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Suppression of the Populaion of Two Spotted Spider Mite *Tetranychus urticae* (Koch) by Two Compost Tea Rice Straw and Farmyard Manure (Acari:Tetranychidae)

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ABSTRACT

Experiment was conducted in a greenhouse to study the effect of two compost rice straw and farmyard manure against the spider mite, *Tetranychus urticae* (Koch) by three different methods of application spray, (spray+ added) and added to soil. Data showed that the highest reduction percentages of *T. urticae* was obtained by (R.W) spray the plant and added to soil (87.46%), while (Fym) spray and (Fym)spray and added to soil were equal in the reduction mortality which were 83.7% and 82.4%, respectively. The lowest reduction was achieved by (R.W) added to soil(63.46%) . All treatments had significant differences in reducing *T. urticae* populations infesting on pepper between treatments and check after spraying.

INTRODUCTION

Spider mite, *Tetranychus urticae* Koch (Acari:Tetranychidae) is ubiquitous agricultural pest causing significant yield losses of many plant species . controlling of spider mites below the economic threshold level could be a achieved by chemical acaricides . However, excessive use of chemicals could lead to environmental pollution and intrinsic hazarders to human, plants and animal life's (Wilson 1993 and Wilson et al.,1991) . Also, the agriculture trash which burned leads to environmental pollution and that can be recovered by using compost. Therefore, a great concern has been given to use of ecofriendly alternative strategies such as compost tea (Arancon et al., 2003 and 2007, Edwards et al., 2007). Accordingly, the present study aims to focus on the possibility of using agricultural trash such as compost in controlling two-spotted spider mite, *T. urticae* in addition to their enhancement plant growth.

MATERIALS AND METHODS

Experiments was carried out to determine the effectiveness of liquid botanicals compost on the reproduction of *T. urticae* on *Phaseolus valgaris* L. plants under greenhouse conditions .

Rearing of *T. urticae*

Seeds of kidney been *P. valgaris* have been transplanted in pots (20 cm in diameter) and received all agricultural services . Three weeks after plantation, been plants were infested with spider mites, *T. urticae* . Plants were left for 60 days for mite population increase.

Source of compost

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Preparation of liquid botanical compost (compost tea):-

Preparation of each liquid compost from solid phase was undertaken at three stages according to Brinton et al. (1996) as follows .

1-Preparation stage: Botanical compost was blended with water in dilution ratio 1:5 (w\v) since 1kg of each solid compost was pot in a plastic tank and stocked into 5 liters of tap water.

2-Extraction stage: A mixture of compost was turned on aquarium pump, then soaked over 24 hours and stirred for 2 hours until the water turned into brown and extract had no smell.

3-Filtration stage: After brewing, the compost tea mixture was strained by the aid of cheese cloth into another buckt. Plant extracts were kept in open plastic flasks and analyzed for chemical compositions as shown in Table (1).

Table 1. chemical composition of the two compost tea.

Treatments	O.M%	C%	N%	C/N	P%	K%
Rice straw (R.S)	0.353	0.205	0.014	14.6	0.0029	0.0373
Farmyard manure(FYM)	0.321	0.187	0.011	17.0	0.0026	0.0352

Experimental Technique:-

Twenty five days old seedling of kidney been were infested by *T. urticae* and left for 15-20 days and received the agricultural practices. Five replicates were used for each treatment and control. Each replicate was represented by three plants. A hand sprayer was used to spray each of the tested by material where each replicate received about 20ml. Data of living mites was counted before treatment as well as 24,48,72,96, and 120 hours after application. Percentage of reduction was estimated and corrected according to the equation of Henderson and Tilton (1955) .

Statistical analysis

Data were subjected to analysis of variance program (ANOVA) (Gomez and Gomez, 1984) followed by Multiple Range Test to compare means (Duncan, 1955).

RESULTS AND DISCUSSION

Effectiveness of two compost tea on *T. urticae*:

The results showed that the effected of two tested compost tea (Fym) and (R.S) affected the reproduction of *T. urticae* on kidney been by three different methods of application, spray, added to soil and spray and compost added to soil under greenhouse conditions.

Data recorded in table (2) showed that the mean reduction in population of *T. urticae* decreased the mean individual from 16.06 to 0.33 , 0.26,0.66 and 0.00 mites 48, 72, 96, and 120 days after treatment with abamectine respectively. After that, the mean number of *T. urticae* decreased from 13.06 to 0.93 after 120 dayes after using $(R.S)_2$.

