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## **Efficacy of Certain Phytochemical Extracts And Acaricides Against Two Spotted Spider Mite, *Tetranychus urticae* (Koch) On Tomato**

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### **ABSTRACT**

Tomato, *Lycopersicon esculatum*.L. a vegetable of great significance, is widely grown in India. It is obvious that the quality and quantity of the tomato fruit was drastically reduced by various insect and non-insect pests. Among these pests, two spotted spider mite, *Tetranychus urticae* (Koch) cause heavy damage to the tomato crop. Study was carried out to evaluate the efficiency of certain botanical extracts and two acaricides against two spotted spider mite. Treatments includes the *Melia* leaf extract, *Vitex* leaf extract *Ocimum* leaf extract, *Leucas* leaf extract, *Mimosa* leaf extract, Dicofol and Fenazaquin were tested for its efficacy. The maximum mortality was recorded from Dicofol (80.2%), Fenazaquin (78.9%) followed by *Melia* (63.2%), *Vitex* leaf extract (60.4%) and *Leucas* leaf extract (60.3%).The *Ocimum* leaf extract shows moderate efficacy. The least was recorded in case of the *Mimosa* leaf extract (58.2%) against two spotted spider mite.

**Key words:** Two spotted spider mite, Phytochemical extracts and Acaricides.

### **INTRODUCTION**

Tomato, *Lycopersicon esculatum*.L. is an important annual commercial crop of India. Mite species belonging to the genus *Tetranychus* cause severe loss in the yield of tomato fruits. Among the mite pests, two spotted spider mite, *Tetranychus urticae* Koch cause severe damage on tomato crop. Feeding of spider mites resulted in white specks on leaves which later coalesce and produce white patches resulting in the reduction of photosynthetic activity.

Repeated use of insecticides at short intervals is uneconomical besides environmentally unsafe. Hence, it is imperative to search for an alternative safer chemicals or phytochemical pesticides that are economical and eco-friendly in nature. More over very meager work was reported on the effect of traditional bio-active compounds of plant origin in Tamil Nadu.

### **MATERIALS AND METHODS**

Field experiment was carried out to evaluate the efficacy of certain botanical extracts and two acaricides against two spotted spider mite on tomato crop. The treatments viz., *Melia* leaf extract 5 %, *Leucas* leaf extract 5 %, *Ocimum* leaf extract 5 %, *Vitex* leaf extract 5 %, *Mimosa* leaf extract 5 %, Dicofol 18.5 EC 2.5 ml/l and Fenazaquin 50 EC 2.5 ml/l. were tested for its efficacy and an untreated check was also maintained . The variety tested was PKM 1. The experiment was conducted in a randomized block design (RBD) with four replications. Two sprayings were given and spraying was done using high volume sprayer. Pre-treatment and post treatment observations on the motile stages of mite population on terminal, middle and bottom leaves of the plants on 3, 7, 10, and 14 days after spraying (DAT) using a 2 x 2 cm window hole template counting method. Yield data was recorded at each harvest. The data so obtained were converted to per cent reduction and analysed statistically using DMRT after angular transformation.

#### **Preparation of Phytochemical Extracts**

Methanol leaf extract was prepared using soxhlet extraction principle. The freshly collected leaves were washed thoroughly with running tap water then washed with distilled water and the excess water was drained and by means of the muslin cloth the excess moisture was removed, then the leaves were allowed to air dry or shade dry. The leaves must be completely dried without any trace of moisture, which was made into fine powder by means of a blender. Each leaf sample was extracted separately at 50°C for 8 hours in 300ml of the above solvent. Later the crude extract was then evaporated to obtain concentrated

slurry of about 10ml. The concentrated extract thus obtained was filtered through a sterilized Whatmann No.1 filter paper. The filtrate obtained was a pure native botanical extract from which we can prepare different required dose levels [1, 5, 2, 11].

