

Management of cotton jassid (*Amrasca biguttula*) through seed treatments in okra (*Abelmoschus esculentus*)*

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Cotton jassid [*Amrasca biguttula* (Ishida)] is one of the major pests which limit okra (*Abelmoschus esculentus* L.) cultivation, especially in rainy season. The avoidable losses in seed yield were estimated to be 79.03% (Mahal *et al.* 1994). The reduction in plant height, number and weight of fruits was estimated to be 49.80, 53.90 and 61.40%, respectively (Rawat and Sahu 1973). However, Saha (1982) estimated 53.79 and 70.15% avoidable losses in fruit and seed yield of okra, respectively, while Choudhary and Dadheech (1989) reported a net yield loss of 54.04% under spray conditions. Since, the pest is more serious in the early stage of crop in rainy season, thus seed treatments are expected to give better protection to crop against this pest and help in enhancing the crop yield. Keeping this in view, the present investigation was undertaken to evaluate the efficacy of different seed treatments against cotton jassid in okra vegetable crop.

The trial was carried out during rainy (*kharif*) season in 2008 at the Vegetable Research Farm, Punjab Agricultural University, Ludhiana. The trial was laid out in randomized block design and replicated thrice. The plot size was kept 10m² with row-to-row and plant-to-plant spacing of 45 cm×30 cm. 'Punjab Padmini' okra was sown on 9 July 2008 and it germinated on 14 July 2008. Eight seed treatments as per Table 1 were given and compared with the untreated control. The observations on jassid nymphal counts from three leaves each from top, middle, and bottom canopy of randomly selected five plants in each plot were recorded at weekly intervals. Jassid injury grade and the plant height (cm) of randomly selected five plants in each plot were recorded on 15, 30, 45 and 60 days after germination. The scale for jassid injury grade was used as 0, healthy leaves; 1, cupping and yellowing of leaf margins; 2, cupping of leaf margins and yellowing of 50% leaf lamina; 3, cupping of leaf margins

and yellowing of 100% leaf lamina; 4, necrosis and defoliation. The weight of fruits was recorded at each picking in each plot. Later on total fruit yield tonnes/ha basis was worked out.

The jassid nymphs/leaf (Table 1) were found significantly lower in all the seed treatment T₁–T₈ (0.00–0.15) than the untreated control (0.72) on 14 days after germination. On day 21 after germination, the same trend was observed except for treatment T₅ which was found at par with untreated control. However, the jassid counts were found to be non significant among all treatments with 2.15–3.44, 1.11–2.21, 1.93–3.06, 1.79–2.26 and 1.28–2.35 nymphs/leaf, respectively on 28, 35, 42, 49 and 63 days after germination. However significantly low (1.46–2.24 nymphs/leaf) were recorded in treatments T₁, T₂, T₃, T₄, T₇ and T₈ as against treatment T₅ and T₆ (2.64–3.06 nymphs/leaf) and untreated control (2.89 nymphs/leaf) on 56 days after germination.

The pooled data reveal that significantly lower jassid nymphs/leaf (1.40–1.50) were registered in treatments (T₂, T₃, and T₄), followed by treatment T₁ and T₈ (1.59–1.63) as compared to treatments T₅–T₇ (1.79–1.94) and untreated control (2.08).

From the above data, it is clear that overall significantly lowest jassid incidence was registered in three higher doses of imidacloprid 70 ws, i e 3, 4 and 5 g/ kg, followed by the higher dose of thiomethoxam 70 ws, i e 5 g/kg. Table 1 also indicates that all the seed treatments gave protection against cotton jassid up to 21 days after germination. The population of jassid increased in all the treatments on 28 days after germination, but decreased afterwards due to intermittent rain from 21–45 days after germination. So, overall pest pressure was low, may be due to rains.

