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EFFICACY OF CERTAIN PHYTOCHEMICAL OILS AND ACARICIDES ON THE REPELLENCY PROPERTY AGAINST TWO SPOTTED SPIDER MITE, *TETRANYCHUS URTICAE* (KOCH) ON GREENGRAM, *VIGNA RADIATA* L.

V. Sathyaseelan[1], M. Senthil Kumar[2] M. Pazhanisamy[3] and V. Baskaran*

[1]Associate Professor, Asst. Professors of Entomology, Faculty of Agriculture, Annamalai University
*Asst. Professor in Agricultural Entomology, Institute of Agriculture, Trichy, TNAU.
osathyamagri@gmail.com

Abstract

Greengram, *Vigna radiata* L. a protein rich pulse crop of greater importance, is widely grown in India. Greengram is cultivated throughout the year both under irrigated and rainfed conditions. It is obvious that the quality and quantity of the greengram was drastically reduced by various insect and non-insect pests. Among these pests, two spotted spider mite, *Tetranychus utricae* (Koch) also cause heavy damage to the greengram crop. Study was carried out to evaluate the efficacy of various phytochemical oils and two acaricides against two spotted spider mite on greengram. Treatments includes the neem oil, pungam oil, mahua oil, pinnai oil, mustard oil, dicofol 18.5% EC and propargite 57% EC were tested for its efficacy. As the maximum mite repellency was recorded in case of propargite (87.27%) and dicofol (81.92%) followed by neem oil, (72.35%). The pungam oil (68.42%) and pinnai oil (67.83%) shows on par results with each other. Mahua oil recorded a moderate efficacy against mite. The least was recorded in case of the mustard oil (54.21%) against two spotted spider mite after 48 hours of release. The phytochemical oils are the economically cheaper and environmentally safer with effective mite management

Keywords **:** Two spotted spider mite, Phytochemical oils and Acaricides.

Introduction

Green gram, *Vigna radiata* L. is an important annual commercial crop of India. Mite species belonging to the genus Tetranychus cause severe loss in the yield of green gram. Among the mite pests, two spotted spider mite, *Tetranychus urticae* Koch cause severe damage on green gram 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 was reported by Ebadollahi *et al*. (2017).

Injudicious application 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 essential oils containing bio-active compounds of plant origin in Tamil Nadu.

Materials and Methods

Leaf disc bioassay technique

The bio efficacy of the certain potent essential oils against *T. urticae* was done on the excised green gram leaf disc. For this purpose leaf disc were used from fresh greengram leaf. The leaf is checked under stereo binocular microscope for mite and other insect. The fresh leaf discs were dipped in the following treatments like the neem oil, pungam oil, mahua oil, pinnai oil, mustard oil, dicofol 18.5% EC and propargite 57% EC and an untreated check for 15 min after which it was allowed to dry for 5 min at room temperature. Then the leaves were kept on a wet cotton pad in a petridish (10 cm diameter and 1.5 cm in width). The petridish brim was smeared with petrogel or vaseline and firmly bind with rubber band to avoid the escape of test mite, *T. urticae*. The petridish were placed inside a glass box with wood frame of appropriate size to prevent disturbance due to air circulation in the laboratory at room temperature (25 ± 2°C) and >80% relative humidity. The laboratory reared adult female two spotted spider mite, *T. urticae* were transferred to each petridish with the help of a fine camel hair brush. The doses of potent essential oils were serially diluted with water. Each petridish was examined under a stereo binocular microscope for 1, 3, 6, 9, 12, 24 and 48 hours after treatment, the repellency property of two spotted spider mite was recorded by the movement of mites from the treated leaf discs. This experiment was conducted as per the procedure followed by Sathyaseelan and Baskaran (2016). The respective treatments were replicated thrice; observations on the mite repellency were recorded at different intervals and were subjected to ANOVA to infer about the differences among the treatments.

