

Studies of Persistent Toxicity of Some Natural Products (Neem) against *Pyrilla perpusilla* (Sugarcane pest) in Bihar

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ABSTRACT

Investigations were carried out to study the persistent toxicity of some natural products (Neem) like neem oil, Nimbecidine, Neemark and Nimbitor against *Pyrilla perpusilla*. The observations recorded on mean percent protection against second instar larva indicated that the treatments with 2 percent Nimbecidine, 2 percent neemark and 2 percent Nimbitor persisted for five days. In percent Nimbecidine, 2 percent Nimbecidine and 2 percent Nimbitor persisted four days after application.

1. Introduction

Sugarcane (*Saccharum officinarum*) is the most important commercial crop which production of Bihar. The 30 species of insects pests have been reported about damage to sugarcane in state of Bihar. Gupta 1957, Prasad 1960, Chakarvarti 1970, Srivastava, K.P. (1981). The sugarcane pest *Pyrilla perpusilla* is a leaf hopper (Hemiptera : Lophopidae). This insect is a serious pest of sugarcane in Bihar. The pest is found gregariously on the under surface of the leaves where they suck up plant sap that causes yellowing and eventually drying of leaves. Siddiqui (1965). Many synthetic insecticides are recommended for control of these pest. But most of the chemicals are found to be infective owing to the problem of pest and development of Insects resistance. Plant products may prove to be useful in formulating sound pest management strategies Benerji et.al, 1985. Thus keeping in view this studies persistent toxicity of some natural products (Neem) against *Pyrilla perpusilla* (Sugarcane pest) in Bihar were carried out.

2. Material and Methods

The statistically designed experiments with three replicatios and ten treatments were laid out from April, 2009 to July, 2010 with the persistent toxicity of some natural products (Neem) against the second instar larva of *Pyrilla perpusilla*. Castr seed were sown in the eastern posts on 14.12.2009 as host plant. Two plants per pot were grown and pots were kept in the field. Method suggested by Srinivasa Rao et.al. (1996) was used with slight modification to study the persistent toxicity of some neem products. Spraying was done with hand compression sprayer. A total of 200ml of spray suspension was required for spraying the six plants of three posts for assessment of persistent toxicity, three leaves form each treatment were plucked at random from the treated as well as untreated potted caster plants and brought to the laboratory one hour after treatment Leaf discs of 10 cm diameter were prepared from these leaves and transferred to petridishes with a piece of moist blotting paper at its bottom. Ten second instar larvae and two fourth instar larvae of *Pyrilla purpusilla* were released in each petridish and exposed for 24 hours. The

petridishes containing leaves and larvae were kept in the laboratory for recording observations. One blank was kept in order to calculate shrinkage coefficient. The procedure was repeated after 24 hours till feeding in treatment was observed similar to that of control. Percent protection over control was calculated as per the method suggested by Babu and Beri (1969). The relative efficacy of each treatment was determined by a criterion developed by Saini (1959) and employed by Samuthisraveluland David. 1990 for testing neem products. According to this criterion the product (PT) of average residual toxicity (T) and the period (P) for which the toxicity persisted was used as an index of persistent toxicity. Fig:(A) Male *Pyrilla purpusilla*, Fig: (B) Female *Pyrilla purpusilla*



Fig:(A) Male *Pyrilla purpusilla*



Fig: (B) Female *Pyrilla purpusilla*

3. Results and Discussion

Persistent toxicity of neem products against second instar larvae:

The data on mean per cent protection over control and persistent toxicity (PT) value obtained in the experiment are presented in Tables 1 and 2.

Table 1. Mean per cent protection against second instar larvae of *Pyrilla purpusilla* due to neem products at various intervals.

Treatment		Mean Per cent protection over control						
Days per treatment								
		1	2	3	4	5	6	7
1	1% Neem oil	70.37	50.00	37.50	6.24	0.00		
2	2% Neem oil	85.36	62.50	43.75	25.00	0.00		
3	1% Nimbecidine	71.87	53.12	31.22	12.47	0.00		
4	2% Nimbecidine	87.49	71.87	53.12	31.22	6.24	0.00	
5	1% Neemark	81.24	62.50	37.50	18.75	0.00		
6	2% Neemark	93.75	78.11	53.12	37.50	12.47	0.00	
7	1% Nimbitor	79.02	59.33	32.72	7.74	0.00		
8	2% Nimbitor	90.62	79.30	59.36	18.75	6.24	0.00	
9	0.05% edosulfan	100.00	92.00	80.20	56.23	32.72	12.47	0.00

Table 2. The values of persistent toxicity (PT) and the order of relative efficacy (ORE) of some neem products in respect of second instar larvae of *Pyrilla purpusilla*.

