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Chemical control of sucking complex of okra

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Abstract
The field evaluation of such synthetic pesticides (Acetamiprid 19% weightable water (WW), Lambda 25% WW, Colarphipare 32% WW, Lambda 2.5% WW, and Abamectin 1.3% WW for their effectiveness on okra crops against Jassid *Amrasca biguttula biguttula* (Ishida) was performed during 2015 and observations were reported after 24 hours, 48 hours, 7 hours against the target insect pests. The pre-treatment count of jassid on okra was non-significant different from pesticide effectiveness ($P>0.05$). In contrast, the measured efficacy of different jassid insecticides, *Amrasca biguttula biguttula* (Ishida), was significantly different from pesticide toxicity ($P<0.01$). The observations were noted that both insecticides demonstrated their highest effectiveness after 7 days of spray. Acetamiprid 19% weightable water (WW) was more successful in combating target insect pests compared to other pesticides that developed 70.53 and 74.03% field effectiveness against jassid, *Amrasca biguttula biguttula* (Ishida) after 7 days of 1st and 2nd spray, respectively. Abamectin 1.3% WW, was moderately successful that developed 59.16 and 55.36% field efficacy against jassid, *Amrasca biguttula biguttula* (Ishida) after 7 days of 1st 2nd spray, respectively. Colarphipare, 32% WW, was also moderately effective, yielding field effectiveness after 7 days of 1st and 2nd spray, 53.61 and 46.85 percent against jassid, *Amrasca biguttula biguttula* (Ishida). Acetamiprid, 19% WW, demonstrated higher effectiveness against jassid, *Amrasca biguttula biguttula* (Ishida), led by Colarphipare 32% WW and Abamectin 1.3% WW, while Lambda 25% WW and Lambda 2.5% WW were less successful.

Keywords: Pesticides, acetamiprid, colarphipare, lambda, abamectin, jassid, okra

Introduction
Okra is often referred to in English as Lady's finger and in South Asian languages as bhindi. It is botanically referred to as *Abelmoschus esculentus* Moench. In the Malvaceae family, it is a vegetable crop [1]. It originates in various African regions, including Ethiopia and Sudan. Okra is renowned for its taste and status of nutritionally rich vegetables [2] liked by rich and poor alike, especially in the South Asian region. It increases the best in tropics as well as subtropics but sensitive to cold [3], low-temperature sensitivity [4], and water stress-sensitive [5, 6, 7]. A wide range of adaptability has been reported [8], but under optimum levels of soil organic matter and other essentials required nutrient elements, drained and fertile soil is most suitable [9, 10]. Sucking insect pests infestation always causes large economic losses in okra crops of these major insect pests [11], which primarily included jassid, whitefly, and thrips [12], and many researchers have reported control of these insect pests by synthetic pesticides [13-16].
With the advent of new insecticides, their efficacy level needs to be tested from time to time [17] to ensure their effectiveness and efficacy for insect pest control. Several synthetic pesticides for the management of okra insect pests were evaluated by [18], including cypermethrin, carbaryl, abamectin, deltamethrin, diflubenzuron, fenvalerate, fluvalinate, monocrotophos, and quinalphos. To combat sucking complexes with yields of 2.23, 2.26, and 2.14 tonnes ha^{-1}, respectively [19], suggested cypermethrin, fenvalerate, or decamethrin [20]. The observations were noted when tracked after 72 hours of spraying, okra insect pests treated with alphamethrin, fenvalerate, cypermethrin, chlorpyrifos, and triazophos @250, 250, 500, 1000, and 1500 ml ha^{-1}, respectively, resulted in 100% mortality [21]. Controlled sucking complex and bollworm complex virtually by application of synthetic pesticides. The hypothesis describes that evaluating chemicals in the market with a regular period is essential to check the alteration and determine insect resistance against these pesticides. Hence, the present study was considered to evaluate the efficacy of some insecticides available in the market against the sucking complex of okra under field conditions.

