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Management of Cotton Leafhopper, *Amrasca biguttula biguttula* with Insecticides

Key words : Amrasca biguttula biguttula, Cotton leafhopper, Management .

Cotton (*Gossypium* spp.), the king of fiber is an important industrial crop of the world. India is the major producer of cotton in the world next to China since 2006 with a record production of 336 lakh bales (AICCIP, 2010). About 162 insect pests attack cotton in India (Lingappa, 2001) of which 15 are key pests, which cause losses to the extent of 30-80 percent. Insect pests mainly categorized into bollworms, sucking pests and mites. Among the early season sucking pests, cotton leafhopper, *A. biguttula biguttula* (Ishida) is considered as one of the major pests causing considerable damage even under insecticidal cover. It can cause a loss of nine percent in seed cotton yield (Dhawan and Sidhu, 1986). The desapping by nymphs and adults along with the injection of toxic saliva by insects devitalizes the plants (Matthews, 1989). Cotton growers in India depend heavily on synthetic pesticides to combat sucking pests. At least 2-3 sprays are directed against cotton leafhopper (Acharya *et al*., 2002). Often foliar application of the insecticides after colonization of sucking pests was not only hazardous to environment but also cleared the natural enemies of sucking pests resulting turbulence in natural equilibrium. Hence the knowledge on management of leafhopper with the different groups of insecticides will help in devising suitable management strategies.

The experiment was laid out in Randomized Block Design with eleven treatments including untreated control and replicated thrice. The cotton seed was initially treated with imidacloprid as per the recommended dose one day earlier to sowing. *Bt* cotton hybrid RCH-2 was selected for this experiment. Required quantity of monocrotophos, 10 ml was mixed with 40 ml of water to get desired dilution of 1:4. The insecticide was applied to the middle 1/3rd portion of the main stem in one stroke for about four inches length with the help of stem applicator bottle at 20, 40 and 60 DAS. The remaining treatments were imposed as foliar sprays as per the recommended doses. A total of three sprayings were imposed at 10 days interval, starting from 70 DAS. Mean data indicated that leafhopper incidence/three leaves ranged from 2.92 to 7.99 (Table 1). Lowest leafhopper incidence of 2.92 was recorded in T_7 which was significantly at par with all other treatments, except T_1 & T_2. Per cent reduction of leafhoppers/three leaves over untreated control ranged from 18.27 to 63.45 (Table 1). Highest reduction of 63.45 per cent was recorded in T_7 followed by 62.32 per cent in T_5.

It is clearly evident from the results, that the treatment (Seed treatment alone) and (Seed treatment + stem application) were not sufficient in managing the leafhoppers in cotton. This is mainly because these treatments are unable to give long lasting protection against leafhoppers. Other studies indicated that, especially in recent years after the introduction of *Bt* cotton this pest has become a major menace during entire crop growth period (Radhika *et al*., 2006, AICCIP, 2010). However, Patil *et al*. (1999) reported that seed treatment with imidacloprid 70WS @ 5 g/kg was found effective till 40 DAS, afterwards leafhopper incidence increased to above ETL level. Michael Raj (2000) reported that dilutions of monocrotophos 1:5 and 1:10 as stem application recorded only moderate percentage reduction of leafhoppers i.e. 38.82 and 30.93, respectively.

In the remaining treatments wherein foliar sprays were also included, the leafhopper population incidence was less. These observations are in agreement with Ameta and Sharma (2005) who reported that imidacloprid 70 WG at 35 g a. i. ha^{-1} caused the highest reduction in population of leafhoppers in cotton at one, three, five and seven days after first and second sprays. Saleem *et al.* (2001) showed that imidacloprid 200 SL was most effective in suppressing leafhopper population in cotton. Seshamahalakshmi (2007) reported that imidacloprid 200 SL (0.33 ml/l) was highly effective against sucking pests. Thirumala Prasad *et al*. (1993) indicated that reduction in cotton leafhoppers was maximum with acephate 0.1% and 0.15%. Acephate 95% SG @ 750 g a.i. ha^{-1} and acephate 75% SP @ 562.5 and 750 g a.i. ha^{-1} were effective against leafhoppers (AICCIP, 2010). Asi *et al*. (2008)

Table 1. Efficacy of different insecticides against cotton leafhopper, *Amrasca biguttula biguttula*

Treat-ments	Treatment	Mean	% Reduction over control	Yield (kg ha$^{-1)}$	% Increase over control
T_1	Seed treatment with imidacloprid 70 WS 5g / kg seed	6.53(2.74)	18.27	744	41.44
T_2	Seed treatment +stem application with monocrotophos (1 :4) 36 SL @ 1.6 ml/l at 20, 40, 60 DAS	5.25(2.50)	43.92	995	89.16
T_3	T2 +spraying of imidacloprid 17.8 SL @ 0.5 ml / l at 70, 80, 90 DAS	3.22(2.03)	59.69	1205	129.08
T_4	T2 +spraying of acephate 75 SP @ 1.5 g / l at 70, 80, 90 DAS	3.53(2.11)	55.81	1229	133.65
T_5	T2 + spraying of fipronil 5 SC @ 2ml / l at 70, 80, 90 DAS	3.01(2.00)	62.32	1504	185.93
T_6	T2 + spraying of monocrotophos 36 SL @ 1.6 ml/l at 70, 80, 90 DAS	3.84(2.20)	51.93	1287	144.60
T_7	T2 + spraying of imidacloprid 17.8 SL @ 0.5ml / l at 70 DAS + spraying of acephate 75 SP @1.5g/l at 80 DAS + fipronil 5 SC @ 2 ml/l at 90 DAS	2.92(1.97)	63.45	1564	197.33
T_8	T2 + spraying of acephate 75 SP @1.5g/l at 70 DAS + spraying of imidacloprid 17.8 SL @0.5 ml/l at 80 DAS + spraying of fipronil 5 SC @ 2 ml/l at 90 DAS	3.15(2.02)	60.57	1449	175.47
T_9	T2 + spraying of fipronil 5 SC @ 2ml/l at 70 DAS + spraying of acephate 75 SP @1.5 g/l at 80 DAS + spraying of imidacloprid 17.8 SL @ 0.5 ml/l at 90 DAS	3.17(2.02)	60.32	1463	178.13
T_{10}	T1 + spraying of chemicals as and when pest crosses ETL (Thiamethoxam 25WG@0.2g/l).	3.91(2.21)	51.06	1061	101.71
T_{11}	control	7.99(2.99)	-	526	-
F-test		**Sig**	**-**	**Sig**	**-**
SEd		**0.12**	**-**	**233**	**-**
CD (P=0.05)		**0.24**	**-**	**486**	**-**
CV%		**7.5**	**-**	**24.1**	**-**

reported that monocrotophos 40 WSC was found effective in suppressing the cotton leafhopper even after 168 hours after spray and it was found equal in its efficacy with other insecticides like imidacloprid, diafenthiuron, endosulfan and flufenoxuron. The present findings are in accordance with Wadnerkhar *et al*. (2003) who reported that fipronil 5% SC @ 50-75 g a.i. ha^{-1} was effective in lowering the population of thrips, aphids and leafhoppers infesting cotton.

Seed cotton yield ranged from 526 to 1564 kg/ha (Table 1). Highest yield of 1564 was recorded in T_7 and was significantly at par with remaining treatments except T_1 & T_2. Highest per cent of yield increase (197.3) over untreated control was recorded in T_7 followed by 185.93 per cent in T_5.

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