On 15 days after germination, lowest injury grade (0.27–0.28) was recorded in treatments T₇ and T₈, followed by T₃ and T₄ (0.31–0.32) as against other treatments (0.38–0.50) and untreated control (0.95). On 30 and 45 days after germination, the same trend was observed for the treatments T₂, T₃, T₄ and T₈. Consistently lower jassid injury grade (0.33–

*Short note

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0.40) was recorded in the treatment T₃, T₄ and T₈ as against other treatments (0.48–0.88) and untreated control (0.72). The above data reveal that imidacloprid 70 ws @ 3 and 4 g/kg and thiomethoxam 70 ws @ 5 g/kg showed the lowest jassid injury.

The difference among different treatments with respect to plant height was observed significant only on 15 and 30 days after germination (Table 3). The height (cm) of plants in all the treatments was registered significantly higher (23.43–25.56 cm) than the untreated control (19.86 cm). On 30 days after germination, highest plant height (76.20 cm) was recorded in T₈ treatment, followed by T₂, T₃, T₄ and T₇ (65.53–70.06 cm) as compared to other treatments (60.33–64.46 cm) and untreated control (50.40 cm). Afterwards the plant height in all the treatments did not vary significantly on 45 and 60 days after germination. The reason may be the intermittent rains occurred during 21–45 days after germination had not only suppressed pest population but also boosted the foliage and height of crop by increasing the plant succulency. From the above data it is clear that the plant height in different treatments increased with increase in concentration of imidacloprid and thiomethoxam. At higher doses pronounced phytotonic effect of insecticides was seen.

Significantly highest total fruit yield (12.51 tonnes/ha) was registered in treatments T₂, followed by treatment T₈ (12 tonnes/ha) as against other treatment (9.03–11.33 tonnes/ha) and untreated control (7.73 tonnes/ha). This showed that seed treatment of imidacloprid 70 ws @ 3 g/kg resulted in

the highest yield, followed by treatment with thiomethoxam 70 ws @ 5 g/kg.

Tables 1, 2 and 3 revealed the lowest jassid nymphs counts/leaf were recorded up to 21 days after germination. Although the jassid population was observed significantly lower in all the treatments than the untreated control, but lowest jassid injury grade was observed only in treatments T₃, T₄ and T₈, followed by T₂. The differences in plant height were found significant up to 30 days after germination. Highest plant height was obtained in treatment T₈ (76.20 cm), followed by T₇, T₄, T₃ and T₂, respectively (65.53 to 70.06 cm), as against control (50.40 cm), on 30 days after germination. However, highest total fruit yield (12.51 tonnes/ha) was registered in treatment T₂ followed by T₈ (12.00 tonnes/ha).

It is observed that although the jassid injury grade and nymphal counts were marginally higher in the treatments T₂ than T₃ and T₄, but yield was also higher in T₂ treatment. This indicated that with increase in concentration of imidacloprid 70 ws crop yield reduced. In case of seed treatment with thiomethoxam 70 ws higher dose, i.e. 5 g/kg resulted in better control of jassid and resulted in higher yields. Rana *et al.* (2006) also observed increase in yield of okra in seed treatments with imidacloprid @ 2 ml and thiomethoxam @ 2 g/kg seed. However, in present study, highest yield in case of imidacloprid 70 ws was observed with the dose of 3 g/kg as against its other doses 2, 4 and 5 g/kg. Whereas, thiomethoxam 70 ws seed treatment only at its higher dose, i.e. 5 g/kg resulted in the higher yield. The present results are also in tune with the finding of Nemade *et al.* (2007) reported

Table 1 Effect of different seed treatments on jassid nymphs in okra crop during 2008