Materials and Methods

The research was conducted during the year 2015 to analyze the chemical regulation of the okra sucking complex. The experiment was performed at the Tandojam Agriculture Research Institute. The experiment was carried out in a Randomized Complete Block design with three replicated. Homogenous seeds of the standard commercial okra variety Sabz Pari were dibbled on well-prepared ridges on 6 March 2015, keeping a ridge to ridge distance of 75 cm. After one month of sowing, thinning was done, and maintained 30 cm plant spacing. Six plots were planned for six treatments (synthetic pesticides) and monitoring (untreated). These six plots were repeated three times to change the overall variance. Pesticides were sprayed against jassid *Amrasca biguttula biguttula* (Ishida) on okra crops when the apparent population of the target pests was at the economic threshold level (ETL) and compared the population of the insects with control (untreated). Before spraying each insecticide, the spray tank was cleaned carefully to avoid adding any mixture before spray. Hand-powered knapsack sprayer used. Usually conducted, the spray was in the morning. Reported the Jassid, *Amrasca biguttula biguttula* (Ishida) pre-treatment observation counted on one day before each spray. In contrast, the Jassid *Amrasca biguttula biguttula* (Ishida) post-treatment count was reported 24 hours, 48 days, 72 hours, and one week after each insecticide spray. Jassid, *Amrasca biguttula biguttula* (Ishida) population was selected from control and handled parcels based on three leaves per okra crop plant (one from the top, middle and bottom parts) early growth stage. When harvesting, fruiting bodies were selected from control and handled parcels, jassid, *Amrasca biguttula biguttula* (Ishida) on okra.

Statistical analysis of data

To assess care dominance, analysis of the difference was conducted on all data obtained by the average reduction percentage and followed by Gomez and Gomez (1984).

Treatments

Following are the dose of treatments used against jassid, *Amrasca biguttula biguttula(Ishida).*

1. T1: Acetamiprid 19% WW, 25 cc/16 lit water (500ml/acre)
2. T2: Lambda 25% WW, 40 g/16 lit water (250g/acre)
3. T3: Colarphipare 32% WW, 35 cc/16 lit water (250ml/acre)
4. T4: Lambda 2.5% WW, 80 cc/16 lit water (1000ml/acre)
5. T5: Abamectin 1.3% WW, 30 cc/16 lit water (500ml/acre)
6. T6: Control(untreated)

RI		RII		RIII
T4		T2		T5
T2		T6		T3
T5	**Path**	T4	**Path**	T6
T1		T3		T2
T3		T1		T4
T4		T5		T1

Results

The field study was carried out during 2015 to investigate jassid's chemical control, *Amrasca biguttula biguttula (Ishida)* on okra using five insecticides (Acetamiprid 19% WW, Lambda 25% WW, Colarphipare 32% WW, Lambda 2.5% WW, and Abamectin 1.3% WW. The control (untreated) was kept comparing the treatment effect. Efficacy of insecticides for two spray applications was carried out at Agriculture Research institute Tandojam during 2015 based on insect mortality after 24 hrs, 48 hrs, 72 hrs, and 07 days after spray data are presented in tables 1-2.

1st Spray

The effect of insecticidal spray on jassid, *Amrasca biguttula biguttula* (Ishida) population after first spray was non-significant for pre-treatment count (F=0.64; DF=17; $P>0.05$); and significant for observation after 24 hours of spray (F=14.44; DF=17; P=0.0003), after 48 hours of spray (F=36.00; DF=17; $P<0.0000$), after 72 hours of spray (F=74.31; DF=17; $P<0.0000$) and after seven days of spray (F=103.24; DF=17;$P<0.0000$). The data on the efficacy of certain insecticides against jassid, *Amrasca biguttula biguttula* (Ishida) after 24 hrs, 48 hrs, 72 hrs, and 07 days of 1st spray is presented in Table 1. The efficacy of insecticides increased with the development in time after spray and after 24 hrs, 48 hrs, 72 hrs and07days of 1st spray the efficacy of Acetamiprid 19% WW was 16.01,40.30,63.56 and 70.53%, followed by Abamectin 13% WW (18.63, 27.53 ,42.78 and 59.16%), Colarphipare 32% WW (8.02, 17.23, 41.98 and 53.61%), Lambda 25% WW (6.00, 19.17, 30.48 and 47.89%) and Lambda 2.5% WW (10.04, 18.13, 25.44 and 36.65%), respectively. Based on jassid, *Amrasca biguttula biguttula* (Ishida) mortality, Acetamiprid 19% WW proved to be more effective than the rest of the insecticides evaluated for their efficacy; In comparison, Lambda 25%WW and Lambda 2.5% WW did not prove effective against jassid, *Amrasca biguttula biguttula* (Ishida). Moreover, it observed that the highest efficacy irrespective of the type of product was recorded after 7 days of spray.

