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Comparative efficacy of selected insecticides against Jassids on Brinjal

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ABSTRACT

Novel insecticides like Dimilin, Bactospeine and Repelin were used alone at the recommended concentrations and at half the dose in combination with conventionals like fenproparthrin, mono crotophos and carbaryl against jassids on brinjal. During the crop period three sprays were given and observations recorded at 1, 5, 10 and 14 days after spraying. Among all the 16 treatments tested, conventionals alone brought down the populations drastically at one day after spraying, among which fenpropathrin was the best. Combinations proved effective than conventionals alone from five days after spray and among them diflubenzuron + fenpropathrin, diflubenzuron + monocrotophos, bactospeline + fenpropathrin, bactospeine + monocrotophos were the most effective.

Key words : Combinations, Conventionals, Efficacy, Mean population reduction, Novel insecticides.

Brinjal is an important solanaceous vegetable grown widely all over the country. It is high in nutritive value with 6.4% carbohydrates, 1.3% fat 0.02% calcium, 0.06% phosphorus and is also claimed to have medicinal value. As many as 26 species of insect and non-insect pests have been reported to attack and cause damage to brinjal crop (Vevai, 1970). Among them Jassid *Amrasca biguttula*, Ishida is one.

Due to the irrational use of conventional insecticides several adverse effects like pest resistance, resurgence, residues, environmental pollution etc cropped up.To overcome the above disadvantages novel methods of pest control should be utilized. New insecticides like diflubenzuron (Dimilin 25 WP) a chitin inhibitor, *Bacillus thuringiensis* (Bactospeine 16000IU mg^{-1}) a microbial insecticide and a botanical insecticde of neem origin (RD-9 Repelin) were utilized alone and in combination with coventional insecticides like fenpropathrin (Danitol 10EC), monocrotophos (Nuvacron 36SC) and carbary (Sevin 50WP) at half of the recommended dosage to control jassids on brinjal.

MATERIAL AND METHODS

Pusa purple long variety of brinjal seed weighing150 gms was broadcasted in a raised nursery seedbed of 3 sq.m area in the college farm, Agricultural College, Rajendranagar. The field experiment was laid out in randomized block design with 16 treatments replicated thrice. The plots measuring 20 sq.m each were transplanted with brinjal seedlings at 75 x 50 cm spacing. Fertilizers were applied @ 100-60-60 kg NPK ha^{-1} in the form of urea, super phosphate and murate of potash. The recommended agronomic practices were carried out from time to time.

The insecticides were sprayed with knapsack compression sprayer at fortnightly intervals. A total of three sprays were given during the period of study. Care was taken to prevent the drift of spray fluid reaching the adjacent plots by putting a screen in between the plots. Plants were covered with spray fluid thoroughly to the point of runoff. Observations on number of jassids were recorded from top three leaves in the early stage of crop growth and one leaf each from top, middle and botton at later stages of crop growth from five randomly selected plants per plot. The pest population levels were recorded one day prior to spraying and also on one, five, ten and fourteen days after imposing treatments in all the plots. From this data per cent mean reduction of jassids over control was calculated using modified Abotts formula (Fleming and Ratnakaran, 1985) and then transformed to angular values. The data was subjected to analysis of variance.

% population reduction = {[1-(post treatment population in treatment x pre treatment population in check)]x100} / (pre treatment population in treatment x post treatment population in check)

RESULTS AND DISCUSSION

One day after spray fenpropathrin was the most effective with 98.9 per cent followed by monocrotophos which recorded 97.3 per cent mean reduction of jassid population. The combined treatments of diflubenzuron + monocrotophos and

bactospeine+fenpropathrin also gave effective control with 76.2 and 75.3 per cent reduction with no significant difference between them, Among all the treatments, repelin (20%) and bactospeine (10.1%) alone were found to be the least effective. At five days after spray, diflubenzuron+fenproparthrin was the best treatment with 91 per cent mean reduction of population closely followed by fenpropathrin and diflubezuron+monocrotophos which recorded 89.4 and 88 per cent mean reduction, respectively. The treatments in the descending order of efficacy were monocrotophos, diflubenzuron+carbaryl, bactospeine + fenpropathrin and bactospeine + monocrotophos with 86.7, 85.7, 84.4 and 83.5 per cent mean reduction.Diflubenzuron + bactospeine with 52.3 per cent gave moderate control. Bactospecine + repelin (27.6), repelin (25.9) and bactospeine (10.6) were the least effective among all the treatments. The trend with regard to the efficacy of treatments at 10 and 14 after spray was more or less similar to that of five days after spray. Slight build up of population was observed in all the treamtnes at 14 days after spray (Table 1.)