Seed treatment	Jassid nymphs/leaf days after germination *								Pooled mean
	14	21	28	35	42	49	56	63	
T ₁ (Imidacloprid (Gaucho) 70 WS @ 2 g/kg of seed)	0.15 ^a (1.07)	0.59 ^a (1.26)	2.89	1.11	2.40	2.10	2.06 ^a (1.74)	1.42	1.59 ^{ab} (1.58)
T ₂ (Imidacloprid (Gaucho) 70 WS @ 3 g/kg of seed)	0.00 ^a (1.00)	0.51 ^a (1.22)	2.26	1.29	2.22	1.99	2.24 ^a (1.79)	1.48	1.50 ^a (1.54)
T ₃ (Imidacloprid (Gaucho) 70 WS @ 4 g/kg of seed)	0.11 ^a (1.05)	0.44 ^a (1.19)	2.27	1.15	1.93	2.26	1.75 ^a (1.65)	1.35	1.40 ^a (1.52)
T ₄ (Imidacloprid (Gaucho) 70 WS @ 5 g/kg of seed)	0.09 ^a (1.04)	0.49 ^a (1.21)	2.15	1.53	1.97	2.14	1.86 ^a (1.69)	1.28	1.44 ^a (1.53)
T ₅ (Thiomethoxam (Cruiser) 70 WS @ 2 g/kg of seed)	0.06 ^a (1.03)	0.97 ^b (1.40)	2.19	1.84	3.06	2.05	3.06 ^b (2.01)	2.26	1.94 ^c (1.68)
T ₆ (Thiomethoxam (Cruiser) 70 WS @ 3 g/kg of seed)	0.11 ^a (1.05)	0.82 ^a (1.34)	2.31	1.99	2.80	1.89	2.64 ^b (1.90)	1.77	1.79 ^{bc} (1.64)
T ₇ (Thiomethoxam (Cruiser) 70 WS @ 4 g/kg of seed)	0.06 ^a (1.03)	0.73 ^a (1.31)	3.44	1.77	2.73	1.79	2.11 ^a (1.75)	2.35	1.88 ^{bc} (1.66)
T ₈ (Thiomethoxam (Cruiser) 70 WS @ 5 g/kg of seed)	0.13 ^a (1.06)	0.55 ^a (1.23)	2.71	1.98	2.24	1.94	1.46 ^a (1.56)	2.02	1.63 ^{abc} (1.59)
T ₉ (untreated control)	0.72 ^b (1.31)	2.82 ^b (1.91)	2.18	2.21	2.03	2.06	2.89 ^b (1.96)	1.78	2.08 ^d (1.74)
CD (P= 0.05)	(0.09)	(0.18)	NS	NS	NS	NS	(0.24)	NS	(0.09)
CV (%)	4.95	7.66	15.94	11.41	8.63	3.92	7.86	8.66	9.91

*Figures in parentheses are \square_{n+1} transformed values

Table 2 Injury grade of jassid in different seed treatments in okra crop during 2008

Seed treatment	Jassid injury grade			
	Days after germination			
	15	30*	45*	Pooled mean
T ₁ (Imidacloprid (Gaucho) 70 WS @ 2 g/kg of seed)	0.47	0.50	0.56	0.51
T ₂ (Imidacloprid (Gaucho) 70 WS @ 3 g/kg of seed)	0.44	0.42	0.57	0.48
T ₃ (Imidacloprid (Gaucho) 70 WS @ 4 g/kg of seed)	0.32	0.39	0.43	0.38
T ₄ (Imidacloprid (Gaucho) 70 WS @ 5 g/kg of seed)	0.31	0.34	0.34	0.33
T ₅ (Thiomethoxam (Cruiser) 70 WS @ 2 g/kg of seed)	0.50	0.98	1.16	0.88
T ₆ (Thiomethoxam (Cruiser) 70 WS @ 3 g/kg of seed)	0.38	0.60	0.92	0.63
T ₇ (Thiomethoxam (Cruiser) 70 WS @ 4 g/kg of seed)	0.27	0.55	0.69	0.50
T ₈ (Thiomethoxam (Cruiser) 70 WS @ 5 g/kg of seed)	0.28	0.38	0.56	0.40
T ₉ (untreated control)	0.95	1.15	0.79	0.72

* There were intermittent rains from 21– 45 days after germination during the crop season

Table 3 Plant height and total fruit yield in different seed treatments of okra during 2008