	Treatment	Period (days) (P)	Average residual toxicity (T)	PT	ORE
1	1% Neem oil	4	41.03	164.11	9
2	2% Neem oil	4	54.15	216.61	5
3	1% Nimbecidine	4	42.17	168.68	8
4	2% Nimbecidine	5	49.99	249.94	4
5	1% Neemark	4	50.00	200.00	6
6	2% Neemark	5	54.99	274.95	2
7	1% Nimbitor	4	44.70	178.81	7
8	2% Nimbitor	5	50.85	254.27	3
9	0.05% edosulfan	6	60.40	362.40	1

$$T = \frac{\text{Sum of per cent protection over control on different days}}{\text{Number of observations}}$$

It is evident that the protection offered against second instar larvae was 70.37 per cent in treatment with 1 per cent Neem oil in samples drawn one day after treatment. The per cent protection declined to 6.24 on fourth day with zero protection on fifth day after treatment. The treatment with 2 per cent Neem oil offered maximum protection (85.36 per cent) when exposed to treated leaves one day after treatment and found to be effective up to fourth day after treatment. Similarly the treatment with 1 per cent Nimbecidine persisted up to fourth day. The per cent protection offered was 71.87 one day after application which declined to 12.47 per cent on fourth day.

In the case of treatment with 2 per cent Nimbecidine, the protection was 87.49 per cent one day after application. The treatment offered protection upto fifth day. In the plant samples drawn one day after application of 1 per cent Neemark, 81.24 per cent protection, over control was observed. The treatment was effective up to fourth day after application. In 2 per cent Neemark per cent protection was 93.75 one day after application which further declined to 37.50 and 12.47 per cent on fourth and fifth day, respectively. It is apparent from results that the per cent protection was 79.02 one day after application of 1 per cent Nimbitor. There was protection of only 7.74 per cent on fourth day after treatment. In treatment with 2 per cent Nimbitor, the protection was 90.62 per cent one day after application. The treatment persisted up to fifth day after

application. It is quite clear from the table that there was cent per cent protection one day after application of 0.05 per cent edosulfan which reduced to 12.47 per cent on sixth day.

Based on persistent toxicity (PT) value 0.05 per cent edosulfan should highest PT value (362.40) followed by 2 per cent Neemark (274.95), 2 percent Nimbitor (254.27), 2 per cent Nimbecidine (249.94), 2 per cent Neem oil (216.61), 1 per cent Neemark (200.00). 1 per cent Nimbitor (178.81), 1 per cent Nimbecidine (168.68) and 1 per cent neem oil (164.11).

Persistent toxicity of neem products against fourth instar larvae:

The data recorded on mean per cent protection over control and persistent toxicity (PT) values obtained are presented in Table 3 and 4.

It is evident from the data that protection offered against fourth instar larvae was 71.30 per cent in samples drawn one day after treatment of 1 per cent Neem oil which declined to 59.24 and 26.30 per cent on second and third day after application. The treatment with 2 per cent Neem oil offered protection up to fourth day. Per cent protection against fourth instar larvae was 74.06 one day after application of 1 per cent Nimbecidine which declined to 46.33, 33.33 and 11.11 on second, third and fourth day, respectively. The treatment with 2 per cent Nimbecidine showed the similar trend as 1 per cent Nimbecidine. The treatment with 1 per cent Neemark offered

protection up to third day whereas 2 per cent Neemark protect the crop up to fifth day with per cent protection 85.00, 74.06, 48.13, 25.91 and 9.27 per cent on first to fifth day, respectively. In the case of treatment with 1 per cent Nimbitor the protection was 76.20 per cent one day after application which declined to 44.22 and 22.22 per cent on second and third day, respectively whereas the treatment with 2 per cent Nimbitor offered protection up to fourth day.

Based on PT values. 0.05 per cent endosulfan showed the highest PT value (316.63) followed by 2 per cent Neemark (242.37), 2 per cent Nimbitor (219.36), 2 per cent Nimbecidine (207.37), 2 per cent Neem oil (185.18), 1 per cent Nimbecidine (164.83), 1 per cent Neemark (152.19) and 1 per cent Nimbitor (142.86).

Table 3: Mean per cent protection against fourth instar larvae of *Pyrilla purpusilla* due to neem products at various intervals.

Treatment		Mean Per cent protection over control						
Days per treatment								
		1	2	3	4	5	6	7
1	1% Neem oil	71.30	59.24	26.30	0.00			
2	2% Neem oil	77.77	62.97	35.17	9.27	0.00		
3	1% Nimbecidine	74.06	46.33	33.33	11.11	0.00		
4	2% Nimbecidine	81.47	59.24	44.44	22.22	0.00		
5	1% Neemark	74.06	48.13	30.00	0.00			
6	2% Neemark	85.00	74.06	48.13	25.91	9.27	0.00	
7	1% Nimbitor	76.20	44.44	22.22	0.00			
8	2% Nimbitor	83.33	68.52	44.44	23.07	0.00		
9	0.05% Edosulfan	100.00	83.33	74.06	48.13	11.11	0.00	

Table 4: The values of persistent toxicity (PT) and the order of relative efficacy (ORE) of some neem products in respect of fourth instar larvae of *Pyrilla purpusilla*.

	Treatment	Period (days) (P)	Average residual toxicity (T)	PT	ORE
1	1% Neem oil	3	52.28	156.84	7
2	2% Neem oil	4	46.30	185.18	5
3	1% Nimbecidine	4	41.21	164.83	6
4	2% Nimbecidine	4	51.84	207.37	4
5	1% Neemark	3	50.73	152.19	8
6	2% Neemark	5	48.47	242.37	2
7	1% Nimbitor	3	47.62	142.86	9
8	2% Nimbitor	4	54.84	219.36	3
9	0.05% Edosulfan	5	63.33	316.63	1

$$T = \frac{\text{Sum of per cent protection over control on different days}}{\text{Number of observations}}$$

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