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EFFECT OF BOTANICALS AND SYNTHETIC INSECTICIDE ON OKRA JASSID, *Amrasca devastans*

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ABSTRACT

Experiments were carried out in the Field Laboratory of Entomology, Bangladesh Agricultural University, Mymensingh, during February to May, 2008 to investigate the population abundance and to determine the efficacy of three botanical oils (Neem, Mahogani, Karanja) and one synthetic insecticide (Admire 200 SL) against Okra Jassid, *Amrasca devastans.* The Jassid was first noticed in early March just 7 days after germination and attacked the crop seriously. The highest mean number of Jassid leaf^{-1} (34) was found in April, 2008. In evaluating the effectiveness of the insecticide and botanical oils to control Okra Jassid, three times applications were made at 7 days interval. The Jassid population varied significantly with the application of insecticide and botanicals. Admire 200 SL give the best result among the treatment. Out of three botanicals Karanja repelled 93.33%, where as Mahogoni and Neem repelled 86.66 and 63.33%.The effectivity of botanicals and synthetic insecticides was found in the following order: Admire 200 SL> Karajan oil >Mahogani oil >Neem oil.

Key Words: Okra Jassid, Synthetic insecticide, Plant oil, Toxicity, Repellency

INTRODUCTION

Okra, *Abelmoschus esculentus L.* is a popular and most common vegetable crop grown in Bangladesh and other part of the world. In Bangladesh okra is produced mainly in the kharif season but it can be grown all the year round (Rashid, 1976).This crop is infested by many insect species, such as Okra Jassid, Okra shoot and fruit borer, Cut worm etc. Among this Okra Jassid, *Amrasca devastans* has been recorded as the most serious pest of Okra. Many workers reported that *Amrasca devastans* commonly known as the cotton Jassid is an important pest infesting cotton, okra, brinjal, potato, tomato, cowpea, cucurbits, castor, rose, sunflower, hollyhock and many other plants (Agarwal *et al.*, 1978; Kishore *et al.*, 1983; Krishnaiah *et al.*, 1979; Sangappa *et al.*, 1978; Sarker and Kulshreshtha, 1978; Singh and Butani, 1963).
Insecticides are the major means of insect control in all vegetables including Okra in

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Bangladesh. Control of insect pests by the routine use of chemical insecticide creates several problems in agro-ecosystem such as direct toxicity to beneficial insects, fishes and man (Munakata, 1977; Pimentel 1981), pesticide resistance (Brown, 1968; Fukuda, 1966.) and increased environmental and social costs (Pimentel *et al.,* 1980). To solve these problems farmer can shift the practice of sole reliance on insecticide to alternative approaches. The biologically active natural plant products may play a significant role in this regard.

Botanical insecticides are broad-spectrum in pest control and many are safe to apply, unique in action and can easily be processed and used. Locally available plant materials have been widely used to protect field and stored products against insect infestation (Golob and Webley, 1980). The indigenous plant materials are available everywhere in our country and can easily be produced by the farmers and small traders. Among them neem oil has extensively been used and has proved its pest controlling efficacy against several insect pests both in field and storage (Saxena *et al.,* 1981 and Heyde *et al.,* 1983.).

The present research work was undertaken to investigate the incidence of Okra Jassid, *A. devastans,* and to determine the efficacy of some indigenous plants oil such as neem, *Aiadirachla indica*, Karanja, *Pongania pinnata* and Mahogany, *Swietenia mahogani* oil against Okra Jassid and one insecticide Admire 200 SL.

MATERIALS AND METHODS

The experiment on the efficacy of three botanical oils such as Neem, Mahogani, Karanja, and one synthetic insecticide (Admire 200 SL) against Okra Jassid, *Amrasca devastans* was carried out on Okra variety of BARI Okra-1 in the Entomology Field Laboratory of Bangladesh Agricultural University (BAU), Mymensingh, during February to May, 2008.

For convenience of the study, three experiments were conducted. The first one comprised to investigate the population of Okra Jassid from control plots. Second one comprised of the application of insecticide (Admire 200 SL) and three botanical oils (Neem, karanja and Mahogani) for control of Okra Jassid. The third one was repellent effect of the botanicals. The first 2 experiments were conducted in the field laboratory and the 3rd one was conducted in the IPM Laboratory, Department of Entomology Bangladesh Agricultural University, Mymensingh (BAU).

