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BIO - EFFICACY OF NEONICOTINOIDS AGAINST *AMRASCA BIGUTTULA BIGUTTULA* (ISHIDA), *APHIS GOSSYPII* GLOVER OF OKRA (*ABELMOSCHUS ESCULENTUS* L. MOENCH)

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Abstract- An experiment was conducted to observe the bio-efficacy of neonicotinoids against *Amrasca biguttula biguttula* (Ishida), *Aphis gossypii* Glover of okra *(Abelmoschus esculentus* L. Moench)" during *kharif* season of 2014 at the Entomological experimental field, college of agriculture JNKVV Jabalpur (M.P.). Overall lowest mean of jassid recorded in the plot treated with thiamethoxam 25% WG @ 50 g a.i./ha (21.88 jassid / 30 leaves) followed by thiamethoxam 25% WG @ 25 g a.i./ha (36.41 jassid / 30 leaves). However, treatment thiamethoxam 25% WG @ 50 g a.i./ha and thiamethoxam 25% WG @ 25 g a.i./the ha were observed significantly less (6.50 aphid / 30 leaves) and (13.80 aphid / 30 leaves) aphid population respectively as compared the rest of treatment. On the basis of the above result thiamethoxam 25% WG @ 50 g a.i./ha and thiamethoxam 25% WG @ 25 g a.i./ha were most effective treatment against jassid and aphid, imidacloprid 17.8% SL @ 21.36 g a.i./ha and emamectin benzoate 5% SG @ 12 g a.i./ ha were found moderately effective than other treatments in respect of less damaged okra.

Keywords- Jassid, Aphid, Neonicotinoids, and Bio efficacy.

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Introduction

India is a major vegetable producing and consuming country. Okra, *Abelmoschus esculentus* L. Moench, popularly known as *Bhindi* or lady's finger belongs to family Malvaceae. Tender fruits are used as vegetables. It is also used for thickening gravies and soups, because of its high mucilage content. India stands top in area and production. In the World, okra is cultivated in an area of 1.06 m/ha with a total production of 7.83 MT and average productivity of 7.4 MT/ha [1]. In India okra is cultivated 524.00 m/ha with an annual production of 6203.00 MT [2] and productivity 11.90 MT/ha in 2013-14 [3]. In Madhya Pradesh okra is cultivated in 26.51 m/ha area and production 305.90 MT/ha in 2013-14 [4]. The productivity of okra is low due to many factors and one of the most important factors of insect pests. Aphid *(Aphis gossypii),* and Jassid, *Amrasca biguttula biguttula* are most serious pests of okra. The jassid (*A. biguttula biguttula)* is one of the serious pests of okra belonging to family Cicadellidae of order Hemiptera [5]. Damage to the crop caused by nymph and adults. They suck the cell-sap from the underside of the leaves. Injury to plants is due to the loss of sap and probably also due to the injection of toxins. The attacked leaves turn pale, then rust red with a change in appearance, the leaves also turn downwards, dry up and fall to the ground. In recent year various type of systemic and contact insecticide either in spray or seed treatment or in granular formulation have been tried to manage the pest. A number of new molecules are on the seen there periodical evaluation for their competitively effectiveness specificity, selectivity and economic control. Studies revealed that all those treatment that have neo-nicotinoids as a seed treatment with imidacloprid (3.0 or 5.4 g ai kg^{-1} seed) or foliar spray of imidacloprid @ 20g ai /ha or thiometoxam @ 25 g ai /ha at 50 days of sowing were found effective in managing *A.biguttula biguttula* population. Different workers have tested a wide range of systemic and contact insecticides in either spray or seed treatment or granular formulations have been tried to manage the pest menace. A number of new molecules are on the scene, therefore periodical evaluation for their comparative effectiveness, specificity, selectivity and economics of control operations is essential. The present study was aimed to the Bio efficacy of neo-nicotinoids against jassid and aphid.

MaterialsandMethods

An experiment was conducted to observe the "Bio-efficacy" of neonicotinoids against *A. biguttula biguttula* (Ishida*), A. gossypii* Glover of okra (*A. esculentus* L. Moench)" during *kharif* season of 2014 at the Entomological experimental field, college of agriculture JNKVV Jabalpur (M.P.). The experiment was laid out in Randomized Block Design (RBD) with three replications and each replication consists of 7 treatments. Pre treatment observations were recorded 24 hours before spraying and post treatment observation was taken 1st, 5th, 7th, and 10th day after application of treatment. The statistically analysed described by [6] to find out the overall total variability present in the material under study for each character and for all the populations.

