

Efficacy of Some Plant Extracts on *Tetranychus urticae* Koch

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Abstract: Chemical acaricides caused several problems to different organisms and environment, natural control is now minimize pesticides. Laboratory experiments were conducted to evaluate the toxic effect of some plant extracts on the red spider mite *Tetranychu surticae* these extracts was lemon grass *Cymbogon citrates* (L.), menthol *Mentha piperita* L., Dafla *Nerium oleander* L. and Lantana (*Lantana salvifolia*). The extracts were applied at four concentration of each plant under laboratory conditions. Results obtained showed that The LC_{50} value for the extracts lemongrass, Lantana, Dafla (Oleander) and Menthol was 1803.7, 3494.4, 4622 and 5628.6 ppm respectively. The Lemongrass extract was the most efficient, followed by Lantana then Dafla while, the Menthol extract was the less efficiency against *T. urticae*. Meanwhile, if the concentrations increased, the total mortality also increased to all extracts. Therefor we supposed in pest management we could be used these extracts to solve environmental problems resulting from use of pesticides.

Key words: Efficacy • Concentrations • *Tetranychus urticae* • Lemongrass • Menthol oleander • Lantana

INTRODUCTION

Strawberry *Fragaria ananassa* Duch had many pests attacking it the red spider mite *Tetranychu surticae* Koch (Acari: Tetranychidae) is one of them, which is considered one of the most important pests of the Tetrancidi family [1]. The most common among the plant mites, infest field crops, vegetables and fruits it has a wide range of host plant [2-5]. The two spotted spider mite was also one of the dangerous pests all over the world, because they feed by piercing leaf tissue and drinking the fluids from the plant while, the ability to rapidly acquired resistance to pesticides is the greatest problem with this mite [6]. The use of pesticides has led to many negative effects, including the impact on the environmental and humans, in addition to the resistance of many pests to the action of pesticides. Which has prompted scientists to search for alternative ways to control pests and among these attempts is the use of plant extracts, in the hope of reaching effective preparations against these pests. It is very good alternative to synthetic pesticides as means to few negative impacts towards to health of human and the environment by Natural products [7]. Aromatic plants and their essential oils are considered one of the most efficient plants, as they obtained from continuous distillation of

herbs and medicinal plants [8]. These oils are harmless to humans and wildlife (with some exceptions) [9, 10]. Their activities are diverse they induce local toxicity and fumigant as well as repellent or ovicidal effects.

The present investigation amid to evaluate the toxic effect of some plant extracts against the red spider mite *T. urticae*.

MATERIALS AND METHODS

Rearing Mites: The female of *T. urticae* were collected from unsprayed strawberry plants and reared at $25 \pm 2^\circ\text{C}$ and $60 \pm 5\% \text{RH}$.

Preparation of Plant Extracts Lemongrass, Menthol, Dafla (Oleander) and Lantana: Lemongrass, Menthol, Dafla (Oleander) and Lantana leaves were dried at room temperature for one month and then dried with an electric grinder. The plants powder was soaked in a roughly a week in an equal mixture hexane, acetone and ethanol solvents proportion (1:1:1) before the flask was shaken and its contents were filtered. The solvents were then removed under decreased pressure and the crude extract was weighted and stored in a deep freezer until used.

Table 1: The scientific and English name and the parts used of the extracted plant

Scientific name	Family	English name	Part used
Cymbogon citrates	Gramineae	Lemongrass	Leaves
<i>Mentha piperita</i>	Lamiaceae	Menthol	Leaves
Nerium oleander	Apocynaceae	Oleander	Leaves
Lantana salvifolia	Verbenaceae	Lantana	Leaves

Preparing the Stock Solution the Tested Plant Extracts:

On the basis of the measured plant weight and the volume of the distilled water (w/v) convenient stock quantities of extract were made with tween 80(0.1%) as emulsifier. The stock concentrations were kept in glass bottles with stoppers and refrigerated store. These stock solutions were created on a regular basis. For each plant extract, four diluted concentrations were used to draw the LC-P lines. There were three replicates for each concentration.