At one day after second spray fenproparthrin was most effective with 99.2 per cent recduction and was on par with monocrotophos which gave 98.9 per cent reduction. Carbaryl (87.3) and diflubenzuron + repelin, bactospeine + repelin and diflubenzuron + bactospeine with 32.3, 29.8 and 28.7 per cent reduction were on par and recorded poor control of jassids. At five days after second spray, diflubenzron + fenpropathrin was the most effective with 97.3 per cent mean reduction and was closely followed by diflubenzuron + monocrotophos (96.4), fenpropathrin (91.2). Diflubenzuron + repelin (58%) and diflubenzuron + bactospeine (52.9%) recorded good reduction of population. Bactospeine + repelin (29.5%), repelin (26.3%) and bactospeine (12%) were the least effective among all the treatments. Similar trend was observed regarding the efficacy of teatments at 10 and 14 days after spraying.

The observations recorded at one day after third spraying indicated that fenpropathrin and monoctophos were the most effective with 99.5 and 98.6 per cent mean reduction of population, respectively. Very good control was observed in the treatments of carbary in (87.7%) and diflubenzuron + fenpropathr (86.7%). At five days after third spraying diflubenzuron + fenpropathrin was the most effective with 98.7 per cent reduction followed by diflubenzuron + fenpropathrin was the most effective with 98.7 per cent reduction followed by diflubenzuron + bactospeine (51.2%). Bactospeine + repelin, repelin and bactospeine with 21.1, 16.9 and 14.7 per cent mean reduction, respectively were the least effective. Similar trend was observed regarding the efficacy of treatments at 10 and 14 days after spraying.

From the above results it can be derived that all the treatments were significantly superior to control in reducing the jassid population at 1, 5, 10 and 14 days after first, second and third sprayings. Slight build up of population was observed in all the treatments at 14 days after sprayings. Individual treatments of conventional insecticides brought down the pest population drastically at one day after spray when compared to combination treatments either with diflubenzuron or bactospeine. Fenpropathrin showed prolonged efficacy by giving good control of jassids even at 14 days after spray. Reddy (1977) found that fenvalerate was the most effective among the eight insecticides tested aginst Amrasca sp on bittergourd. Shah *et al* (1990) reported that monocrotophos was the most effective out of the seven insecticides tested against *Amrasca* sp on cotton. The declined efficacy of monocrotophos and carbaryl from five days after spray may be due to their degradation.

Combinations of conventionals with diflubenzuron were better than individual treatments at five days after spray. Combinations proved less effective initially but their efficacy increased with time after application. Sandhya (1987) also reported similar trend with regard to the efficacy of diflubenzuron on jassids. Low efficacy of combinations immediately after application may be probably due to the fact that conventionals were used only at half the concentration and diflubenzuron is not expected to effect immediately after application. This is in confirmation with the report of Arjuna Rao and Mehrotra, (1986), that diflubenzuron acts slowly and the effect is seen mostly during and after next molt after application.Khalil and Watson (1986) reported that diflubenzuron increased residual effect of other insecticides when used in combination. It may due to the interference in cuticle deposition (Mulder and Gijswijt, 1973) leading to enhanced permeability of cuticle to conventional insecticides.

However, combinations of conventionals with bactospeine proved less effective. Diflubenzuron alone was found to improve its efficacy against jassids while bactospeine and repelin again showed poor efficacy.Poor efficacy of bactospeine might be due to the fact that it has to be ingested into the stomach for showing its action. Since jassids suck the sap there is little chance of it entering into the stomach and showing action. Moderate efficacy of combinations of bactospeine with conventionals was

Table 1. Efficacy of insecticidal treatments against Jassid (first spraying)

