Journal of Entomology and Zoology Studies

Available online at www.entomoljournal.com

E-ISSN: 2320-7078
P-ISSN: 2349-6800
www.entomoljournal.com
JEZS 2022; 10(6): 143-145

Received: 01-08-2022
Accepted: 05-10-2022

Arun Kumar KM
Department of Entomology, University of Agricultural Sciences, GKVK, Bangalore, Karnataka, India

N Srinivasa
Department of Entomology, University of Agricultural Sciences, GKVK, Bangalore, Karnataka, India

Honnakerappa S Ballari
Department of Entomology, University of Agricultural Sciences, GKVK, Bangalore, Karnataka, India

Corresponding Author:
Arun Kumar KM
Department of Entomology, University of Agricultural Sciences, GKVK, Bangalore, Karnataka, India

Impact of feeding activity of yellow mite, *Polyphagotarsonemus latus* (Banks) on moisture content of mulberry leaf

Arun Kumar KM, N Srinivasa and Honnakerappa S Ballari

DOI: https://doi.org/10.22271/j.ento.2022.v10.i6b.9111

Abstract
Impact of feeding activity of yellow mite, *Polyphagotarsonemus latus* (Banks) on moisture content of mulberry leaf was studied through leaf moisture content analysis of mite infested and healthy leaves of five popular mulberry varieties *viz.*, V -1, Mysore local, M -5, Vishwa/DD and Tr – 10 at UAS, GKVK, Bangalore. The leaf moisture content in the healthy leaves of different mulberry varieties ranged from 68.45% to 80.67% and 28.17% to 37.55% in mite infested leaves. It was observed that the damage caused by yellow mite on mulberry resulted in loss in the moisture content of the leaves. The percent leaf moisture content in different varieties varied from 68.45 to 80.05% in the healthy leaves and 29.63 to 37.55% in mite infested leaves. The maximum loss in the leaf moisture content was 62.99% in the mulberry variety V- 1 (from 80.05% to 29.63%) followed by 60.01% in Mysore local (from 74.10% to 29.63%), 58.85% in Tr – 10 (68.45 to 28.17%), 53.45% in M -5 (80.67 to 37.55%). Lowest reduction in leaf moisture content recorded was 48.19% in variety Vishwa/DD (70.90 to 36.73%).

Keywords: Mulberry, leaf moisture, yellow mite, *Polyphagotarsonemus latus*

Introduction
Mulberry (*Morus* spp.) is a fast growing, deciduous woody tree species of Moraceae family with perennial nature and origin in Himalayan foot hills of India and China (Soo-ho *et al.*, 1990; Vijayan, 2010; Khan *et al.*, 2013; Yuan and Zhao, 2017; Rohela *et al.*, 2020) [6, 7, 4, 8, 5]. Moraceae, also known as the mulberry or fig family, is a family of flowering plants of more than twenty-four species with one subspecies and at the minimum hundred identified varieties. The term Morus is derived from the Latin word 'mora, which means delay, most likely because of the slow development of its buds. It is an economical and widespread woody plant and has an enormous economic value other than sericulture leading to its several unique and special features. *Morus alba* (white mulberry), *Morus nigra* (black mulberry) and *Morus rubra* (red mulberry) are all commonly accepted worldwide species of genus Morus as they exhibit maximum medicinal properties. Amongst all the species, *M. alba* is a dominant species (Ercisli and Orhan, 2007) [2]. The yellow mite, *Polyphagotarsonemus latus* (Banks) usually attacks on the ventral surface of small terminal tender leaves and on the medium sized younger leaves. Female lays the eggs on the ventral surface of leaves. The tiny yellow mite colonizes and feeds on the ventral surface of leaf and when their population attains maximum they may come to the upper surface of leaves even and cause severe distortion. The nymphs and adult mites are cell feeders and use their delicate stylet like chelicerae for piercing and sucking the cell content from the epidermal layer of the young leaves causing leaf margins to curl and effect on the leaf moisture content of the leaves and becomes brittle, shrivelled, cupped, curled, dwarfed, thickened and puckered. Internodes may be short, giving plants a stunted or tufted appearance and the mite injects toxins even during their feeding (Karmakar, 1995) [3].

Materials and Methods
Impact of feeding activity of yellow mite, *Polyphagotarsonemus latus* (Banks) on moisture content of mulberry leaf was studied through leaf moisture content analysis of mite infested and healthy leaves of five popular mulberry varieties *viz.*, V -1, Mysore local, M -5, Vishwa/DD and Tr – 10, which were planted and maintained in the experimental block of Department of Sericulture at GKVK, Bengaluru.

Mite free mulberry plants were maintained by spraying the plants with acaricide *viz*., dicofol.