Neem oil, Mahogani oil, Karanja oil and Admire 200 SL were collected from Department of Entomology, BAU, Mymensingh. From these plant oils and insecticides different concentrations were prepared with water (1.0, 2.0 and 3.0% each of Neem, Mahogani and Karanja oil and 0.6, 1.2 and 2.4% of Admire). The BARI Okra -1 Seeds were collected from BARI, Gazipur, and sown in the experimental plots at the rate of 54 seeds $plot^{-1}$ (three seeds pit^{-1} and 18 pits $plot^{-1}$). Seed were shown on 24th February, 2008. The plant spacing was 60 × 35 cm.

The experiments consisting of 4 treatments combinations and were laid out in the Randomized Complete Block Design (RCBD). The entire experimental field was divided into 4 blocks. The each experimental block was divided into 3 plots. Each treatment was replicated three times. The test treatments comprised of insecticide (Admire 200 SL), and three botanicals (Neem, karanja and Mahogoni oil) and untreated control. The botanical treatments were done on each plot at 7 days interval and the chemical treatment thereafter.

The population of Okra Jassid was recorded at 10 days intervals. The plant was observed regularly for detection of initial population as well as for population of different treatments. The counting was started from the very beginning of Okra Jassid infestation. Jassid (nymphs and adults) infested plants were randomly selected from each plot by tagging and the Jassid nymphs on the leaf were removed from the plant on a white paper and counted. Adults were counted by covering with polybag.

The effect of treatment on Jassid population was determined by counting the number of Jassid per plant at pre and post (after 24 hrs of application) treatment. The reduction of Jassid per plant was calculated using the following way :

$$\% \text{ Reduction} = \frac{P_r - P_0}{P_r} \times 100 \text{ (Where, } P_r = \text{Pre count plant}^{-1} \text{ and } P_o = \text{Post count plant}^{-1})$$

The recorded data were complied and tabulated for statistical analysis. Analysis of variance was done with the help of computer package MSTAT. The mean differences among the treatments were adjudged as per test with Duncan's Multiple Range Test (DMRT) and Least Significant Difference (LSD) when necessary (Gomez and Gomez, 1984).

RESULTS AND DISCUSSION

Incidence of Okra Jassid, Amrasca devastans

The numbers of Jassid leaf $^{-1}$ at different week after germination were counted from control plots. From Table 1, it was shown that the population of 13 Jassid leaf^{-1} was found at the first week of March (Early March just 7 days after germination). The infestation increased gradually and reduced after 2nd week of April. The lowest number of insects leaf^{-1} was observed at 4th week of May and it was 12 Jassid leaf^{-1}. From the above results it reveals that the infestation by okra Jassid was highest at vegetative to flowering stage. The peak infestation occurred at the first week of April. The result is similar to the findings of Senapati and Khan (1978), who reported that the largest population of Okra Jassid occurred from December to March. Due to the variation in the environmental conditions the result of the present study varied.

Table 1. Mean number of Jassid leaf^{-1} at different growth age

Month	Mean number of Jassid leaf^{-1}
March 1st week	13
2nd week	17
3rd week	25
4th week	32
April 1st week	35
2nd week	33
3rd week	29
4th week	28
May1st week	20
2nd week	18
3rd week	15
4th week	12

Efficacy of different botanical oils and insecticide in controlling Okra Jassid, Amrasca devastan in Okra plant

The efficacy of botanicals (Karanja, Mahogani and Neem oils) and insecticide (Admire 200 SL) were studied for the management of Okra Jassid, *Amrasca devastans.* A significant effect was evident after application of botanicals and insecticide.

Effect on Okra Jassid population

Significant variation was found in the population of Jassid in the okra plant after application of different treatment (Table 2). The no. of Jassid leaf^{-1} was counted before application and 24, 48 and 72 hours after treatments, respectively. The three botanicals (Mahogoni, Neem and Karanja oil) and the synthetic insecticide applied at different concentration namely Mahogoni, Neem and Karanja oil each at 1, 2 and 3% concentration where as Admire at 0.6, 1.2 and 2.4% concentration. There was no significant difference among the treatments, excepting last cases. In most cases the result was comparatively similar though the number of insects controlled was varied.