In the treatment of $(R.S)_2$ and $(R.S)_1$ mean number of *T. urticae* decreased from 9.53 to 2.73 and 14.46 to 7.93 mites after 120 days respectively. Among

all treatments, mean reduction found cause significant decrease *T. urticae* when compared to check. Arancan et al. (2007) showed that the effect of solid vermicompost on arthropod pests can suppress spider mites, mealy bugs and aphids populations in the field.

Data in table (3) showed that most mean reduction mite population was achieved by abamectin from 16 to 0.26 , 0.66 and 0.00 mites 72, 96, and 120 days after treatment, respectively. After the mean number of *T. urticae* was decreased from 13.46to 3.86, 2.93 and 2.86 after 72, 96 and 120 days using $(Fym)_2$. However, the least mean reduction was recorded with ($Fym)_3$ from 18.4 to 8.2, 12.06 and 5.06 after 72, 96 and 120 days respectively. Edwards et al., (2000) used three soil application rates of vermicompost tea 5, 10, and 20% to decrease spider mites . All three soil applications of vermicompost tea significantly decreased the amounts of damage caused by spider mites compared with the water control .

Data in table (4) showed that the highest mean of reduction was recorded using $(R.W)_2$ (87.46%) compared with abamectin (98.86 %) where as each treatment of $(Fym)_1$ was equal in the redaction mortality which were 83.7% and 82.4 % respectively .the lowest redaction of mortality was showed using $(R.W)_3$, $(Fym)_3$ and $(R.W)_1$ 75.68%, 69.42% and 63.46%, respectively. However, Arancon et al., (2007) found that the suppression of aphids and spider mites by vermicompost tea were very similar to those obtained from growing plants in the greenhouse .

However, the present investigation indicated that compost tea treatments of three different method of (Fym) and (R.W) has obviously impact on total phenol as compared with check. Nevertheless, percentages of carbohydrates, nitrogen and crude protein were influenced in response to screened compost teas (Figs 1and 2).

Table 2. Rice straw applied by three different methods under greenhouse condition .

Treatment	Before spraying	After spraying				
		24 hours	48 hours	72 hours	96 hours	120 hours
$(R.W)_1$	14.46 b ±1.06	7.13 b ±0.78	7.60 b ±0.78	10.46 b ±0.67	8.86 b ±1.75	7.93 b ±0.61
(R.W)	13.06 b ±1.20	4.2 c ±0.42	7.26 b ±0.57	1.13 d ±0.42	0.93 c ±0.40	0.93 c ±0.33
$(R.W)_3$	9.53 c ±0.79	6.86 b ±0.81	5.73 b ±0.97	4.13 c ±0.83	1.4 c ±0.36	2.73 c ±1.97
Abamectin	16.06 b ±1.01	1.06 d ±0.31	0.33 c ±0.18	0.26 d ±0.11	0.06 c ±0.06	0 c
Check	21.86 a ±1.12	93.73 a ±1.70	41.93 a ±1.32	43.8 a ±1.49	30.46 a ±2.37	28.86 a ±1.53
LSD	2.69	2.66	2.41	2.38	3.78	3.27
F	18.52	279.74	378.07	464.35	91.71	106.93
P	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Values followed by the same letter (s) in a column are not significantly different according to Duncan's test at level 0.05.
(R.W) = Rice straw $(R.W)_{1=}$ spray $(R.W)_{2=}$spray+ addition $(R.W)_{3=}$ addition