## RESULTS AND DISCUSSION

The initial population of mites before first spraying ranged between 21.08 and 24.68 in the treatments. Among the botanical extracts, *Melia* leaf extract 5 % recorded 66.00, 64.50, 62.00, 59.00 per cent reduction in mite population after 3, 7, 10 and 14 DAT respectively. The *Vitex* leaf extract 5% registered a mean population reduction of 61.88 per cent over control after first round of spraying. Among the acaricides tested, Fenazaquin 10 EC 2.5 ml/l was significantly superior to all other treatments and effected 84.00, 82.00, 78.50 and 68.00 per cent reduction in mite population 3, 7, 10 and 14 DAT, respectively. This was followed by Dicofol 18.5 EC 2.5 ml/l (83.00, 81.00, 77.25, and 65.00) (Table 1).

**Table 1. Certain phytochemical extracts and acaricides against two spotted spider mite *Tetranychus urticae* on tomato**

Treatments	Pre count (Nos / 4 cm <sup>2</sup> )	Percent mortality of adult & nymphs*				Pooled mean
		Days after first spraying				
		3	7	10	14	
<i>Leucas</i> leaf extract 5 %	21.08	68.00 (55.55)	62.00 (51.94)	60.00 (50.77)	55.00 (47.87)	61.25 (51.50)
<i>Melia</i> leaf extract 5 %	20.21	66.00 (54.33)	64.50 (53.43)	62.00 (51.94)	59.00 (50.18)	62.88 (52.46)
<i>Mimosa</i> leaf extract 5 %	23.02	61.11 (51.42)	59.50 (50.48)	57.00 (49.02)	55.00 (47.87)	58.15 (49.69)
<i>Vitex</i> leaf extract 5 %	22.73	75.50 (60.33)	72.00 (58.05)	55.00 (47.87)	45.00 (42.13)	61.88 (51.87)
<i>Ocimum</i> leaf extract 5 %	24.68	67.00 (54.94)	61.00 (51.35)	59.60 (50.53)	50.00 (45.00)	59.40 (50.42)
Fenazaquin 10 EC 2.5 ml/l	22.97	84.00 (66.42)	82.00 (64.90)	78.50 (62.38)	68.00 (55.55)	78.13 (62.11)
Dicofol 18.5 EC 2.5 ml/l	23.30	83.00 (65.65)	81.00 (64.16)	77.25 (61.51)	65.00 (53.73)	76.56 (61.04)
C.D. (5 %)	NS	14.16	12.87	11.41	9.36	9.66

\*: Per cent reduction over control; Mean of four replications  
Figures in the parentheses are arc sine transformed values

**Table2. Certain phytochemical extracts and acaricides against two spotted spider mite, *Tetranychus urticae* on tomato**

Treatments	Percent mortality of adult & nymphs *					Yield (kgs/plot/10 pickings)	
	Days after second spraying				Pooled mean		Cumulative
	3	7	10	14			
<i>Ocimum</i> leaf extract 5 %	72.00 (58.05)	61.00 (51.35)	53.00 (46.72)	51.00 (45.57)	59.25 (50.33)	60.3	18.63 <sup>c</sup>
<i>Melia</i> leaf extract 5 %	74.00 (59.34)	72.00 (58.05)	60.00 (50.77)	48.00 (43.85)	63.50 (52.83)	63.2	20.74 <sup>b</sup>
<i>Mimosa</i> leaf extract 5 %	68.00 (55.55)	66.00 (54.33)	50.05 (45.03)	49.00 (44.43)	58.26 (49.76)	58.2	17.91 <sup>c</sup>
<i>Vitex</i> leaf extract 5 %	75.00 (60.00)	70.00 (56.79)	53.00 (46.72)	52.00 (46.15)	62.50 (52.24)	62.2	19.54 <sup>b</sup>
<i>Leucas</i> leaf extract 5 %	74.00 (59.34)	69.00 (56.17)	52.00 (46.15)	50.50 (45.29)	61.38 (51.57)	60.4	18.89 <sup>c</sup>
Fenazaquin 10 EC 2.5 ml/l	93.00 (74.66)	91.00 (72.54)	74.00 (59.34)	71.00 (57.42)	82.25 (65.08)	80.2	22.34 <sup>a</sup>
Dicofol 18.5 EC 2.5 ml/l	92.00 (73.57)	89.00 (70.63)	77.00 (61.34)	67.00 (54.94)	81.25 (64.34)	78.9	21.85 <sup>a</sup>
C.D. (5 %)	15.25	14.81	10.40	9.22	12.84		

