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Impact of certain biopesticides to manage leaf curl disease and its vectors in chilli

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ABSTRACT

A supervised field experiment was conducted in the chilli during *Rabi*, 2014-15 to study the impact of certain biopesticides in leaf curl disease and its vectors *viz*., thrips and mites. The treatments were application of Nanma @ 1 per cent (T_1), application of neem oil 0.15EC @ 0.3 per cent (T_2), application of Sonata @ 0.1 per cent (T_3), alternate spray of T_1, T_2 and T_3 (T_4) and untreated check (T_5). It was found that thrips and mites population was higher in untreated check (0.80 and 1.39, respectively) while a low population was recorded in the treatment with the alternate spray of T_1, T_2 and T_3 (0.10 and 0.16, respectively). Similarly lowest leaf curl index was recorded in alternate spray of T_1, T_2 and T_3 (T_4) (0.20) followed by application of neem oil 0.15EC @ 0.3 per cent (T_2) (0.21). It can be concluded that alternate spray of nanma @ 1 per cent, neem oil 0.15 EC @ 0.3 per cent, sonata @ 0.1 per cent can reduce leaf curl disease incidence in chilli.

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Chilli is one of the most important commercial crops of India. It is grown almost throughout the country. India is the world leader in chilli production followed by China and Pakistan (Anonymous, 2011). India is not only the largest producer but also the largest consumer of chilli in the world. chillies are the most common spice cultivated in India. India contributes about 36 per cent to the total world production. In India, chillies are grown in almost all the state throughout the country. Andhra Pradesh is the largest producer of chilli in India and contributes about 26 per cent to the total area under chilli, followed by Maharashtra (15 %), Karnataka (11 %), Orissa (11 %), Madhya Pradesh (7 %) and other states contributing nearly 22 per cent to the total area under chilli (Anonymous, 2012). This crop is attacked by a number of insects. Among them aphids (*Myzus persicae* S.), white fly (*Bemisia tabaci G.*) and thrips (*Scirtothrips dorsalis H.*) are the major which besides sucking the sap of the plant parts, also act as vectors of virus diseases like mosaic and leaf curl due to which the crop suffers heavy losses (Singh *et al.*, 1998).

Rapid increase in population and demand of food materials has initiated the large scale use of insecticides and pesticides resulting in harmful biomagnifications and infertility of soils. Indiscriminate use of these insecticides has led to insecticide resistance, pest resurgence, killing of beneficial insects and imbalance in the ecosystem (Sridhar *et al.*, 2014). Besides, the problem of pesticide residues in chilli fruits (Joia *et al.*, 2001) in the recent past has become the non-tariff barrier for export of chilli to developed countries. Hence, reduction of usage of toxic pesticide is need of the day. The present investigation was therefore carried out to evaluate the impact of certain biopesticides to manage leaf curl caused by thrips and mite.

A supervised field experiment was conducted during *Rabi*, 2014-15 at the adopted village namely Batapora of Krishi Vigyan Kendra, West Tripura. The soil of the experimental plots was loamy-sand in the texture with medium to low fertility status and acidic in nature. The experiment was laid out in a Randomized Block Design with three replications and five treatments. The crop was raised in the nursery and 25 day old seedlings were transplanted in the experimental field having a plot size of 3.6 × 2.7 sqm with 45 cm × 60 cm spacing. Standard agronomic practices were followed to grow the crop. The treatments include application of Nanma @ 1 per cent (T_1), application of neem oil 0.15EC @ 0.3 per cent (T_2), application of Sonata @ 0.1 per cent (T_3), alternate spray of T_1, T_2 and T_3 (T_4) and untreated check (T_5).

Incidence of the diseases was recorded by taking counts of twenty randomly selected and tagged plants leaving the borders seven days after imposing the treatment in the nursery as well as main field. Mosaic disease was scored on three young leaves of a twig on the tagged plants. In both the cases the number of the infected plants was transformed, jointly, to per cent infection. Vector population was also monitored. To study mite population five plants were selected randomly from each plot and tagged. The plants were again untagged after recording the thrips population to avoid observation from the same plant. Six leaves from each plant (two each from bottom, middle and top canopy) were plucked and kept in properly labelled polypropylene bag. Later, these selected leaves were examined under stereo-binocular microscope for counting the number of mites per leaf. To study the thrips population another five plants were selected randomly from each plot. A pot containing kerosinized water was placed under the selected plant and each twig was shaken gently, and thrips which fell on the water were noted down. The data obtained from the field experiments were analysed in a Randomized Block Design by 'F' test for significance as described by Panse and Sukhatme (1958). Critical difference values were calculated at 5 per cent probability level and the treatment mean values of the experiment were compared using Duncan's Multiple Range Test (DMRT) (Gomez and Gomez, 1984).