From Table 3, it was shown that okra Jassid most effectively controlled by Admire L at 2.4% concentration and it was 97.92% reduction and the lowest rate of control was found in Neem 1% and the reduction rate was 65.07%. So, reduction ranged from 65.07 to 97.92% at spraying botanicals as well as chemical. At first spray, the highest of Jassid population reduction (97.92%) was observed in Admire 2.4% treated plot. The 2nd and 3rd highest of population reduction (95.09 and 93.01%) were observed in Admire 1.2 and 0.6% treated plots, respectively. In case of botanicals the highest rate of Jassid population reduction was 87.41, 86.71 and 83.25% and that was found in Karanja 3, Mahogani 3 and

Neem each at 3%, respectively. The effectivity of botanicals and synthetic insecticides was found in the following order: Admire 200 SL>Karajan oil>Mahogani oil>Neem oil

Table 2. Effectiveness of different botanicals and a chemical insecticide

Treatments	Mean number of Jassid leaf^{-1} at different time intervals		
	At 24 hrs	At 48 hrs	At 72 hrs
Karanja 1%	3.67^{b}	3.67^{bcd}	2.33^{bc}
Karanja 2%	4.00^{b}	3.67^{bcd}	2.00^{bc}
Karanja 3%	2.33^{b}	2.33^{cd}	1.33^{bc}
Mahogoni 1%	5.00^{b}	5.67^{bc}	2.00^{bc}
Mahogoni 2%	4.33^{b}	3.67^{bcd}	2.33^{bc}
Mahogoni 3%	3.00^{b}	2.00^{d}	1.33^{bc}
Neem 1%	5.00^{b}	6.67^{b}	5.00^{b}
Neem 2%	3.33^{b}	5.67^{bc}	3.67^{bc}
Neem 3%	2.00^{b}	3.33^{bcd}	2.67^{bc}
Admire 0.6%	1.67^{b}	1.00^{c}	0.67^{c}
Admire 1.2%	1.33^{c}	0.67^{c}	0.33^{c}
Admire 2.4%	0.67^{c}	0.33^{c}	0.00^{c}
Control	12.67^{a}	14.67^{a}	20.33^{a}
CV (%)	8.35	5.13	6.80

Within a column means followed by same letter(s) did not differed significantly at P<0.01 by DMRT

Table 3. Reduction of Okra Jassid population at different treatments

Treatment (dose)	Mean number of jassid/leaf at different time intervals					
	At 24 hrs	At 48 hrs	At 72 hrs	Total	Average	Percentage reduction over control
Karanja 1%	3.67	3.67	2.33	9.97	3.22	79.72
Karanja 2%	4.00	3.67	2.00	9.97	3.22	79.72
Karanja 3%	2.33	2.33	1.33	5.99	1.99	87.41
Mahogoni 1%	5.00	5.67	2.00	12.67	4.22	73.44
Mahogoni 2%	4.33	3.67	2.33	10.33	3.44	78.35
Mahogoni 3%	3.00	2.00	1.33	6.33	2.11	86.71
Neem 1%	5.00	6.67	5.00	16.67	5.55	65.07
Neem 2%	3.33	5.67	3.67	12.67	4.22	73.44
Neem 3%	2.00	3.33	2.67	8.00	2.67	83.25
Admire 0.6%	1.67	1.00	0.67	3.33	1.11	93.01
Admire 1.2%	1.33	0.67	0.33	2.33	0.78	95.09
Admire 2.4%	0.67	0.33	0.00	1.00	0.33	97.92

Repellent effects

The repellency rates of Okra Jassid to different botanical oils at 2 hours later are presented in the Table 4. The test was carried out in the laboratory in a closed Petri dishes. Ten insects were released on the leaf sprayed with three botanicals (Mahogoni, Neem, Karanja oil). From Table 4 it was showed that out of three botanicals Karanja repelled 93.33%, where as Mahogoni and Neem repelled 86.66 and 63.33%, average insects respectively. The study was conducted at 1, 2 and 3% concentration of the botanicals.

Table 4. Number of Jassid repelled at different concentration of botanicals

Treatments	Total insects	Repelled insects	Repelled	Average
Karanja 1%	10	8	80	
Karanja 2%	10	10	100	93.33
Karanja 3%	10	10	100	
Mahogoni 1%	10	7	70	
Mahogoni 2%	10	9	90	86.60
Mahogoni 3%	10	10	100	
Neem 1%	10	6	60	
Neem 2%	10	6	60	63.33
Neem 3%	10	7	70	

It can be concluded from the present research findings that Jassid infestation varied in different growth stages of Okra plants and hampered okra production severely. The chemical insecticide Admire 200 SL was the most effective against Okra Jassid. Botanical oils were effective to some extent and among the botanical oils Karanja oil was the most effective against Okra Jassid.

It should be advised to use Admire 200 SL for controlling Okra Jassid when the population of Jassid is very high. The botanicals could be applied when the Jassid population is low in the field. The botanicals are environment friendly and effective though not as Admire 200 SL. If botanicals are applied from the very beginning the population could be kept below economic injury level which is an important point of IPM.

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