Result and Discussion

The efficacy of six insecticides namely thiamethoxam 25% WG (25 g a.i./ha), thiamethoxam 25% WG (50 g a.i./ha), imidacloprid 17.8% SL (21.36 g a.i./ha), emamectin benzoate 5% SG (10 g a.i./ha), emamectin benzoate 5% SG (12 g a.i./ha), triazophos 40% EC (400 g a.i./ha) were tested against jassid on okra, *A. devastans, A. gossypii* and on okra. On the basis of average leaf infestation due to, *A. devastans, A. gossypii* population in different treatments and their efficacy was assessed.

Jassid *A. biguttula biguttula* (Ishida)

On the basis of overall mean of three sprays all the insecticidal treatments significantly reduced the jassid population as compared to control (127.50 jassids/ 30 leaves). Among the treatments, thiamethoxam 25% WG @ 50 g a.i./ha maintain superiority as it recorded lowest jassid population (21.88 jassids/ 30 leaves). The next effective treatments were thiamethoxam 25% WG @ 25 g a.i./ha (36.41 jassids/ 30 leaves) and imidacloprid 17.8% SL @ 21.36 g a.i./ha (42.41

jassids/ 30 leaves) but were found to be at par with each other, followed by emamectin benzoate 5% SG @ 12 g a.i./ha (64.47 jassids/ 30 leaves). The next better treatments were emamectin benzoate 5% SG @ 10 g a.i./ha (81.08 jassids/ 30 leaves) and triazophos 40% EC @ 400 g a.i./ha (88.36 jassids/ 30 leaves) although found at par with each other. While [5,7] reported that thiamethoxam 25% WG (25 g a.i./ha) was found most effective against jassids in okra. Similarly, [8, 9 and 10] also found that thiamethoxam and imidacloprid showed the similar levels of protection against jassids in okra. In contrary to the present findings [11] reported that the lowest jassid population was recorded in the treatment of emamectin benzoate 5% SG (8.5 g a.i./ha) in okra.

Table-1 *Treatment details of insecticides.*

Treatment code	Treatments	a.i. g/ha	Dose g/ml/ha
T_1	Thiamethoxam 25% WG	25	100
T_2	Thiamethoxam 25% WG	50	200
T_3	Imidacloprid 17.8% SL	21.36	120
T_4	Emamectin benzoate 5% SG	10	200
T_5	Emamectin benzoate 5% SG	12	240
T_6	Triazophos 40% EC	400	1000
T_7	Control	-	-

Table-2 *Efficacy of different insecticides against jassid infesting okra (Mean of third spray)*

Treatment Code	Treatment	Dose g a.i./ha.	Mean population of Jassid / 30 leaves				Mean	Overall mean of three sprays
			Days after third spray					
			1	5	7	10		
T_1	Thiamethoxam 25% WG	25	30.00 (5.47)	29.66 (5.44)	36.00 (6.00)	33.00 (5.74)	32.16 (5.66)	36.41 (6.00)
T_2	Thiamethoxam 25% WG	50	12.00 (3.46) **L**	11.66 (3.41) **L**	19.00 (4.35) **L**	20.00 (4.47) **L**	15.66 (3.92) **L**	21.88 (4.59) **L**
T_3	Imidacloprid 17.8% SL	21.36	33.00 (5.74)	31.66 (5.62)	37.00 (6.08)	39.00 (6.24)	35.16 (5.92)	42.41 (6.47)
T_4	Emamectin benzoate 5% SG	10	73.66 (8.58)	72.66 (8.52)	79.00 (8.88)	85.00 (9.21)	77.58 (8.80)	81.08 (8.99)
T_5	Emamectin benzoate 5% SG	12	59.00 (7.68)	56.33 (7.50)	65.00 (8.06)	61.00 (7.81)	60.33 (7.76)	64.47 (8.02)
T_6	Triazophos 40% EC	400	98.00 (9.89)	94.00 (9.69)	100.00 (10.00)	92.00 (9.59)	96.00 (9.79)	88.36 (9.39)
T_7	Control	-	133.00 (11.53)**H**	138.00 (11.74)**H**	131.00 (11.44)**H**	124.00 (11.13)**H**	131.50 (11.46)**H**	127.50 (11.28) **H**
SEm±			0.23	0.18	0.18	0.17	0.14	0.25
CD at 5%			0.70	0.54	0.56	0.52	0.41	0.76