Estimation of leaf moisture content (Sun *et al*., 2019) [9]

Leaf moisture content and moisture retention capacity were determined on fresh weight basis. At maturity, 25 leaves were harvested separately for each variety from a longest shoot. Leaves were wiped with a muslin cloth to remove dirt particles and fresh weight was recorded immediately. Then leaves were kept room temperature (26 °C ± 1 °C temperature; 70% ± 5% relative humidity) for 6 hours. After 6 hours of harvest, leaves were weighed for calculating water retention capacity. Then leaves were dried in hot air oven at 80 °C for 48 hours till constant weight was attained and dry weight was recorded. Leaf moisture content of tender, medium and coarse leaves was calculated separately by using following formula and expressed in percentage (%) (Garnier and Laurent, 1994; Bower and Danson, 2004) [10, 11].

$$\text{Leaf moisture content (\%)} = \frac{\text{Fresh weight of leaves (g) - Dry weight of leaves (g)}}{\text{Fresh weight of leaves (g)}} X100$$

Statistical analysis

The data from the leaf moisture content of mulberry leaves of both mite-infested and mite-free leaves were analysed statistically following Analysis of Variance Technique (ANOVA) for Completely Randomized Design (CRD) and the results were interpreted at 5% level of significance.

Results

The data pertaining to the leaf moisture content in both healthy and mite infested leaves are shown in Table 1. The leaf moisture content in the healthy leaves of different mulberry varieties ranged from 68.45% to 80.67% and 28.17% to 37.55% in mite infested leaves. It was observed that the damage caused by yellow mite on mulberry resulted in loss in the moisture content of the leaves. The percent leaf moisture content in different varieties varied from 68.45 to 80.05% in the healthy leaves and 29.63 to 37.55% in mite infested leaves. The maximum loss in the leaf moisture content was 62.99% in the mulberry variety V- 1 (from 80.05% to 29.63%) followed by 60.01% in Mysore local (from 74.10% to 29.63%), 58.85% in Tr–10 (68.45 to 28.17%), 53.45% in M -5 (80.67 to 37.55%). Lowest reduction in leaf moisture content recorded was 48.19% in variety Vishwa/DD (70.90 to 36.73%) (Fig. 1). Thus in all the varieties of mulberry, there was a reduction in leaf moisture content due infestation of yellow mite, *Polyphagotarsonemus latus* (Banks) on mulberry. This makes leaf to curl, brittle and makes the silk worms unpalatable and get ignored by the worms to feed on the leaves. As a result, the infestation yellow mites directly effect on sericulture industry as it makes the rearing of silk worms difficult.

Table 1: Leaf moisture content in selected mulberry varieties *vis-a–vis* infestation of yellow mite, *Polyphagotarsonemus latus* (Banks)

Mulberry varieties	Leaf moisture content (%)		Reduction in leaf moisture content (%)
	Mite-free leaves	Mite-infested leaves	
V -1	80.05	29.63	62.99
Mysore local	74.10	29.63	60.01
M -5	80.67	37.55	53.45
Vishwa/DD	70.90	36.73	48.19
Tr – 10	68.45	28.17	58.85
F test	*	*	-
SEM ±	0.98	0.64	-
C.D. @ P=0.05	3.09	2.02	-