2nd Spray

The effect of second spray of insecticides on Jassid, *Amrasca biguttula biguttula (Ishida)* population after second spray was non-significant for pre-treatment count (F=0.28; DF=17; P=0.9123) and 24 hours of spray (F=1.77; DF=17; P=2070), and significant for observations after 48 hours of spray (F=6.20; DF=17; $P<0.0072$), after 72 hours of spray (F=24.77; DF=17; $P<0.0000$) and after seven days of spray (F=30.18; DF=17;$P<0.0000$). The results regarding the efficacy of some pesticides against jassid, *Amrasca biguttula biguttula* (Ishida) after 24 hrs, 48 hrs, 72 hrs, and 07 days of 2nd spray given in Table 2. The efficacy of pesticides increased with the progression of time after spray and after 24 hrs, 48 hrs, 72 hrs and 07 days of 1st spray the efficacy of Acetamiprid 19% WW was 25.97, 47.42, 67.96 and 74.03%,followed by Abamectin 13% WW (32.88, 40.26, 46.86 and 55.36%), Colarphipare 32% WW (17.98, 26.21, 33.58 and 46.85%), Lambda 2.5% WW (15.99, 27.75, 37.85and53.43%) and Lambda 25% WW (28.27, 34.68, 40.55 and 49.46%), respectively. It was observed that the pesticide Acetamiprid 19% WW showed a higher reduction% percentage as compared to Abamectin 13% WW and Colarphipare 32% WW pesticides for their efficacy. However, Lambda 2.5% WW and Lambda 25% WW did not show desired results for controlling the jassid population. Moreover, it was observed that the highest efficacy against jassid, *Amrasca biguttula biguttula (Ishida)* regardless of the type of product was recorded after 7 days of spray.

Table 1: Effect of synthetic pesticide on the population of jassid, *Amrasca biguttula biguttula* (Ishida) on okra at different intervals after 1st Spray

Treatments	Pre-treatment	24-hrs		48-hrs		72-hrs		7-days	
		Decrease	Efficacy%	Decrease	Efficacy%	Decrease	Efficacy%	Decrease	Efficacy%
Acetamiprid 19% WW	10.62	1.70	16.01	4.28	40.30	6.75	63.56	7.49	70.53
Lambda 25% WW	10.17	0.61	6.00	1.95	19.17	3.10	30.48	4.87	47.89
Colarphipare32% WW	9.98	0.80	8.02	1.72	17.23	4.19	41.98	5.35	53.61
Lambda 2.5%WW	10.26	1.03	10.04	1.86	18.13	2.61	25.44	3.76	36.65
Abamectin 1.3% WW	9.77	1.82	18.63	2.69	27.53	4.18	42.78	5.78	59.16
Control	10.95	-0.11	-1.00	-0.22	-2.01	-0.07	-0.64	0.15	1.37
S.E.±			0.757		0.630		0.559		0.512
LSD 0.05			1.662		1.324		1.247		1.140
CV%			6.64		6.96		7.40		7.92

Table 2: Effect of synthetic pesticide on the population of the jassid, *Amrasca biguttula biguttula* (Ishida) on okra at different intervals after 2nd spray

Treatments	Pre-treatment	24-hrs		48-hrs		72-hrs		7-days	
		Decrease	Efficacy%	Decrease	Efficacy%	Decrease	Efficacy%	Decrease	Efficacy%
Acetamiprid 19% WW	14.17	3.68	25.97	6.72	47.42	9.63	67.96	10.49	74.03
Lambda 25% WW	14.45	2.31	15.99	4.01	27.75	5.47	37.85	7.72	53.43
Colarphipare32% WW	15.07	2.71	17.98	3.95	26.21	5.06	33.58	7.06	46.85
Lambda 2.5%WW	14.82	4.19	28.27	5.14	34.68	6.01	40.55	7.33	49.46
Abamectin 1.3% WW	15.30	5.03	32.88	6.16	40.26	7.17	46.86	8.47	55.36
Control	15.07	0.30	1.99	0.15	1.00	0.00	0.00	0.31	2.06
S.E.±			1.0792		0.9369		0.6931		0.7048
LSD 0.05			2.4045		2.0875		1.5443		1.5704
CV%			14.18		13.92		12.43		15.08

