

# Studies of Toxicity of Antifeedancy of Neem against *Aceria litchii* (Litchi mite) in Bihar (INDIA)

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**Abstract:** In Bihar Neem (*Azadirachta indica*) has been used to control disease and pests of plants and animals. Many anti-bacterial and anti-fungal agents has been detected from various parts of Neem. Investigations were carried out to study the toxicity of some neem (Natural products) like neem oil, Nimbecidine, Neemark and Nimbitor against *Aceria litchii* (Litchi mite). Non-insecticidal treatment has been tested for distruction and controlling of Litchi tree as well as Litchi fruit infestation. Non-insecticidal pest control measures appear to be in a positive way to check the menace of modern pesticides. Non-insecticidal treatment is eco-friendly and healthy for the yield production of Litchi fruits in Bihar.

**Keywords:** Toxicity, Nimbecidine, Nimbitor, Eco-friendly, *Aceria litchii*.

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## 1. INTRODUCTION

Litchi (*Litchi chinensis*,soon), belongs to the family sapindaceae, is an everygreen fruit tree, native to the state of Bihar. It is the most important commercial fruits which production of Bihar. The many species of insects pests have been reported about damage to litchi in state of Bihar. It is certain that the pest problem is one of the limiting factor's to bring litchi revolution in these litchi growing area of Bihar. Deficiencies in nutrients can affect fruit development in *A. litchii*, Joubert (1970). Calcium play an important role and distinct for fruits. Generally the fruits in Litchi and longan consist of two distinct phases : growth of the pericarp or skin and the seed followed by growth of the arial, or flesh (Kanwar et.al., 1972, Huang et.al. 1883, Huang 2001).

Among the different pests of Litchi a species of eriophyid mite knows as Litchi erineum mite. *Aceria litchii* (Keifar) is considered as the most important pest. The curling of leaves of Litchi, *Litchi chinensis* ,sonn. was first noticed in North Bihar in Raj Garden Darbhanga in 1912 by C.S. Mishra.

The scientific name of this eriophyid mite has been changes from Eriophyce litchi to *Aceria litchii* (Keifer). The mite was first reported by Mishra (1912). In India the mite is reported mostly from all litchi growing regions viz. Darbhanga, Pusa, Champaran, Ranchi, Agra, Varanasi, Lucknow, Bankipur, Jalpaiguri and Assam (Mishra, 1912; Fletcher, 1917; MC Sweney, 1920; Hayes, 1945). Fruit cracking is the major issue in litchi, but is less important longon. Cracking in the litchi is most common in China (Chen and Huang, 2001) and India (Mitra and Ghosh, 1991).

## 2. MATERIAL AND METHODS

The statistically designed experiments with three replications and ten treatments were laid out from April 2011 to July 2012 with the toxicity of some natural products, neem against the larva of *Aceria litchii*- Two tree 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 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 tree of these of three posts for assessment of toxicity. The larva of *Aceria litchii* were released in each petridish and exposed for 24 hours.

The procedure was repeated after 24 hours till feeding in treatment was observed similar to that of control. Per cent protection over control was calculated as per the method suggested by Babu and Beri (1969). The relative efficiency of each treatment was determined by Criterion developed by Saini (1959) and employed by samuthisrakilul and David (1990) for testing neem products. According to this criterion the product (T) of average residual toxicity (T) and the period (P) for which the toxicity persisted was used as an index of toxicity.

### 3. RESULTS AND DISCUSSION

#### Toxicity of neem products against Larva

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

**Table 1: Mean Per cent protection against Larva of *Aceria litchii* due to neem products at various intervals**

Treatment		Mean Per cent protection over control						
		Days per treatment						
SL.No.		1	2	3	4	5	6	7
1.	1% Neem Oil	71.38	51.00	38.51	7.25	0.00		
2.	2% Neem Oil	86.37	63.51	44.76	26.00	0.00		
3.	1% Nimbecidine	72.87	54.13	32.23	13.48	0.00		
4.	2% Nimbecidine	88.50	72.88	54.13	32.23	7.25	0.00	
5.	1% Neemark	82.25	63.51	38.51	19.76	0.00		
6.	2% Neemark	94.76	79.12	54.12	38.51	13.48	0.00	
7.	1% Nimbitor	80.02	50.34	33.73	8.75	0.00		
8.	2% Nimbitor	91.62	80.31	60.37	18.75	6.25	0.00	
9.	0.05% Edosulfan	100.00	93.00	81.21	56.23	33.73	13.48	0.00

**Table-2: The values of toxicity and the order of relative efficacy (ORE) of some products in respect of Larva of *Aceria litchi***

SL.No.	Treatment	Period (days) (P)	Average residual toxicity(T)	T	ORE
1.	1% Neem oil	4	42.04	165.12	9
2.	2% Neem oil	4	55.16	217.62	5
3.	1% Nimbecidine	4	43.18	169.69	8
4.	2% Nimbecidine	5	50.91	249.94	4
5.	1% Neemark	4	51.00	200.00	6
6.	2% Neemark	5	55.99	275.96	2
7.	1% Nimbitor	4	45.71	179.82	7
8.	2% Nimbitor	5	51.86	255.28	3
9.	0.05% endosulfan	6	61.41	363.41	1

It is evident that the protection offered against larva was 71.38 per cent in treatment with 1 per cent neem oil in samples drawn one day after treatment. The per cent protection declined to 7.25 on fourth day with zero protection on fifth day after treatment. The treatment with 2 per cent Neem oil offered maximum protection (86.37 per cent) when exposed to treated leaves one day after treatment and found to be effective upto fourth day after treatment. Similarly the treatment with 1 per cent Nimbecidine persisted up to fourth day. The per cent protection offered was 72.87 one day after application which declined to 13.48 per cent one day after application. The treatment offered protection upto fifty 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 are 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 endosulfan which reduced to 12.47 per cent on sixth day.

Based on Toxicity value 0.05 per cent endosulfan should highest PT value (362.40) followed by 2 per cent Neemark (274.95), 2 per cent Nimbitor (254.27), 2 per cent Nimbecidine (249.94), 2 per cent Neem oil (216.61), 1 per cent Neemark (20000), 1 per cent Nimbitor (178.81), 1 per cent Nimbecidine (168.68) and 1 per cent neem oil (164.11).

### Toxicity of neem products against larvae

The data recorded on mean per cent protection over control and toxicity. Values obtained are presented in Table 3 and 4.

It is evident the data protection against larva 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 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 and 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 where as 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 where as the treatment with 2 per cent Nimbitor offered protection up to fourth day.

Based on toxic values 0.05 per cent endosulfan showed the highest toxicity 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 larvae of *Aceria litchii* due to neem products at various intervals:**

SL.No.	Treatment	Period (days) (P)	Average residual toxicity(T)	T	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% Endosulfan	5	63.33	316.63	1

**Table 4: The value of Toxicity and the order of relative efficacy (ORE) of some neem products in respect of larvae of *Aceria litchii***

Treatment		Mean Per cent protection over control						
		Days per treatment						
SL.No.		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		

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

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