Seed treatment	Days after germination plant height (cm)				Total fruit yield (tonnes/ha)
	15	30*	45*	60	
T ₁ (Imidacloprid (Gaucho) 70 WS @ 2 g/kg of seed)	23.46 ^a	60.73 ^d	88.33	100.26	11.05 ^{abcd}
T ₂ (Imidacloprid (Gaucho) 70 WS @ 3 g/kg of seed)	24.26 ^a	65.53 ^{bc}	89.13	114.00	12.51 ^a
T ₃ (Imidacloprid (Gaucho) 70 WS @ 4 g/kg of seed)	24.73 ^a	66.26 ^{bc}	92.40	113.46	9.87 ^{cde}
T ₄ (Imidacloprid (Gaucho) 70 WS @ 5 g/kg of seed)	24.96 ^a	67.46 ^{bc}	92.80	114.13	9.24 ^{def}
T ₅ (Thiomethoxam (Cruiser) 70 WS @ 2 g/kg of seed)	23.43 ^a	60.33 ^d	89.80	112.26	9.03 ^{ef}
T ₆ (Thiomethoxam (Cruiser) 70 WS @ 3 g/kg of seed)	25.26 ^a	64.46 ^{cd}	90.80	114.00	10.29 ^{bcde}
T ₇ (Thiomethoxam (Cruiser) 70 WS @ 4 g/kg of seed)	25.36 ^a	70.06 ^b	90.66	114.40	11.33 ^{abc}
T ₈ (Thiomethoxam (Cruiser) 70 WS @ 5 g/kg of seed)	25.56 ^a	76.20 ^a	95.33	120.13	12.03 ^{ab}
T ₉ (untreated control)	19.86	50.40 ^e	92.60	101.53	7.73 ^f
CD <i>P</i> = 0.05	3.10	5.42	NS	NS	1.88
CV (%)	7.45	8.90	8.31	11.61	10.51

* There were intermittent rains from 21– 45 days after germination during the crop season

that the seed treatment with imidacloprid was effective in checking jassid population in early stages of okra crop. They also reported that with increase in concentration on imidacloprid there was decrease in jassid population. So from the above study, it is concluded that seed treatment of okra *khari* season crop with imidacloprid 70 ws (Gaucho) 3 g/kg or seed treatment with thiomethoxam 70 ws (Cruiser) 5 g/kg gave better protection of crop during early stages of crop from up to 21 days and resulted in higher yields. Thus, use of these new insecticides as seed treatments provided an opportunity to minimize the quantity of insecticide on crop and better crop protection during rainy season.

SUMMARY

Studies were carried out at the Vegetable Research Farm, PAU, Ludhiana during 2008 to evaluate the bioefficacy of seed treatments with imidacloprid 70 ws (Gaucho) and thiomethoxam 70 ws (Cruiser) at different doses against cotton jassid, *Amrasca biguttula* (Ishida). Out of eight

treatments, seed treatment of imidacloprid (Gaucho) 70 ws 3 g/kg, followed by seed treatment of thiomethoxam (Cruiser) 70 ws 5 g/kg of seed were found effective in controlling cotton jassid in the early stage of crop and resulted in the highest yield. The effect of seed treatment was observed up to 21 days after germination.

REFERENCES

- Choudhary H R and Dadheech L N. 1989. Incidence of insects attacking okra and the avoidable losses caused by them. *Annals of Arid Zone* 28(3–4): 305–7
- Mahal M S, Brar L S, Singh R and Singh B. 1994. Influence of varying magnitude of jassid injury on seed yield of okra and economics of its control. *Journal of Insect Science* 7 (2): 129–32
- Nemade P E, Wadnerkar shinde B D, Bansod, R S and Zanwar, P R. 2007. Evaluation of seed treatment and foliar application effects of imidacloprid against sucking pests of okra. *Pestology* 31(3): 23–8.
- Rana, S C, Singh P B, Pandita V K and Sinha S N. 2006. Evaluation of insecticides as seed treatment for the control of early sucking

- pests in seed crop of okra. *Annals of Plant Protection Science* **14** (20): 364–7
- Rawat R R and Sahu H R. 1973. Estimation of losses in growth and yield of okra due to *Empoasca devastans* Dist. and *Earias* Spp. *Indian Journal of Entomology* **35** (3): 252–4.
- Saha N N. 1982. 'Estimation of losses in yield of fruits and seeds of okra caused by the spotted bollworms *Earias* spp.' PhD thesis, Punjab Agricultural University, Ludhiana.

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