S.No.	Treatment	Dose	No of jassids before spray	one day after spraying			five day after spraying			ten day after spraying			fourteen day after spraying		
				Mean no of jassids	% reduction over control	angular value	Mean no of jassids	% reduction over control	angular value	Mean no of jassids	% reduction over control	angular value	Mean no of jassids	% reduction over control	angular value
1	Diflubenzuron	0.025	56.20	43.90	22.90	28.59	21.90	62.20	52.08	25.80	56.10	48.52	42.90	28.60	32.33
2	Bactospeine	0.15	52.00	47.40	10.10	18.50	47.90	10.60	19.00	49.30	9.10	17.56	51.00	8.30	16.74
3	Fenpropathrin	0.02	50.60	0.60	98.90	83.60	5.50	89.40	71.00	10.40	80.30	63.63	37.00	31.60	34.18
4	Monocrotophos	0.054	48.00	1.30	97.30	80.50	6.60	86.70	68.59	19.50	61.10	51.46	36.00	29.80	33.11
5	Carbaryl	0.15	58.80	7.80	85.00	67.22	14.70	71.80	57.92	25.90	51.20	45.69	39.20	27.90	31.90
6	Repelin	1.00	57.00	46.20	20.00	26.57	43.40	25.90	30.61	44.40	25.20	30.13	46.30	24.20	29.47
7	Diflubenzuron + Bactospeine	0125+0.0	59.10	46.00	23.30	28.84	29.00	52.30	46.30	33.90	45.10	42.19	47.30	25.30	30.20
8	Diflubenzuron+ Fenpropathrin	0125+0.0	59.40	9.50	84.40	66.74	5.40	91.00	72.44	7.80	87.40	69.21	33.00	48.00	43.85
9	Diflubenzuron+ monocrotophos	0125+0.0	47.80	11.60	76.20	60.82	5.90	88.00	69.73	8.60	82.80	65.45	31.30	38.80	38.53
10	Diflubenzuron+carbaryl	0125+0.0	52.80	14.00	73.90	59.20	7.70	85.70	67.75	13.20	75.90	60.62	38.60	31.60	34.20
11	Diflubenzuron+Repelin	0125+0.5	46.20	33.30	29.10	32.62	18.90	60.30	50.94	20.80	56.90	48.99	36.90	25.50	30.33
12	Bactospeine+ fenpropathrin	075+0.0	48.00	12.00	75.30	60.20	7.70	84.40	66.74	10.20	79.70	63.25	36.40	29.20	32.73
13	Bactospeine+ Monocrotophos	075+0.02	50.20	17.70	65.20	53.89	8.60	83.50	66.03	19.10	63.70	52.95	38.50	28.50	32.24
14	Bactospeine+Carbaryl	075+0.07	47.00	17.30	63.70	52.95	14.80	69.40	56.40	28.10	42.70	40.78	37.10	26.40	30.93
15	Bactospeine+Repelin	075+0.5	44.40	32.10	28.70	32.39	33.10	27.60	31.69	33.60	27.40	31.60	35.20	25.90	30.61
16	Control		42.60	43.20	0.00	0.00	43.80	0.00	0.00	44.40	0.00	0.00	45.60	0.00	0.00
	S.Ed					0.485			0.23			0.35			0.61
	CD (0.05)					0.97			0.45			0.69			1.21

Table 2. Efficacy of insecticidal treatments against Jassid (Second spraying)