\*: Per cent reduction over control; Mean of four replications  
Figures in the parentheses are arc sine transformed values  
Cumulative: cumulative percentage of 2 rounds

After second round of spraying, *Melia* leaf extract 5 % was also effective by recording 63.20 and *Vitex* leaf extract 5 % 62.20 per cent reduction after two rounds of spraying. EC Fenazaquin 10 EC 2.5 ml/l was the most effective treatment bringing about a mean of 82.25 per cent reduction of mites and which was

followed by Dicofol 18.5 EC 2.5 ml/l (81.25) The above doses registered a cumulative mean per cent reduction of 80.20 and 78.90 per cent respectively, after two sprayings.(Table 2).

Among the acaricides tested, Fenazaquin 10 EC 2.5 ml/l. recorded a maximum yield of 22.34 (kgs/10 pickings) of tomato fruits per plot which was followed by Dicofol 18.5EC (21.85) and *Melia* leaf extract 5 % (20.74). All the other treatments were on a par with each other (Table 2). Commercial acaricides viz., Fenazaquin10 EC and Dicofol 18.5 EC significantly reduced the mite population on tomato after two rounds of spraying with increased yield.

Szwejdá [10] reported that under high infestation pressure, acaricides including abamectin, and fenpropathrin gave excellent control of *T. cinnabarinus* on green house tomato and cucumber. In all cases more than 98 per cent mortality of the motile stages as obtained after 14 days of application which was in conformity with the current results. The overall mean mite population reduced significantly in the trees sprayed with three rounds of neem oil 3 per cent (50 %) followed by NSKE 5 per cent (48 %) as against coconut eriophyid mite. [7].

Singh and Singh [9] reported that spraying of dicofol (2 ml l<sup>-1</sup>) gave satisfactory control of *T. urticae*. Dhar *et al.* [4] reported spraying of fenazaquin 10 EC (Magister) at 2 ml l<sup>-1</sup> and 1 ml l<sup>-1</sup>, fenpropathrin 10 EC (Dannitol) at 1 ml l<sup>-1</sup> and 0.5 ml l<sup>-1</sup> and dicofol 18.5 EC (Colonel S) at 3 ml l<sup>-1</sup> were found to be the most effective treatments against the motile stages of red spider mite, *T. urticae*. The higher doses of new acaricides viz., diafenthiuron 50 SC, buprofezin, diafenthiuron 50 WP, fenazaquin and fenpyroximate significantly reduced the mite population on bhendi after two rounds of spraying [6]. *Chenopodium* sp, *Artemisia absinthium* and *Tanacetum vulgare* at higher concentration shows a marked reduction in the mite population was observed [2]. Hence, from the study the results revealed that the mite mortality was recorded as maximum in case of *Melia* leaf extract followed by *Vitex* leaf extract and *Leucas* leaf extract 5%.The *Ocimum* leaf extract shows moderate efficacy, whereas least mortality was recorded in case of *Mimosa* leaf extract against two spotted spider mite on tomato crop. Tomato being a vegetable crop application of phytochemical is advisable rather than the usage of acaricides under field condition.

This research is mainly dedicated to the peasant farmers who are not capable of utilizing the acaricides as a primary source of management practices against mite population. Hence focus to be given in future to identify the active principles which are responsible for the maximum efficacy of these bio active compounds.

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