Discussion

Insecticide resistance has grown to be a significant problem, and new insecticides have been recorded to control insect pest infestation using an original composition. This research was intended to examine the effectiveness of synthetic pesticides and Acetamiprid 19% WW, Lambda 25% WW, Colarphipare 32% WW, Lambda 2.5%WW, and Abamectin 1.3% WW against jassid, *Amrasca biguttula biguttula* (Ishida) on okra crop. The study results showed that after 7 days of spray, all the insecticides tested showed their highest effectiveness, and Acetamiprid 19% WW was more effective than other pesticides in combating the target insect pests that produced field efficacy of 70.53 and 74.03% against jassid after 7 days of 1st and 2nd spray accordingly. Abamectin, 13% WW, was reasonably powerful that produced 59.16 and 55.36% of field efficacy against jassid after 7 days of 1st and 2nd spray, respectively. Colarphipare 32% WW was also moderately effective that produced field effectiveness of 53.61 and 53.41% against jassid after 7 days of 1st and 2nd spray, respectively. The efficiency of Acetamiprid 19% WW was higher against jassid, *Amrascabiguttula* (Ishida) followed by Colarphipare 32% WW, and Abamectin 1.3% WW, whereas, Lambda 25% WW and Lambda 2.5%WW have been less successful. Several previous researchers endorse the above findings. [18] A variety of synthetic pesticides were evaluated for controlling insecticides of okra and found to be successful in controlling insect pests infesting okra and cotton plantation with cypermethrin, carbaryl, abamectin, deltamethrin, diflubenzuron, fenvalerate, fluvalinate, monocrotophos, and quinalphos. There are currently many insecticides present on the local market with modified labels. Still, their effectiveness has been a matter for producers in recent years. Endosulfan and profenofos were recommended by [22] whereas [23], suggested that Novastar 56 EC, (Bifenthrien 6% EC and abamectin 0.07%) Maximum whitefly population decrease (70.54%) in okra, jassid (73.08%) and aphid (74.58%) Novastar's population has been decreased. [24] Showed the reduction of *B. tabaci* as 92.62% by pesticidal application against okra insect pests. Fenoxycarb tested against sucking cotton and okra pest complexes, and it found that the application of fenoxycarb against sucking insect pesticides was less efficient, determined by [21]. That pests are seriously attacking the okra (thrips, jassid, whitefly, aphid, and termite) was reported by [25, 26] Found more efficient than any other control measures chemical control for sucking insects on okra. [27] Revealed that endosulfan treatment decreased jassid's population by up to 0.68/5 plants at 15 days; whereas, It was found by [28] that emamectin benzoate and spinosad reported the highest marketable fruit yields (158.51 and 153.23 q/ha, respectively). [29] The effectiveness of synthetic pesticides in use alone was satisfactory; however, it significantly improved suppressing insect pests when combined synthetic pesticides and plant extracts. [21] Determined that Dimethoate (234.9g) and Lamb-dacyhalothrin (244.9g) application has calculated eight insecticides' effectiveness and the highest outputs by controlling the sucking elaborate bollworm complex effectively. The findings of the current study and the studies carried out in various parts of the world are well comparable. But chemicals in different countries are recorded and sold on different labels; however, the cultivar's effectiveness differed due to genetic resistance. The jassid insecticide resistance factors have also been identified in the studies. Further research is expected because Acetamiprid's 19% WW was found to yield desirable results in the present study. This product has, in particular, been 100% efficient against the okra crop that infests whitefly, while other products were moderate to least effective against jassid, *Amrasca biguttula biguttula* (Ishida).

Conclusion

The findings are concluded. After 7 days of spray, all the insecticides showed their highest efficacy. The efficacy of Synthetic pesticides on 2nd spray was relatively higher than

their 1st spray. Pesticides Colarphipare 32% WW and Abamectin 1.3% WW showed some positive results about their complex sucking efficacy, but Lambda 25% WW or Lambda 2.5% WW did not yield promising results their insect pest goal efficacy.

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