



EFFICACY OF CERTAIN NATIVE BOTANICAL EXTRACTS AGAINST TWO SPOTTED SPIDER MITE, *TETRANYCHUS URTICAE* (KOCH) ON HORSE GRAM.

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Abstract

Horse gram, *Macrotyloma uniflorum* L. a highly proteinous pulse crop of greater importance, is widely grown in India. Horse gram is cultivated throughout the year both under irrigated and rainfed conditions. It is obvious that the quality and quantity of the horse gram was drastically reduced by various insect and non-insect pests. Among these pests, two spotted spider mite, *Tetranychus urticae* (Koch) also cause heavy damage to the horse gram crop. Study was carried out to evaluate the efficacy of various native botanical extracts and two acaricides against two spotted spider mite on horse gram. Treatments includes the *Andrographis* leaf extract, *Pongamia* leaf extract, *Eucalyptus* leaf extract, *Vitex* leaf extract, *Lawsonia* leaf extract, Dicofol and Proporgite, an untreated check were tested for its efficacy against mite. The mite mortality was recorded as maximum in case of dicofol and proporgite followed by the *Acalypha* and *Vitex* leaf extracts. As maximum mite mortality was recorded in case of Proporgite (81.06%) and Dicofol (79.58%) followed by *Andrographis* leaf extract (63.27%). *Vitex* leaf extract (60.72%) and *Pongamia* leaf extract (60.58%) recorded on par efficacy against mite. *Eucalyptus* leaf extract shows moderate efficacy against mite. The least was recorded in case of the *Lawsonia* leaf extract (48.31%) against two spotted spider mite after 48 hours of release.

Key words: Two spotted spider mite, Native Botanical extracts and Mortality.

Introduction

Horsegram, *Macrotyloma uniflorum* L. is an important annual commercial crop of India. Mite species belonging to the genus *Tetranychus* cause severe loss in the yield of horse gram. Among the mite pests, two spotted spider mite, *Tetranychus urticae* Koch cause severe damage on horse 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 native botanical extracts containing bio-active compounds of plant origin in Tamil Nadu.

Materials and methods

Leaf dip bioassay technique

The Bio efficacy of the certain potent native botanical extracts against *T. urticae* was done on the horse gram leaf. The leaf is checked under stereo binocular microscope for mite and other insect. The fresh leaves were dipped in the following treatments like *Andrographis* leaf extract, *Pongamia* leaf extract, *Eucalyptus* leaf extract, *Vitex* leaf extract, *Lawsonia* leaf extract, Dicofol and Proporgite, an untreated check were tested for its efficacy against mite. The dipped leaves were kept for 15 min after which it was allowed to dry for 5 min at room temperature. Then the leaves

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were kept on a wet cotton pad in a Petri dish (10 cm diameter and 1.5 cm in width). The Petri dish brim was smeared with vaseline and firmly bind with rubber band to avoid the escape of test mite, *T. urticae*. The Petri dish 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 Petri dish with the help of a fine camel hair brush. The doses of potent native botanical extract were serially diluted with water. Each Petri dish was examined under a stereo binocular microscope for 1, 6, 12, 24 and 48 hours after treatment. The mortality of two spotted spider mite was recorded by the arrest or non movement of mites by touch it with the camel hair brush. This experiment was conducted as per the procedure followed by Sathyaseelan *et al.*, (2019).The respective treatments were replicated thrice; observations on the mite mortality 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 native botanical extracts against the mortality of two spotted spider mite, *T. urticae* on horse gram by using leaf dip method under laboratory condition. The results revealed that the native botanical extracts showed a significant variation in the mortality against mite was observed at 1, 6, 12, 24 and 48 hours after treatment (Table 1).

The maximum mite mortality was recorded in case of Proporgite (71.00%) and Dicofol (67.00%) followed by *Andrographis* leaf extract (26.57%). *Vitex* leaf extract (24.09%) and *Pongamia* leaf extract (21.42%) recorded on par efficacy against mite. *Eucalyptus* leaf extract shows moderate efficacy against mite. The least was recorded in case of the *Lawsonia* leaf extract (14.96%) against two spotted spider mite after one hour of release.

A similar trend was observed in the mite mortality during 6, 12 and 24 hours after treatment. The maximum mite mortality was recorded in case of Proporgite (68.00%) and Dicofol (66.00%) followed by *Andrographis* leaf extract (65.00%). *Vitex* leaf extract (61.88%) and *Pongamia* leaf extract (60.00%) recorded on par efficacy against mite. *Eucalyptus* leaf extract (55.00%) shows moderate efficacy against mite. The least was recorded in case of the *Lawsonia* leaf extract (43.33%) against two spotted spider mite after 48 hours of release.