Results and Discussion

The bio efficacy of the certain potent essential oils against the repellency of two spotted spider mite, *T. urticae* on green gram by using leaf disc method under laboratory condition. The results revealed that the phytochemical oils showed a significant variation in the repellent effect against mite was observed at 1, 6, 12, 24 and 48 hours after treatment (Table 1).

The maximum mite repellency was recorded in case of propargite 57% EC (26.67%) followed by dicofol 18.5% EC (23.33%) and neem oil (20.00%). The pungam oil (16.67%) and mahua oil shows on par results, whereas the pinnai oil (10.00%) recorded a moderate efficacy against mite. The least was recorded in the mustard oil (6.67%) against two spotted spider mite after three hours of release.

A similar trend was observed in the mite repellency during 6 and 9 hours after treatment. The maximum mite

repellency was recorded in case of propargite 57% EC (56.67%) followed by dicofol 18.5% EC (53.33%). The neem oil (51.33%) and pungam oil (50.00%) shows on par results, whereas the mahua oil (40.00%) and pinnai oil (36.67%%) recorded a moderate efficacy against mite. The least was recorded in the mustard oil (27.67%) against two spotted spider mite after 12 hours of release.

The maximum mite repellency was recorded in case of propargite 57% EC (84.33%) followed by dicofol 18.5% EC (76.67%). The neem oil (73.33%) and pungam oil (66.67%) shows on par results, whereas the mahua oil and pinnai oil (53.33%) recorded a moderate efficacy against mite. The least was recorded in the mustard oil (46.67%) against two spotted spider mite after 48 hours of release.

Overall mean results indicated that the The maximum mite repellency was recorded in case of propargite 57% EC (45.24%) followed by dicofol 18.5% EC (44.29%).The neem oil (39.52%) and pungam oil (37.14%) shows on par results, whereas the mahua oil and pinnai oil (27.67%)recorded a moderate efficacy against mite. The least was recorded in the mustard oil (27.29%) against two spotted spider mite release on green gram leaves.

Previous findings demonstrated that the extract of neem and tulasi leaves have insecticidal properties due to the presence of triterpene, sesquiterpene, esters and strong antioxidant components such as flavonoids were reported by Esmaeily *et al*. (2017). This was in occurdance with the findings of Premalatha *et al*. (2016).

The crops sprayed with fractions of essential oils at regular intervals were very effective and recorded maximum repellency of two spotted spider mite under laboratory condition was reported by Heikal (2012). Similar results was obtained with foliar spray of neem oil 3%, NSKE 5% and *Ocimum sanctum* leaf extract 5% recorded the highest reduction of yellow mite was reported by Eswara Reddy and Dolma (2017). This was in line with the findings of Mar *et al.* (2018); Sathyaseelan and Baskaran, (2016); Kheradmand *et al*. (2015) and Laborda *et al*. (2013).

Green gram being a vegetable crop application of phytochemical oils 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 these phytochemicals, which are economically cheaper, environmentally safer cum eco friendly pest management tool.

Table 1 : Bio efficacy of certain Phytochemical oils and acaricides on the repellency property against two spotted spider mite, *Tetranychus urticae* on green gram by leaf disc method.