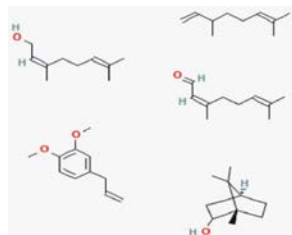
Toxicity Test: Adult females of *T. urticae* were used as test subject to determine the toxicity of lemongrass, Menthol, Dafla (Oleander) and Lantana. Forty newly emerged adult females were moved to the lower surface of castor leaf discs (2.5 cm diameter) were placed separately from one another on wet cotton roving in Petri dishes. There are four replicates and ten female of *T. urticae* individuals in each petri dish. Four different concentrations of each acaricide were sprayed on the individuals. Mortality was noted for 7 days following treatment. According to the Abbott's formula [11], the mortality % was calculated and adjusted. Using Finney [12]. Statistical method of approach LC₅₀ values were determined. Equation: Sun [13] was used to determine LC₅₀ index.

$$\text{Toxicity index for LC}_{50} = \frac{\text{LC}_{50} \text{ of the most effective compound}}{\text{LC}_{50} \text{ of the least effective compound}} \times 100$$

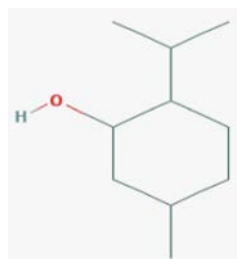
Chemical Constituents of Lemongrass, Menthol, Dafla (Oleander) and Lantana: The lemongrass extract is composed of several chemical compounds that had a strong effect in reducing the number of mites, but the most important and most efficiency in

The extract were geranial and Neral which represented 48.692 and 34.137% respectively.

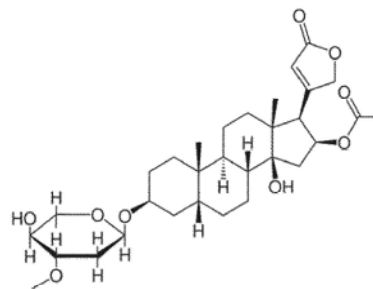
(1)-The chemical formula of lemongrass is C₅₁H₈₄O₅



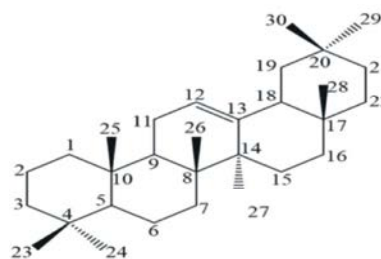
(2)-The chemical formula of Menthol is C₁₀H₂₀O.[14]



(3)-The chemical formula of Oleander is C₃₂H₄₈O₉



(4)-Chemical formula of Lantana is C₃₆H₅₄O₆



Results and Discussion

Toxicity Effect of the Treated Plant Extracts on *T. urticae*: When treating the mites with plant extracts, it became clear through the study the efficiency of only three extracts namely lemongrass, Lantana, Dafla (Oleander) compared to the commercial pesticide of plant origin Neem (Azadirachtin) against *T. urticae* in low concentrations. Total mortality increased for all extracts as concentration increased by determine extracts. By determining the value of the LC₅₀ and LC₉₀ it became clear that Lemongrass extract was the most efficient, followed by Lantana then Dafla while, the Menthol extract was the less efficiency (Table 2).

Table 2: Efficiency of some plant extracts against *T. urticae*

Treatments	Conc.	Corrected mortality%	LC ₅₀	LC ₉₀	Slope± S.D.	Toxicity index LC ₅₀	LC ₅₀ / LC ₉₀
Lemongrass	1000	35	1803.7	14137.5	1.4±0.18	100	7.8
	2000	57.5					
	5000	65					
	10000	90					
Menthol	1000	17.5	5628.6	42661.04	1.5±0.18	32.05	7.6
	2000	22.5					
	5000	40					
	10000	70					
Dafla	1000	25	4622	48716.3	1.3±0.17	39.02	10.5
	2000	30					
	5000	40					
	10000	75					
Lantana	1000	20	3494.4	20614.4	1.7±0.18	51.62	5.9
	2000	35					
	5000	52.5					
	10000	82.5					
Neem (Azadirachtin 3.2%) as control	500	55	471.58	2277.17	1.87±0.25	100	4.8
	1000	67.5					
	2000	90					
	5000	97.5					

Table 3: Corrected mortality percentage of the *T. urticae* femal adults treated with lemongrass, Lantana, Dafla (Oleander) and Menthol extracts under laboratory conditions (27±2°C and 65±5% RH)

Treatments	Conc. (ppm)	Mortality after treatments %				Total Mortality %
		One day	Three days	Five days	Seven days	
Lemongrass	1000	---	5	15	15	35
	2000	2.5	15	25	15	57.5
	5000	5	20	30	10	65
	10000	12.5	27.5	35	15	90
Menthol	1000	---	2.5	5	10	17.5
	2000	---	2.5	12.5	7.5	22.5
	5000	2.5	5	22.5	10	40
	10000	10	20	25	15	70
Dafla	1000	---	5	10	10	25
	2000	2.5	10	12.5	5	30
	5000	5	10	15	10	40
	10000	10	25	30	10	75
Lantana	1000	---	2.5	10	7.5	20
	2000	2.5	7.5	20	5	35
	5000	5	12.5	35	10	52.5
	10000	12.5	25	30	15	82.5
Neem (Azadirachtin 3.2%) ascontrol	500	5	20	25	5	55
	1000	7.5	30	12.5	7.5	67.5
	2000	10	40	30	10	90
	5000	17.5	45	30	5	97.5