Overall mean results indicated that the maximum mite mortality was recorded in case of Proporgite (78.13%) and Dicofol (76.56%) followed by *Andrographis* leaf extract (50.00%). *Vitex* leaf extract (43.04%) and *Pongamia* leaf extract (39.33%) recorded on par efficacy against mite. *Eucalyptus* leaf extract (35.43%) shows moderate efficacy against mite. The least was recorded in case of the *Lawsonia* leaf extract (27.39%) against two spotted spider mite on horse gram leaves. Previous findings demonstrated that the extract of neem and tulasi leaves have insecticidal properties due to the

Table 1. Bio efficacy of certain native botanical extracts on the mortality of two spotted spider mite, *T.urticae* on horse gram by using leaf dip method.

Sl. No.	Treatment	Conc. %	No.of mite/ Replication	Per cent mite mortality					Mean
				1hr	6hrs	12 hrs	24 hrs	48 hrs	
T1	<i>Pongamia</i> leaf extract	5	25	21.42 (13.33)	35.26(33.33)	40.00(39.23)	50.00(45.00)	60.00(50.77)	39.33(36.17)
T2	<i>Vitex</i> leaf extract	5	25	24.09 (16.67)	37.27 (36.67)	46.67(43.09)	53.33(46.91)	61.88(51.87)	43.04(40.09)
T3	<i>Andrographis</i> leaf extract	5	25	26.57(20.00)	40.00(39.23)	53.33(46.91)	58.15(49.69)	65.00(53.73)	50.00(45.00)
T4	Proporgite	2.5 ml/l	25	71.00(57.42)	78.13(62.11)	82.00(64.90)	78.50(62.38)	68.00(55.55)	78.13(62.11)
T5	Dicofol	2.5 ml/l	25	67.00(54.94)	76.56(61.04)	81.00(64.16)	77.25(61.51)	66.00(54.33)	76.56(61.04)
T6	<i>Lawsonia</i> leaf extract	5	25	14.96(6.67)	20.00(16.67)	25.33(23.85)	33.33(35.26)	43.33(41.17)	27.39(24.33)
T7	<i>Eucalyptus</i> leaf extract	5	25	20.00(16.67)	23.57(20.09)	35.26(33.33)	43.33(41.17)	55.00(47.87)	35.43(33.52)
T8	Control	-	25	0.00(0.00)	0.00(0.00)	0.00(0.00)	0.00(0.00)	0.00(0.00)	0.00(0.00)
S.Ed =				7.62	5.92	6.46	6.62	5.80	5.97
CD(p=0.05)				14.94	11.24	12.87	13.41	11.21	11.95

*Mean of three replications.
 *Figures in the parentheses are arc sine transformed values.

presence of triterpene, sesquiterpene, esters and strong antioxidant components such as flavonoids were reported by Esmaeily *et al.*, (2017). This was in accordance 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 mortality of two spotted spider mite under laboratory condition was reported by Heikal (2012). Similar results were 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 *et al.*, (2019), Kheradmand *et al.*, (2015) and Laborda *et al.*, (2013).

Horse gram being a legume crop application of phytochemicals is advisable rather than the usage of acaricides under field condition. This research is mainly dedicated to the poor 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 present in the native botanical extracts, which are economically cheaper, environmentally safer cum eco friendly pest management tool.

References

- Ebadollahi, A., J.J. Sendi, M. Maroufpoor and M. R. Nasrabadi (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., A. Bandani, I. Zibae, I. Sharifian and S. Zare (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 S.K. Dolma (2017). Acaricidal activities of essential oils against two spotted spider mite, *Tetranychus urticae* Koch. *Toxin Reviews*, Early Online: 1–5. DOI: 10.1080/15569543.2017.1320805.
- Heikal, H.M.M., H.K. Abd-Elhady and N.O. Edrees (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., S. Beynaghi, S. Asgari and A.S. Garjan (2015). Toxicity and mortality effects of three plant essential oils against two-spotted spider mite, *Tetranychus urticae* (Acari: Tetranychidae). *J. Agr. Sci. Tech.*, **17**: 1223-1232.
- Laborda, R., I. Manzano, M. Gamon, I. Gavidia, P.P. Bermudez and R. Boluda (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., L.S. Silva, S.G. Azevedo, L.P. Franca, A.F.F. Goes, A.L. Santos, J.A. Bezerra, R.C.S. Nunomura, M.B. Machado and E.A. Sanches (2018). *Lippia organoides* essential oil: An efficient alternative to control *Aedes aegypti*, *Tetranychus urticae* and *Cerataphis lataniae*. *Industrial Crops and Products*, **111**: 292–297.
- Premalatha, K., C. Chinniah, A. Ravikumar, P. Parthiban and M. Kalyanasundaram (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., M. Senthilkumar and M. Pazhanisamy (2019). Mortality property of certain botanical extracts and acaricides against two spotted spider mite, *Tetranychus urticae* on redgram, *Cajanus cajan* L. *Plant Archives*, **19(1)**: 1341-43.