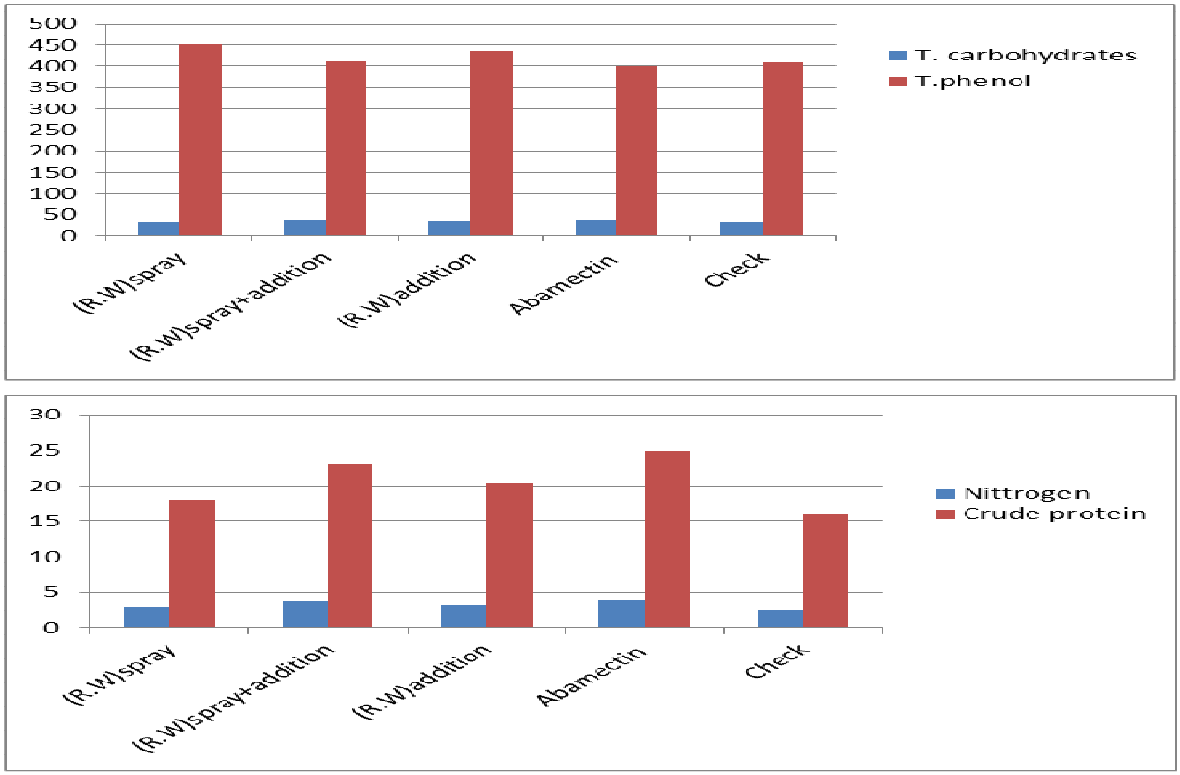
Table 3. Farmyard manure applied by three different methods under greenhouse condition .

Treatment	Before spraying	After spraying				
		24 hours	48 hours	72 hours	96 hours	120 hours
(FYM)	15.4 bc±0.90	5.13 d±0.60	5.2 bc ±0.76	2.93 c ±0.46	3.06 c ±0.77	4.06 b ± 0.72
(FYM)	13.46 c ±1.01	7.93 c ±0.49	3.93 c ±0.36	3.86 c ±0.32	2.93 c ±0.55	2.86 b ±0.35
(FYM)	18.4 b ±1.05	14.2 b ±0.86	6.46 b ±0.63	8.2 b ±0.78	12.06 b ±1.20	5.06 b ±0.70
Abamectin	16.06 bc ±1.01	1.06 e ±0.31	0.33 d ±0.18	0.26 d ±0.11	0.66 c ±0.06	0 c
Check	21.86 a ±1.70	39.73 a ±1.70	41.93 a ±1.32	43.8 a ±1.49	30.46 a ±2.37	28.86 a ±1.53
LSD	2.88	2.63	2.13	2.25	3.56	2.36
F	9.9	270.3	512.10	515.07	96.70	196.23
P	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Values followed by the same letter (s) in a column are not significantly different according to Duncan's test at level 0.05
(FYM) = Farmyard manure $(FYM)_{1=}$ spray $(FYM)_{2=}$spray+ addition $(FYM)_{3=}$ addition

Table 4. Average percentage of mortality in spider mite population traded with rice straw and farmyard manure after different interval for application.

Treatment	24 hours	48 hours	72 hours	96 hours	120 hours	General mean Redaction%
$(Fym)_1$	79.7	82.8	90.6	85.6	79.8	83.7
$(Fym)_2$	64.1	84.4	85.5	94.9	83.1	82.4
$(Fym)_3$	53.5	82.9	77.1	55.1	78.5	69.42
$(R.W)_1$	68.1	74.03	63.1	54.9	57.2	63.46
$(R.W)_2$	81.01	71.2	95.8	94.9	94.5	87.48
$(R.W)_3$	55.4	67.1	77.9	88.9	89.1	75.68
Abamectin	96.6	98.9	99.1	99.7	100	98.86



A **B**

Fig. 1. Chemical constituents in leaves of kidney bean infested with *T. urticae* as influenced by the three different methods of compost tea (R.W) .