S.No.	Treatment	Dose	No of jassids before spray	one day after spraying			five day after spraying			ten day after spraying			fourteen day after spraying		
				Mean no of jassids	% reduction over control	angular value	Mean no of jassids	% reduction over control	angular value	Mean no of jassids	% reduction over control	angular value	Mean no of jassids	% reduction over control	angular value
1	Diflubenzuron	0.025	42.90	37.10	15.10	22.87	15.50	64.80	53.61	17.50	61.10	51.45	31.60	31.00	33.83
2	Bactospeine	0.15	51.00	44.40	15.10	22.87	45.90	12.00	20.27	48.50	9.10	17.56	49.50	8.90	17.36
3	Fenpropathrin	0.02	37.00	0.30	99.20	84.98	3.50	91.20	72.78	5.60	85.50	67.72	23.30	41.00	39.82
4	Monocrotophos	0.054	36.00	0.40	98.90	83.93	3.90	89.40	71.03	15.00	60.30	50.94	30.30	21.10	27.35
5	Carbaryl	0.15	39.20	5.10	87.30	69.10	4.30	69.40	56.44	23.60	42.50	40.65	33.50	20.00	26.57
6	Repelin	1.00	46.30	40.10	15.10	22.92	35.10	26.30	30.83	36.90	23.80	29.22	41.00	17.00	24.33
7	Diflubenzuron + Bactospeine	0125+ 0.075	47.30	34.50	28.70	32.37	22.90	52.90	47.68	25.20	49.00	44.41	39.90	20.70	27.08
8	Diflubenzuron+ Fenpropathrin	0125+ 0.01	33.00	5.40	84.20	66.61	0.90	97.30	80.43	3.30	90.40	71.98	19.40	45.00	42.13
9	Diflubenzuron+ monocrotophos	0125+ 0.027	31.30	7.40	76.80	61.23	1.20	96.40	79.08	5.70	82.80	65.45	20.00	40.10	39.27
10	Diflubenzuron+carbaryl	0125+0.075	38.60	12.60	68.00	56.53	4.50	88.60	70.30	9.00	77.60	61.75	27.60	33.00	35.06
11	Diflubenzuron+Repelin	0125+0.050	36.90	25.50	32.30	33.65	15.90	58.00	49.58	17.40	55.00	47.87	30.60	22.30	28.18
12	Bactospeine+ Fenpropathrin	075 + 0.01	36.40	8.50	77.20	61.53	5.90	85.20	66.58	7.30	81.00	64.16	28.30	27.10	31.40
13	Bactospeine+ Monocrotophos	075 + 0.027	38.50	11.90	69.70	56.60	8.30	78.90	62.63	18.70	53.40	46.95	32.00	21.90	27.88
14	Bactospeine+Carbaryl	075+0.075	37.10	24.00	61.00	51.35	13.40	64.70	52.57	23.20	40.10	39.27	31.60	20.00	26.57
15	Bactospeine+Repelin	075+0.050	35.20	25.20	29.80	33.06	25.50	29.50	32.92	27.70	25.00	30.00	30.30	19.50	26.18
16	Control		45.60	46.50	0.00	0.00	46.80	0.00	0.00	47.70	0.00	0.00	48.60	0.00	0.00
	S.Ed					1.06			1.38			0.45			1.29
	CD (0.05)					2.11			2.76			0.89			2.57

Table 3. Efficacy of insecticidal treatments against Jassid (Third spraying)

S.No.	Treatment	Dose (%)	No of jassids before spray	one day after spraying			five day after spraying			ten day after spraying			fourteen day after spraying		
				Mean no of jassids	% reduction over control	angular value	Mean no of jassids	% reduction over control	angular value	Mean no of jassids	% reduction over control	angular value	Mean no of jassids	% reduction over control	angular value
1	Diflubenzuron	0.025	31.60	27.80	17.20	24.53	11.20	66.80	54.84	15.00	55.80	48.33	25.10	26.60	31.04
2	Bactospeine	0.15	49.50	47.00	10.60	19.06	45.10	14.70	22.54	46.60	12.30	20.50	47.70	10.60	19.06
3	Fenpropathrin	0.02	23.30	0.10	99.50	86.04	1.30	94.70	76.73	2.80	88.80	70.42	16.40	35.00	36.27
4	Monocrotophos	0.054	30.30	0.50	98.60	83.37	2.80	91.30	72.82	8.00	75.60	60.40	26.00	20.40	26.87
5	Carbaryl	0.15	33.50	4.40	87.70	69.44	12.10	66.20	54.45	19.10	46.70	43.13	28.90	20.10	20.03
6	Repelin	1.00	41.00	37.50	13.70	21.72	36.40	16.90	24.27	38.10	13.20	21.27	39.10	11.70	24.73
7	Diflubenzuron + Bactospeine	0125+ 0.075	39.90	34.70	18.20	25.24	20.80	51.20	45.69	22.80	46.70	43.13	35.60	17.50	39.82
8	Diflubenzuron+ Fenpropathrin	0125+ 0.1	19.40	2.70	86.70	68.61	0.30	98.70	83.51	1.20	94.10	75.95	12.30	41.00	38.06
9	Diflubenzuron+ monocrotophos	0125+ 0.027	20.00	5.10	76.10	60.74	0.80	96.50	79.19	4.20	80.40	63.75	13.40	38.00	35.22
10	Diflubenzuron+carbaryl	0125+0.75	27.60	9.00	69.30	56.35	3.30	88.70	70.38	7.20	75.60	60.40	19.80	33.30	39.49
11	Diflubenzuron+Repelin	0125+0.50	30.60	24.50	24.70	29.75	13.20	59.50	50.50	15.20	53.80	47.18	25.10	24.20	29.49
12	Bactospeine+ Fenpropathrin	075+0.1	28.30	5.30	82.30	65.10	4.10	86.50	68.44	7.90	74.00	59.34	25.00	18.20	25.24
13	Bactospeine+ Monocrotophos	075+0.27	32.00	10.20	70.00	56.81	6.00	82.30	65.10	12.10	64.80	53.61	28.70	16.90	24.27
14	Bactospeine+Carbaryl	075+0.75	31.60	11.20	66.70	54.75	11.00	67.30	55.08	19.20	43.30	40.15	28.40	16.70	24.11
15	Bactospeine+Repelin	075+0.50	30.30	27.90	13.80	21.78	25.50	21.30	27.54	26.40	18.80	25.69	27.30	16.70	24.11
16	Control		48.60	51.60	0.00	0.00	51.90	0.00	0.00	52.10	0.00	0.00	52.50	0.00	0.00
	S.Ed					0.57			0.66			0.63			1.41
	CD (0.05)					1.13			1.32			1.26			2.82