Figures in parentheses are √**x** square root transformed values, NS = Non-significant, **L**- Lowest, **H**- Highest

Aphid *A gossypii* Glover

On the basis of overall mean of three sprays all the insecticidal treatments significantly reduced the aphid population as compared to control (42.61 aphids/ 30 1eaves). Among the treatments, thiamethoxam 25% WG @ 50 g a.i./ha was found to be most effective as it recorded lowest aphid population (6.50 aphids/ 30 leaves). The next effective treatments were thiamethoxam 25% WG @ 25 g a.i./ha (13.80 aphids/ 30 leaves) and imidacloprid 17.8% SL @ 21.36 g a.i./ha (16.61 aphids/ 30 leaves), both were found at par to each other, followed by emamectin benzoate 5% SG @ 12 g a.i./ha (19.86 aphids/ 30 leaves). The next better treatments were emamectin benzoate 5% SG @ 10 g a.i./ha (24.75 aphids/ 30 leaves) and triazophos 40% EC @ 400 g a.i./ha (24.88 aphids/ 30 leaves), both were found at par with each other. [10] Also reported that thiamethoxam provides excellent control against a broad range of commercially important pests including aphids. [12] revealed that the average aphids population count was the lowest in the treatment Thiamethoxam 25 WG @ 0.006% (2.14 aphids/leaves).

Conclusion

The efficacy of six insecticides namely thiamethoxam 25% WG (25 g a.i./ha), thiamethoxam 25% WG (50 g a.i./ha), imidacloprid 17.8% SL (21.36 g a.i./ha), emamectin benzoate 5% SG (10 g a.i./ha), emamectin benzoate 5% SG (12 g a.i./ha), triazophos 40% EC (400 g a.i./ha) were tested against jassid and aphid on okra. Among all the insecticides thiamethoxam 25% WG @ 50 g a.i./ha was found to be most effective followed by thiamethoxam 25% WG @ 25 g a.i./ha and imidacloprid 17.8% SL @ 21.36 g a.i./ha but both were found to be at par with each other, however, all the insecticides showed their effectivity against jassid.

Table-3 *Efficacy of different insecticides against aphid infesting okra (Mean of third spray)*

Treatment Code	Treatment	Dose g a.i./ha.	Mean population of aphid / 30 leaves				Mean	Over all mean of three sprays
			Days after third spray					
			1	5	7	10		
T_1	Thiamethoxam 25% WG	25	11.00 (3.31)	10.33 (3.21)	12.33 (3.51)	14.66 (3.82)	12.08 (3.46)	13.80 (3.68)
T_2	Thiamethoxam 25% WG	50	3.00 (1.73)**L**	2.66 (1.63)**L**	3.66 (1.91)**L**	4.66 (2.16)**L**	3.50 (1.86)**L**	6.50 (2.49)**L**
T_3	Imidacloprid 17.8% SL	21.36	13.00 (3.60)	11.00 (3.31)	14.66 (3.82)	14.33 (3.78)	13.25 (3.63)	16.61 (4.04)
T_4	Emamectin benzoate 5% SG	10	21.66 (4.65)	21.00 (4.58)	23.66 (4.86)	27.00 (5.19)	23.33 (4.82)	24.75 (4.96)
T_5	Emamectin benzoate 5% SG	12	13.66 (3.69)	12.66 (3.55)	18.66 (4.32)	25.66 (5.06)	17.66 (4.16)	19.86 (4.42)
T_6	Triazophos 40% EC	400	21.33 (4.61)	19.66 (4.43)	23.33 (4.83)	27.33 (5.22)	22.91 (4.77)	24.88 (4.97)
T_7	Control	-	41.00 (6.40)**H**	40.66 (6.37)**H**	41.00 (6.40)**H**	39.66 (6.29)**H**	40.58 (6.37)**H**	42.61 (6.51)**H**
SEm±			0.21	0.13	0.19	0.19	0.11	0.12
CD at 5%			0.66	0.41	0.59	0.59	0.33	0.37

Figures in parentheses are √x square root transformed values, NS = Non-significant, L- Lowest, H- Highest

Conflict of Interest: None declared

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