21	1.43	1.22	0.96
CD (p=0.05)	3.58	4.22	3.61	2.84
CV %	6.01	6.76	6.23	4.73

Values in parenthesis are angular transformed values
Numbers followed by same alphabet are not significantly different
Sig: significant; DAS: days after sowing

Table 2. Efficacy of different insecticides against whiteflies in blackgram during *rabi* 2011-12

Treatment	Mean per cent reduction in thrips over control			Mean Efficacy
	3 DAS	5 DAS	7 DAS	
T1: Imidacloprid 200 SL 0.06%	40.69 (39.66)^{ef}	40.58 (39.59)^{de}	34.76 (36.15)^{e}	38.55 (38.40)^{f}
T2: Thiamethoxam 25 WG 0.005%	38.33 (38.27)^{ef}	45.33 (42.34)^{de}	33.63 (35.46)^{e}	39.29 (38.84)^{f}
T3: Acetamiprid 20 SP 0.004%	63.57 (52.90)^{bc}	65.27 (53.92)^{b}	57.37 (49.26)^{c}	62.31 (52.15)^{c}
T4: Fipronil 5 SC 0.005%	35.04 (36.31)^{ef}	39.58 (39.01)^{de}	30.95 (33.82)^{e}	35.27 (36.45)^{f}
T5: Thiacloprid 21.7 SC 0.027%	57.50 (49.34)^{cd}	58.99 (50.21)^{be}	50.67 (45.41)^{cd}	55.53 (48.20)^{d}
T6: Spriromesifen 240 SC 0.096%	80.66 (63.94)^{a}	84.83 (67.11)^{a}	79.04 (62.78)^{a}	81.51 (64.56)^{a}
T7: Buprofezin 10 EC 0.01%	70.90 (57.38)^{ab}	76.88 (60.29)^{a}	70.85 (57.35)^{b}	72.88 (58.64)^{b}
T8: Spinosad 45 SC 0.0135%	33.19 (35.20)^{f}	34.22 (35.82)^{e}	32.36 (34.69)^{e}	33.23 (35.22)^{f}
T9: Triazophos 40 EC 0.06%	46.94 (43.27)^{de}	51.04 (45.62)^{cd}	44.26 (41.73)^{d}	47.44 (43.55)^{e}
T10: Azadirachtin 3000 ppm	33.98 (35.68)^{f}	38.43 (38.33)^{e}	34.81 (36.18)^{e}	35.74 (36.73)^{f}
T- test	S	S	S	S
SEm $\pm$	2.15	20.1	1.54	1.26
CD (p=0.05)	6.34	5.94	4.57	3.72
CV %	9.07	8.11	6.82	5.32

Values in parenthesis are angular transformed values
Numbers followed by same alphabet are not significantly different
Sig: significant; DAS: days after sowing

Efficacy of foliar sprays against whiteflies in blackgram:

The pooled efficacy of the two sprays against whiteflies showed that spiromesifen 240 SC 0.096% was the most effective treatment with 81.51 per cent reduction in population over control which was found significantly superior over all the other treatments. The next best treatment was buprofezin 10 EC 0.01% with 72.88 per cent reduction over control and was superior to other treatments followed by acetamiprid 20 SP 0.004% (62.31%). The efficacy of spiromesifen was reported earlier by Palumbo (2009) and Fanigliulo *et al.* (2010). While, Balikai *et al.* (2002) and Dhawan *et al.* (2009) reported the efficacy of buprofezin against whiteflies in different crops. Among the other treatments, thiacloprid 21.7 SC 0.027% recorded 55.53 per cent reduction over control which was followed by triazophos 40 EC 0.06% (47.44%). The remaining treatments were found moderately effective with below 40 per cent reduction in whitefly population, however, all the treatments were fond significantly superior over the untreated control (Table 2).

The present studies are clearly indicating that among the available neonicotinoids, acetamiprid 20 SP was effective against whiteflies, where as imidacloprid 200 SL and thiamethoxam 25 WG

Table 3. Effect of insecticides as foliar sprays on the yield of blackgram during *rabi* 2011-12.

Treatment	Average Yield (kg/ha)	B:C ratio
T1: Imidacloprid 200 SL 0.06%	925[bc]	1.93
T2: Thiamethoxam 25 WG 0.005%	955[bc]	1.99
T3: Acetamiprid 20 SP 0.004%	927[ab]	1.93
T4: Fipronil 5 SC 0.005%	1063[abc]	2.21
T5: Thiacloprid 21.7 SC 0.027%	990[a]	2.06
T6: Spriromesifen 240 SC 0.096%	1188[ab]	2.47
T7: Buprofezin 10 EC 0.01%	1146[ab]	2.39
T8: Spinosad 45 SC 0.0135%	1104[c]	2.30
T9: Triazophos 40 EC 0.06%	792[c]	1.65
T10: Azadirachtin 3000 ppm	546[d]	1.14
T11: Untreated control	427[d]	0.89
T-test	S	
SEm±	67.81	
CD(p=0.05)	200.05	
CV%	12.83	

Numbers followed by same alphabet are not significantly different
S: significant

were effective against thrips in blackgram. However, thiacloprid 21.7 SC was found better among the neonicotiniods against both thrips and whiteflies. The results were in harmony with Toscano and Ballmer (2002) who reported that acetamiprid and thiamethoxam ere more effective when compared to imidacloprid 200 SL and thiacloprid 21.7 SC when all were applied @ 10 g a.i./100 lt against whiteflies in strawberry. Ashok *et al.* (2002) and Muhammad *et al*. (2003) also reported the efficacy of imidacloprid and thiamethoxam against thrips in different crops.

The conventional insecticide *i.e.* triazophos 40 EC showed better efficacy against whiteflies and provided significantly superior control over neonicotiniods except acetamiprid with more than 45 per cent reduction in whitefly population over untreated control. The present results are in conformity with Cheema *et al*. (2006) who reported that triazophos 40 EC proved better over thiamethoxam in reducing the whitefly population under controlled conditions in blackgram. Whereas, azadirachtin was found least effective when compared to the other new molecules in suppressing the population of sucking pests.

Yield:

Among all the treatments, highest seed yield of 1188 kg/ha was recorded from spiromesifen 240 SC 0.096 % treated plots which was on par with buprofezin 10 EC 0.0 1% (1146 kg/ha), spinosad 45 SC 0.0135 % (1104 kg/ha), fipronil 5 SC 0.005% (1063 kg/ha) and thiacloprid 21.7 SC 0.027 % (990 kg/ha) respectively. Among all the treatments, azadirachtin recorded lowest yield of 546 kg/ha which was found at par with untreated control (427 kg/ha) (Table 3).

The benefit cost ratio was calculated for each treatment and the highest benefit cost ratio was recorded with spiromesifen 240 SC 0.096% (2.47) followed by buprofezin 10 EC 0.01% (2.39). Among the neonicotinoids, the BC ratio was highest from thiacloprid 21.7 SC 0.027% (2.06). Among all the treatments, benefit cost ratio was least from azadirachtin (1.14) which was slightly high when compared to untreated control (0.89) (Table 3).

Conclusion:

The results obtained in the present investigation indicate that spinosad 45 SC and fipronil 5 SC were effective against thrips, while

spiromesifen 240 SC and buprofezin 10 EC were highly effective against whiteflies. Hence, insecticides must be selected based on the pest incidence through careful monitoring of the crop for effective control of the pest and also to reduce the cost of plant protection by avoiding repeated sprays.

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