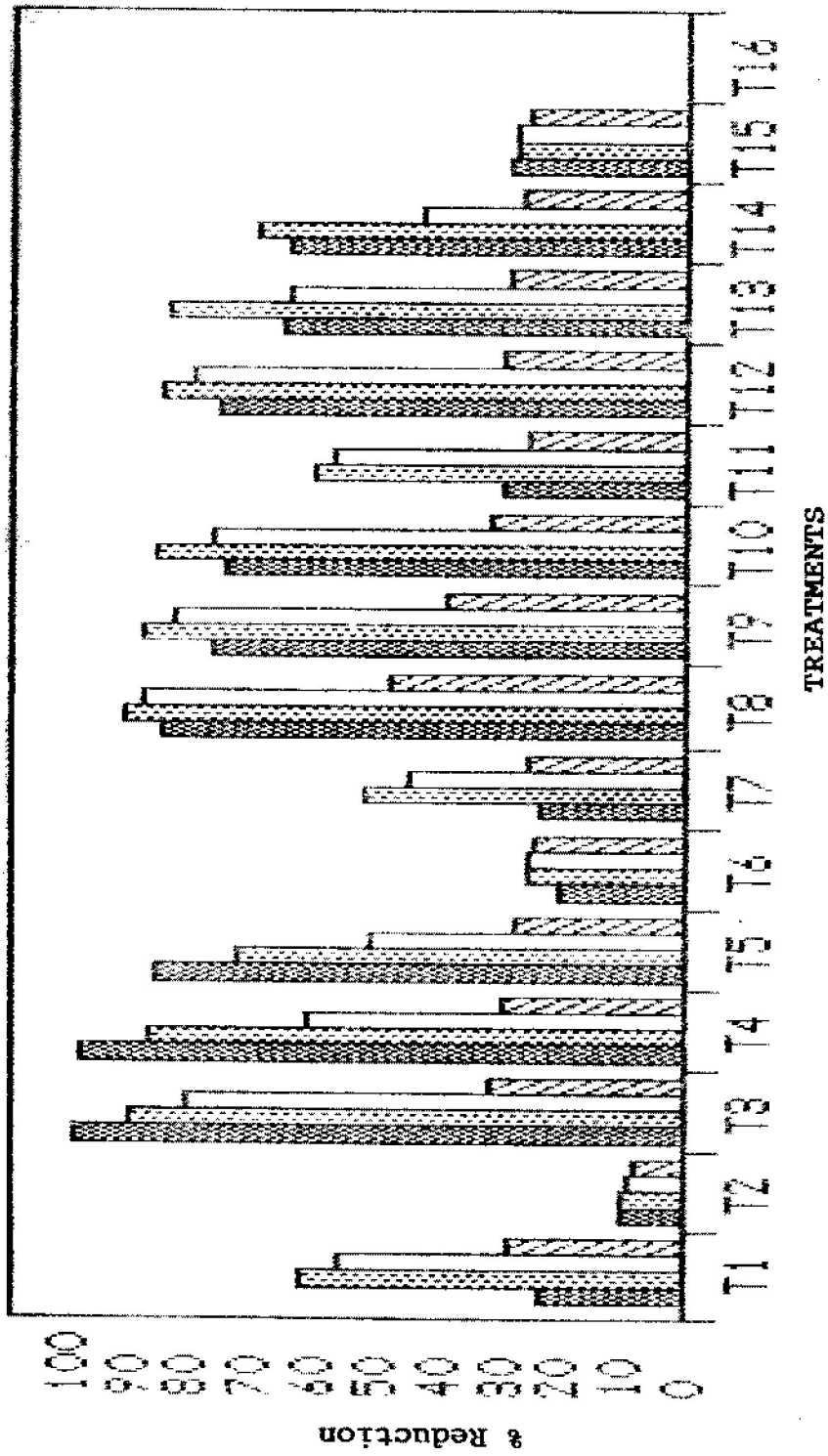

Fig 1: Efficacy of insecticidal treatments against jassid, A.biguttula biguttula (First spraying)