* Significant at P=0.05

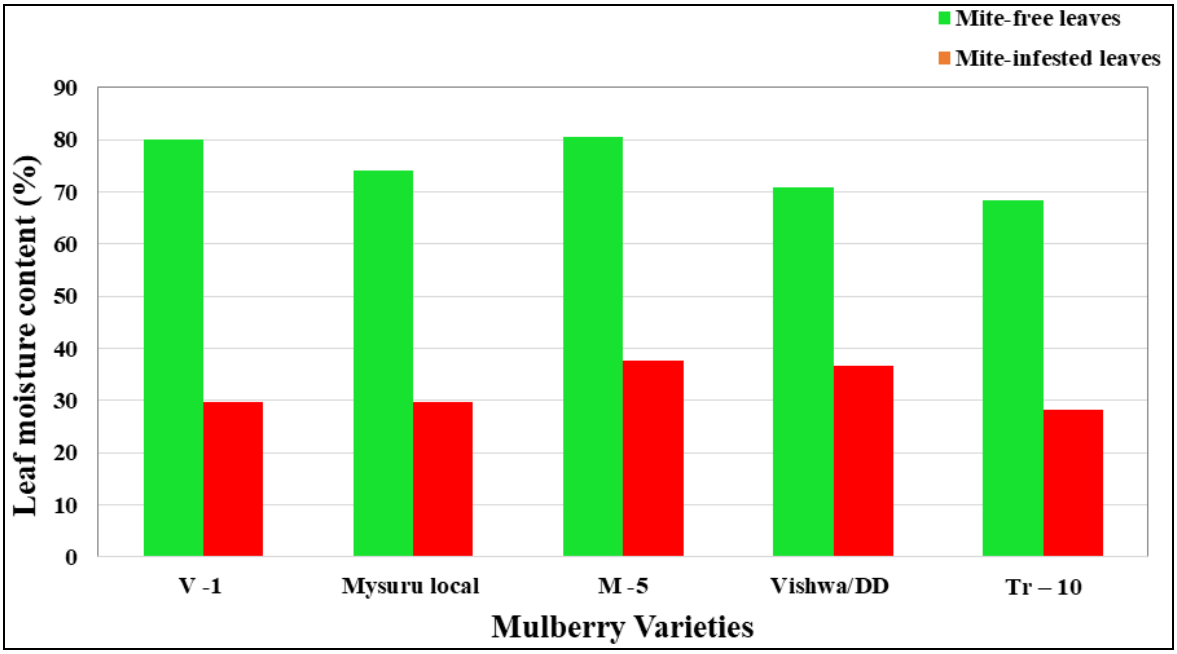

Fig 1: Leaf moisture content in selected mulberry varieties *vis-a–vis* infestation of yellow mite, *Polyphagotarsonemus latus* (Banks)

Discussion

Abou-Awad *et al.* (2016) [12] studied the effect the broad mite feeding on apical leaves of sweet pepper (*Capsicum annuum* L.) and found that increase in the population of mites (from 5.2 to 14.9 /leaf) was accompanied with 56.3% decrease in fresh weight and 49.2% decrease in dry weight of apical leaves. In the present study on mulberry leave, broad mite infestation accounted for decrease in the leaf moisture content to the extent of 56.70%.

Conclusion

Yellow mite feeding removes the moisture content of mulberry leaves. Eventually, such infested or damaged mulberry leaves might not be preferred by silk worms for feeding. Thus, it is inferred that yellow mite infestation and feeding damage adversely affected the nutritional quality of mulberry leaves by reducing the quantity of leaf moisture and interfere with leaf consumption by mulberry silkworms.

Acknowledgments

The authors acknowledge the Head, Department of Agricultural Entomology, College of Agriculture, Bengaluru, University of Agricultural Sciences, GKVK, Bangalore, Karnataka state India, for proving the laboratory facilities for the experiment, my guides and co-guides for their support and guidelines in conducting the experiment.

References

1. Cloyd RA. Broad Mite and Cyclamen Mite: Management in Greenhouses and Nurseries, Kansas State University, Pest Technol. 2010;4(1):14-18.
2. Ercisli S, Orhan E. Chemical composition of white (*Morus alba*), red (*Morus rubra*) and black (Morus nigra) mulberry fruits. Food Chem. 2007;103:1380-1384.
3. Karmakar K, Comparative symptomology of chilli leaf curl disease and biology of tarsonemid mite, *Polyphagotarsonemus latus* (Banks) (Acari: Tarsonemidae). Annals of Entomology. 1995;13:65-70.
4. Khan MA, Rahman AA, Islam S, Khandokhar P, Parvin S, Islam MB, *et al*. A comparative study on the antioxidant activity of methanolic extracts from different parts of *Morus alba* L. (Moraceae). BMC Res. Notes. 2013;6:24.
5. Rohela GK, Phanikanth J, Mir MY, Aftab AS, Pawan S, Sadanandam A, Kamili AN. Indirect regeneration and genetic fidelity analysis of acclimated plantlets through SCoT and ISSR markers in *Morus alba* L. cv. *Chinese* white. Biotech. Rep. 2020;25:313-321.
6. Soo-Ho L, Young-Taek K, Sang-Poong L, In-Jun R, Jungsung L, Byung-Ho L. Sericulture Training Manual. FAO, Roma, p. 117 FAO Agric. Services Bulletin. No; c1990. p. 80.
7. Vijayan K. The emerging role of genomic tools in mulberry (*Morus* spp.) genetic improvement. Tree Genet. Genomes. 2010;6:613-625.
8. Yuan Q, Zhao L. The Mulberry (*Morus alba* L.) Fruit-A review of characteristic components and health benefits. J. Agric. Food Chem. 2017;65:10383-10394.
9. Zhu X, Wu T, Ji L, Li C, Wang T, Wen S, Gao S, Shi X, Luo Y, Peng Q, Sun X. Ambient electro hydrogenation of N 2 for NH 3 synthesis on non-metal boron phosphide nanoparticles: the critical role of P in boosting the catalytic activity. Journal of Materials Chemistry A. 2019;7(27):16117-16121.
10. Garnier E, Laurent G. Leaf anatomy, specific mass and water content in congeneric annual and perennial grass species. New Phytologist. 1994 Dec;128(4):725-736.
11. Danson FM, Bowyer P. Estimating live fuel moisture content from remotely sensed reflectance. Remote Sensing of Environment. 2004 Aug 30;92(3):309-921.
12. Abou-Awad BA, Alazzazy MM, Afia SI. Biology of Aculops guajavae, a new species (Acari: Eriophyidae) infesting guava trees. International Journal of Chem Tech Research. 2016;9(12):108-13.