A= Total carbohydrates and Total phenol; B= Nitrogen and Crude protein

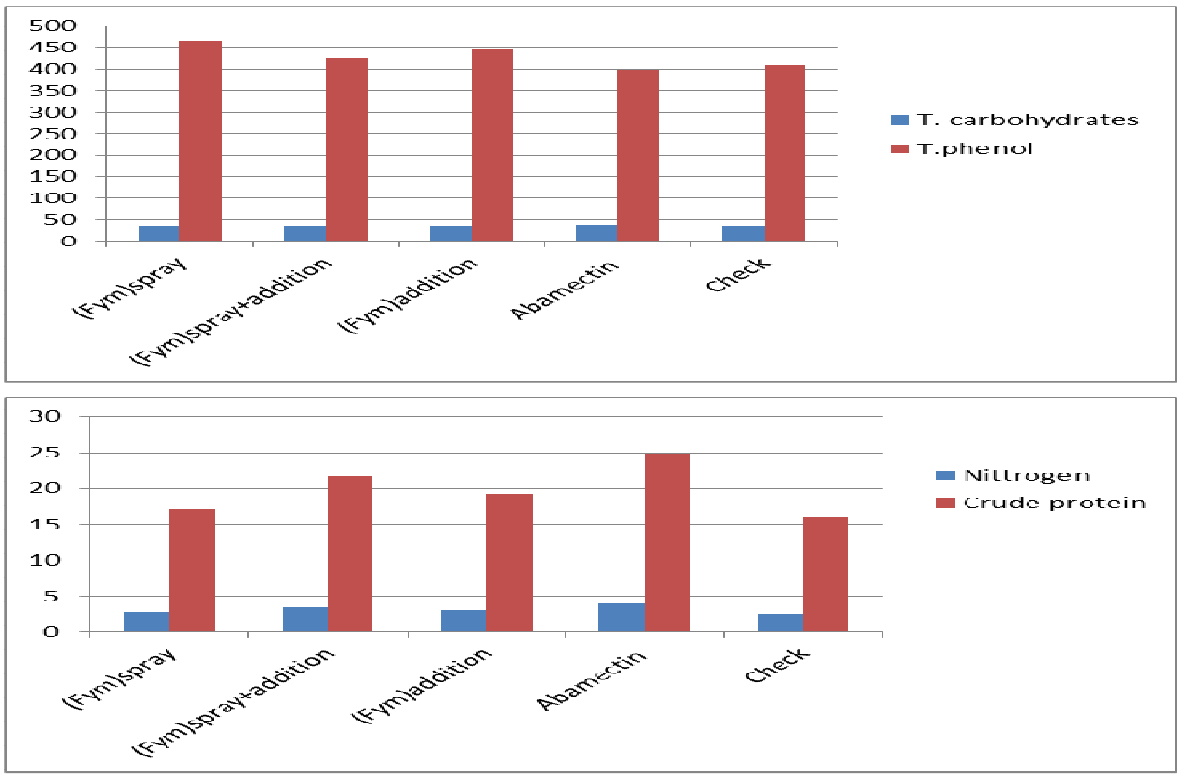


Fig. 2. Chemical constituents in leaves of kidney bean infested with *T. urticae* as influenced by the three different methods of compost tea (Fym) .

A= Total carbohydrates and Total phenol; B= Nitrogen and Crude protein

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خفض تعداد العنكبوت الاحمر باستخدام نوعين من شاى الكمبوست (كمبوست قش الارز و كمبوست المزرعة) .

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اجريت هذه التجربة لتقيم تاثير نوعين من شاى الكمبوست وهما كمبوست قش الارز وكمبوست المزرعة ضد العنكبوت الاحمر عند استخدامهما بثلاث طرق مختلفة وهى الرش على النبات و الرش والاضافة معا والاضافة لتربة فقط . واظهرت النتائج ان اعلى نسبة خفض للعنكبوت الاحمر تحققت باستخدام شاى الكمبوست لقش الارز رشا على النبات مع الاضافة لتربة وكانت ٨٧.٤٦% بينما المعاملة بشاى كمبوست المزرعة رشا على النبات والمعاملة بالرش والاضافة معا كانت متساويا تقريبا فى نسبة الخفض ٨٣.٧% و٨٢.٤% على التوالى . بينما المعاملة باستخدام شاى الكمبوست لقش الارز اضافة لتربة كانت اقل نسبة خفض للعنكبوت الاحمر حيث كانت ٦٣.٤٦% . من ناحية اخرى كانت هناك اختلافات معنوية واضحة على تعداد العنكبوت الاحمر على نبات الفاصوليا ما بين المعاملات والكنترول .