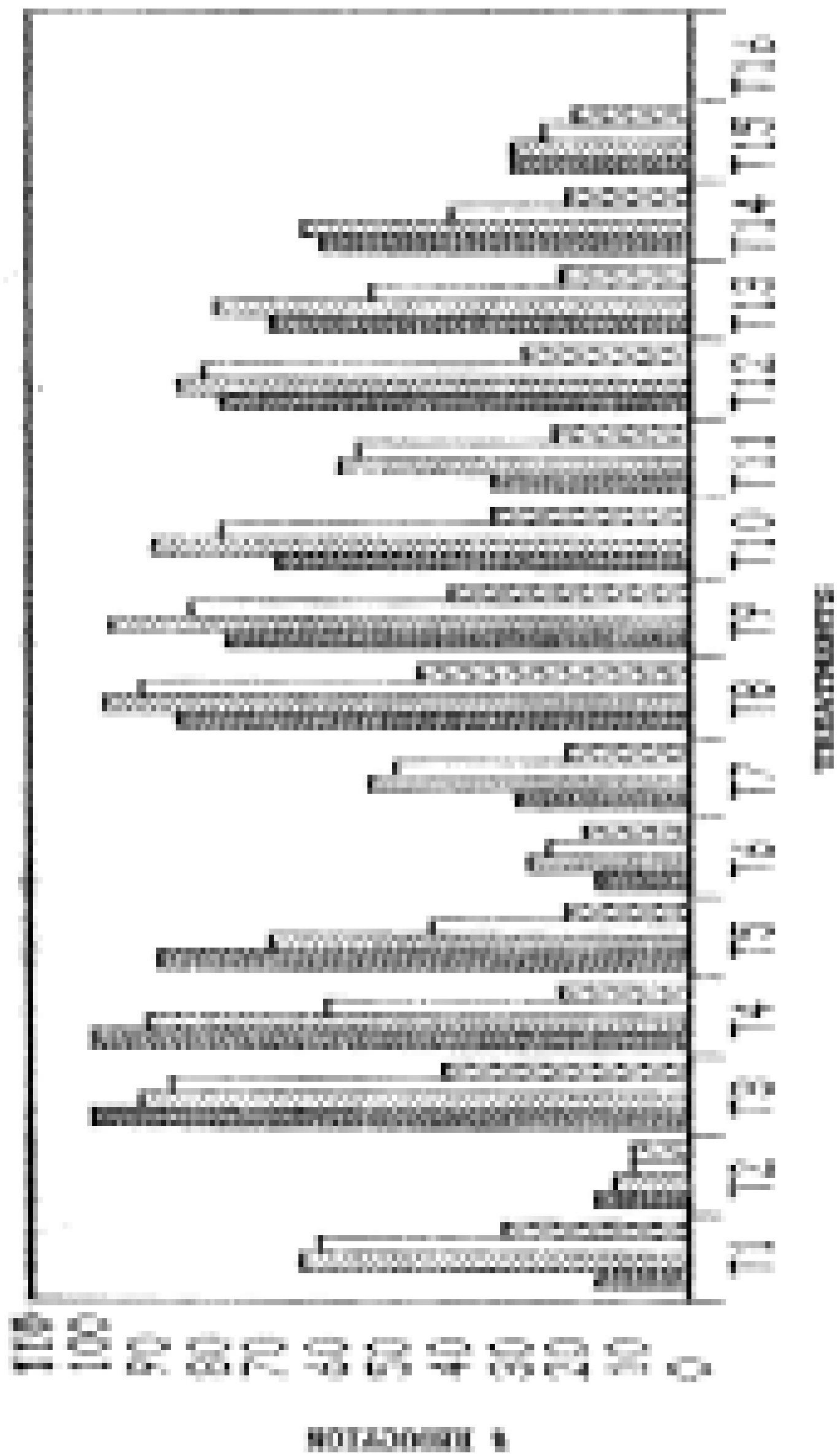

Fig 2 : Efficacy of insecticidal treatments against jassid, *A. biguttula biguttula* (Second spraying)