The LC₅₀ value for the extracts lemongrass, Lantana, Dafla (Oleander) and Menthol were 1803.7, 3494.4, 4622 and 5628.6_{ppm} respectively. According to LC₅₀ and LC₉₀ values, using the lemongrass extract was more toxic than the other this results was agreement with Mead [15] who recorded that using the essential oil lemongrass

have LC₅₀ and LC₉₀ values in the spraying method was more toxic against *T. urticae* adults which registered (0.4313 and 2.6520 %, respectively).

The obtained results in Table (3) and in illustrated Fig. (1) showed that the total mortality percentage for lemongrass, Lantana, Dafla (Oleander) and Menthol

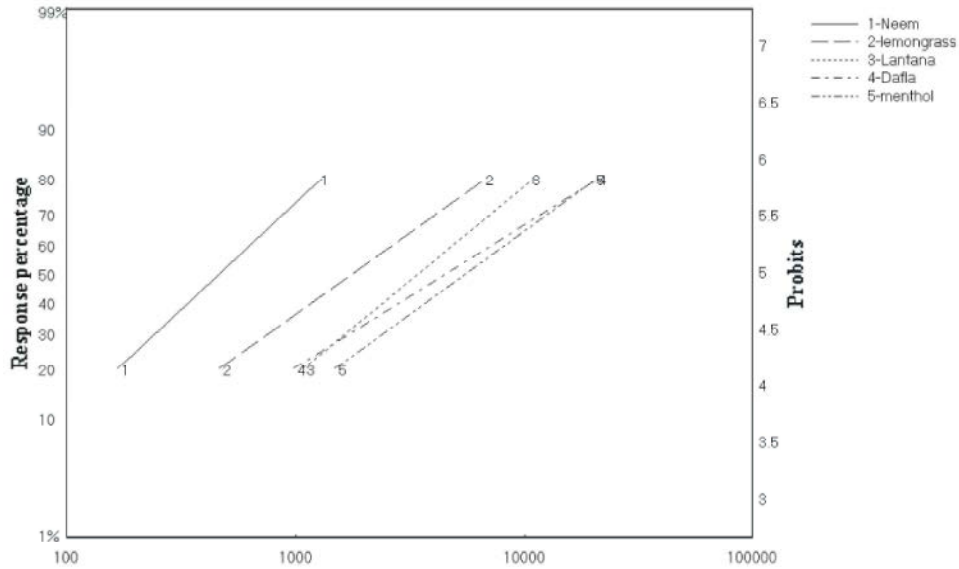


Fig. 1: LC-P line for Neem as a control, lemongrass, Lantana, Dafla (Oleander) and Menthol extract

extracts at concentration 1000_{ppm} were 35%, 20%, 25% and 17.5 % respectively at low concentrations while, in a high concentrations 10000_{ppm} were 90%, 82.5%, 75% and 70% respectively. This means that the extracts of lemongrass, Lantana, Dafla (Oleander) and Menthol had highly effect against *T. urticae* compared with commercial pesticide of plant origin Neem (Azadirachtin). The same result is registered of Zhejiang wanly College [16] it mentioned that the pesticide prepared by the oleander extract disclosed by the invention provides a more effective means for the biological pesticide for comprehensive treatment for the pest and disease damage; the oleander has high killing to sucking pest and it has simply and easily available materials and is a very excellent environmentally-friendly pesticide.

Lantana camara, *Tagetes manuta* and their combination extracts on cabbage plants reduced the number of aphids significantly than on the untreated plants during the trial seasons [17].

According to Bakr and Aziza, [18] Menthol was a natural occurring substance obtained from the peppermint plants acts as a pest deterrent for a variety of stored goods pests and alters the biological characteristics of the two spotted spider mite, *Tetranychus urticae*.

The extracts of lemongrass, Lantana, Dafla (Oleander) and Menthol were appeared to have a pest-controlling effect on *T. urticae* and as a result, they may be a good insecticide choice for Integrated Pest management programs. Therefore it was suggested that these extracts should be employed in synthetic insecticides pending additional investigation.

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