Sl. No	Treatment	Conc. %	No.of mite/ Replication	Per cent mite repellency							
				1hr	3hr	6hr	9 hr	12 hr	24 hr	48 hr	Mean
T1	Mustard oil	3	10	3.33 (10.52)	6.67 (14.96)	13.33 (21.42)	26.67 (31.09)	27.67 (31.73)	43.33 (41.17)	46.67 (43.09)	27.29 (31.49)
T2	Pungum oil	3	10	6.67 (14.96)	16.67 (24.09)	26.67 (31.09)	36.67 (37.27)	50.00 (45.00)	56.67 (48.83)	66.67 (54.74)	37.14 (37.55)
T3	Mahua oil	3	10	6.67 (14.96)	13.33 (21.42)	16.67 (24.09)	26.67 (31.09)	40.00 (39.23)	46.67 (43.09)	56.67 (48.83)	28.10 (32.01)
T4	Pinnai oil	3	10	6.67 (14.96)	10.00 (18.43)	13.33 (21.42)	20.00 (26.57)	36.67 (37.27)	50.00 (45.00)	53.33 (46.91)	27.62 (31.70)
T5	Proporgite	2ml/l	10	13.33 (21.42)	26.67 (31.09	33.33 (35.26)	46.67 (43.09)	56.67 (48.83)	66.67 (54.74)	84.33 (66.82)	45.24 (42.27)
T6	Dicofol	2.5ml/l	10	10.00 (18.43)	23.33 (28.88)	30.00 (33.21)	40.00 (39.23)	53.33 (46.91)	66.67 (54.74)	76.67 (61.12)	44.29 (41.72)
T7	Neem oil	3	10	6.67 (14.96)	20.00 (26.57)	30.00 (33.21)	40.00 (39.23)	51.33 (45.98)	60.00 (50.77)	73.33 (58.91)	39.52 (38.95)
T8	Control	-	10	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
SEd=				6.82	5.46	6.67	6.14	6.07	4.85	5.71	5.89
CD(p=0.05)				14.56	11.37	13.78	12.63	12.56	9.91	11.83	12.42

Mean of three replications
Figures in parentheses are arcsine transformed values

References

Ebadollahi, A.; Sendi, J.J.; Maroufpoor, M. and Nasrabadi, M.R. (2017). Acaricidal Potentials of the Terpene- rich Essential Oils of Two Iranian Eucalyptus Species against *Tetranychus urticae* Koch. Journal of Oleo Science, 66(3): 307-314.

Esmaeily, M.; Bandani, A.; Zibaee, I.; Sharifian, I. and Zare, S. (2017). Sublethal effects of *Artemisia annua* L. and *Rosmarinus officinalis* L. essential oils on life table parameters of *Tetranychus urticae* (Acari: Tetranychidae). Persian Journal Acarology, 6(1): 39–52.

Eswara Reddy, S.G. and Dolma, S.K. (2017). Acaricidal activities of essential oils against two spotted spider mite, *Tetranychus urticae* Koch. Toxin Reviews, Early Online: 1–5.

Heikal, H.M.M.; Abd-Elhady, H.K. and Edrees, N.O. (2012). Composition and acaricidal activities of *Lavandula officinalis* essential oil against *Tetranychus urticae* (Acari: Tetranychidae). Minufiya J. Agric. Res., 37(1): 221 – 230.

Kheradmand, K.; Beynaghi, S.; Asgari, S. and Garjan, A.S. (2015). Toxicity and repellency effects of three plant essential oils against two-spotted spider mite, *Tetranychus urticae* (Acari: Tetranychidae) . J. Agr. Sci. Tech, 17: 1223-1232.

Laborda, R.; Manzano, I.; Gamon, M.; Gavidia, I.; Bermudez, P.P. and Boluda, R. (2013). Effects of *Rosmarinus officinalis* and *Salvia officinalis* essential oils on *Tetranychus urticae* Koch (Acari: Tetranychidae). Industrial Crops and Products, 48: 106–110.

Mar, J.M.; Silva, L.S.; Azevedo, S.G.; Franca, L.P.; Goes, A.F.F.; Santos, A.L.; Bezerra, J.A.; Nunomura, R.C.S.; Machado, M.B. and Sanches, E.A. (2018). *Lippia origanoides* essential oil: An efficient alternative to control *Aedes aegypti*, *Tetranychus urticae* and *Cerataphis lataniae*. Industrial Crops and Products, 111: 292–297.

Premalatha, K.; Chinniah, C.; Ravikumar, A.; Parthiban, P. and Kalyanasundaram, M. (2016). Evaluation of essential plant oils against two spotted spider mite, *Tetranychus urticae* on Tomato. Ann. Pl. Protec. Sci., 25(1): 6-11.

Sathyaseelan, V. and Baskaran, V. (2016). Phytochemicals – An Economically cheaper pesticide. In : Dynamics of Agrarian Transformation in Rural India, (Eds.) Prabhakar, C. and K. Sita Devi, Manivasgar pathipagam, Chidambaram. 225-227.