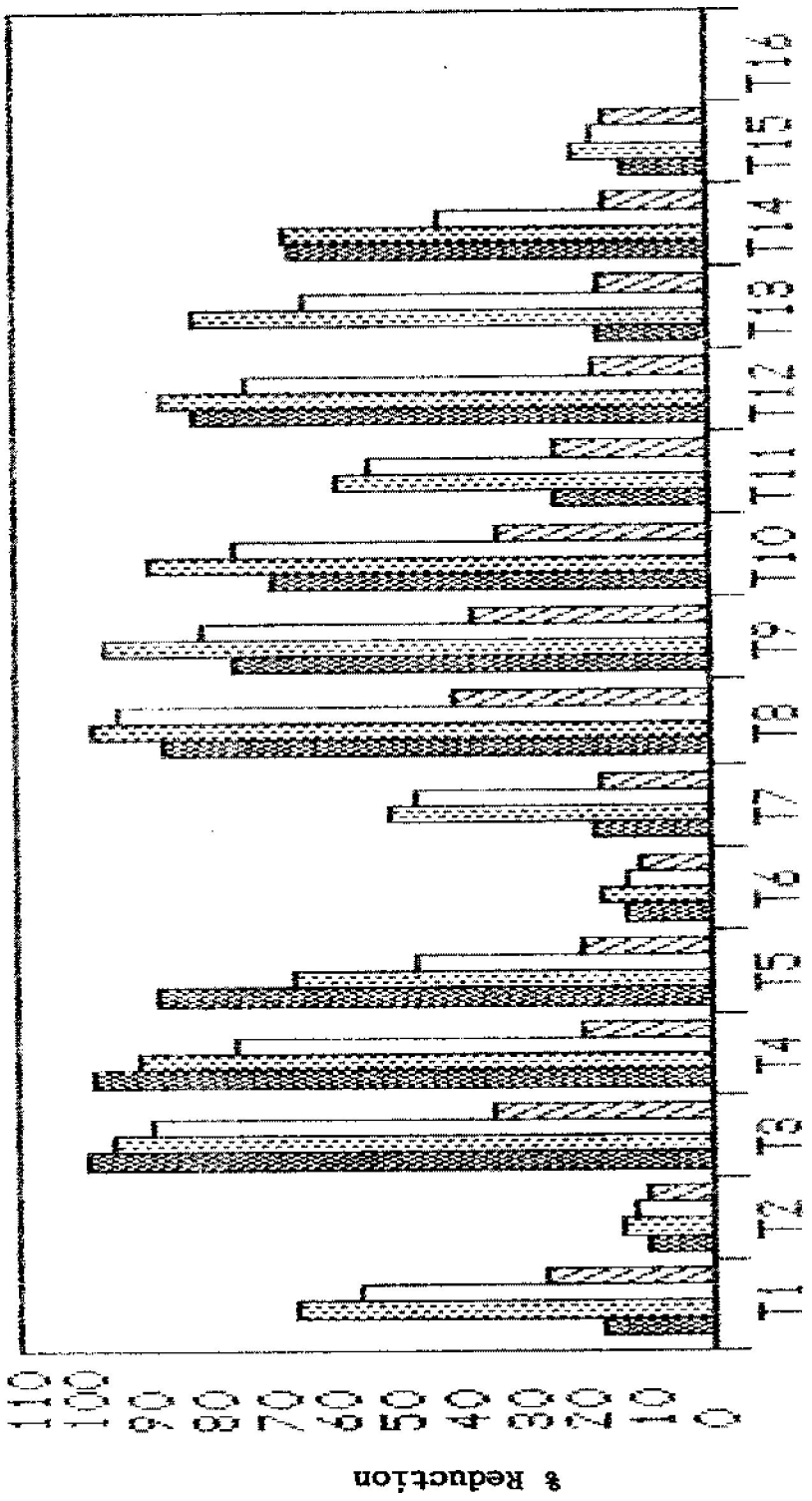

Fig 3 : Efficacy of insecticidal treatments against jassid, A biguttula biguttula (Third spraying)

probably due to the action of conventionals themselves. Negligible effect of repelin may be because it is a non-systemic plant product with no significant insecticidal properties.

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