During *Rabi*, 2014-15, the impact of certain biopesticides on the population of thrips and mites in chilli was studied. It was found that alternate spray of T_1, T_2 and T_3 (T_4) (0.10) and application of neem oil 0.15 EC @ 0.3 per cent (T_2) (0.15) recorded significantly lower population of thrips compare to other treatments and significantly superior to untreated crop (0.80) (Table 1). Similarly treatment with alternate spray of T_1, T_2 and T_3 (T_4) (0.16) and application of neem oil 0.15 EC @ 0.3 per cent (T_2) (0.30) recorded lowest population of mites compared to untreated check (1.39). The unsprayed crop harboured significantly higher population of thrips and mites. Lowest leaf curl index was recorded in alternate spray of T_1, T_2 and T_3 (T_4) (0.20) followed by application of neem oil 0.15 EC @ 0.3 per cent (T_2) (0.21). Highest yield was recorded in the treatment with alternate spray of T_1, T_2 and T_3 (T_4) (5.11) which was on par with the application of neem oil 0.15 EC @ 0.3 per cent (T_2) (4.79).

The present findings revealed that, there was a lower population of thrips and mites in the treatment with the alternate spray of T_1, T_2 and T_3 (T_4) followed by application of neem oil 0.15 EC @ 0.3 per cent alone and other treatments. The results also showed a lower leaf curl index in alternate spray of T_1, T_2 and T_3 followed by application of neem oil 0.15EC @ 0.3 per

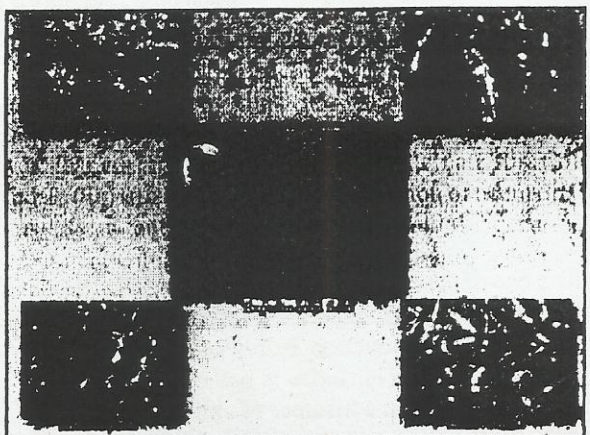

Fig. 1 : Experimental field and infested plant parts

Table 1 : Impact of certain bio-pesticides in leaf curl incidence and vectors population

Sr. No.	Treatments	Thrips population	Mites population	Leaf curl index	Dry chilli yield (q/ha)
1.	Application of Nanma @ 1 % (T_1)	0.40^{a} (1.191)	0.52^{bc} 1.231	0.52	3.71^{b}
2.	Application of neem oil 0.15EC @ 0.3 % (T_2)	0.15^{a} (1.050)	0.30^{ab} 1.141	0.21^{ab}	4.79^{a}
3.	Application of Sonata @ 0.1 % (T_3)	0.19^{a} (1.091)	0.49^{bc} 1.221	0.30^{b}	3.53^{ab}
4.	Alternate spray of T_1, T_2 and T_3 (T_4)	0.10^{a} (1.055)	0.16^{a} 1.018	0.20^{a}	5.11^{a}
5.	Untreated check (T_5)	0.80^{b} (1.343)	1.39^{d} 1.545	1.34^{c}	1.22^{c}
	S.E. ±	0.045	0.038	0.023	0.16
	C.D. (P=0.05)	0.148	0.117	0.071	0.54

In a coloum mean followed by a common letter are not significantly different by DMRT (P=0.05), Values in parentheses are $\sqrt{X+0.5}$ transformed values

cent alone. Hence, it was concluded that the application of all the three biopesticides have an impact on the population of thrips and mites. This finding is in accordance with the reports of several authors.

Application of *Vitex nigundo* L. 5 per cent (leaf extract) and NSKE 5 per cent recorded the lowest leaf curl index due to reduction in thrips and mites incidence (Sridhar *et al.*, 2014). Indigenous products *viz.*, NSKE (2.5 %) + GCK (0.5 %), NSKE (5 %) + cow urine (16.66 %) and GCK (1 %) + cow urine (16.66 %) recorded minimum leaf curl index by inflicting higher mortality of yellow mites (Reddy, 2003). Ahmed *et al.* (2001) reported that neem oil application @ 5 ml lt. 1 recorded 34.28 per cent reduction of chilli mite over control. Among integrated pest management strategies tried to combat insect pests of chilli, application of tobacco powder @ 100 kg ha^{-1} was found to be effective in controlling thrips incidence (Smitha, 2002).

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