



## New Plant Parasite (Arachnida: Acari) discovered from Sub Himalayan Region of India.

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**Abstract :** Eryphyoid mites are exclusively plant parasites. They are highly specialized group of plant feeding mite both from biologically as well as morphologically. They show marked host specificity. During the periodic surveys for these mites in the present study area, a new species, *Diptilomiopus lanneas* sp. nov. of the family Diptilomiopidae of class Arachnida is found along the ventral surface of the leaves of *Lannea coromandelica* Merr. (Anacardiaceae), commonly known as 'Indian ash tree'. This plant is popular for medicinal use. Various parts are traditionally employed to treat conditions like heart disease, inflammation, ulcers, and skin problems. The new species of the mite causes damage to the leaves of this beneficial plant by its phytophagy habits. This new mite species is examined and studied thoroughly from the taxonomic point of view and described with proper illustrations from the specimens collected at northern district in West Bengal, India (Latitude: 24°50'40" N and Longitude: 87°55'50" E). A comparative study of this mite is done with other already recorded species and it is found as new to Science. So the new species is named following the rules of International Code of Zoological Nomenclature and type specimens are registered in ZooBank account. The nature of damage caused to the host plant and the relationship of mite with its host is mentioned in this article. Taxonomic description of this new mite from this area may be helpful for the agronomists, horticulturist and entomologist of plant protection department in India and abroad.

**Keywords** – New species, parasitic mite, *Diptilomiopus lanneas*, taxonomy, *lannea coromandelica*, India.

### I. INTRODUCTION

Arthropods belonging to class Arachnida of order Acari comprising ticks and mites, form one of the largest and biologically most diverse group. Eriophyoids of the family Diptilomiopidae are entirely phytophagous and seek micro environments in which they live, feed and reproduce (Jeppson *et al.*, 1975, Shukla, 2021, Vervaeke, 2021). These mites are interesting to the Biologists in terms of their morphological and biological specializations. Due to their obligatory parasitic mode of nutrition they exhibit marked host specificity. The great diversity of this tiny plant feeder is related to their extreme host specificity and intimate host relationships (Oldfield, 2010, Abdel-Khalek & Momen, 2022; Brown *et al.*, 2021). During feeding they inject saliva to the plant tissues that affects plants in various ways. They cause mechanical damage by their tiny oral and are also known to transmit viruses to the plant body (Druciarek *et al.*, 2019; Sarwar, 2020; Stephan *et al.*, 2008). Keifer *et al.* (1982) provided an elaborated account of plant abnormalities caused by eriophyoid mites in North America. A survey is conducted for these mites in sub Himalayan plains of India during the months of August and September, 2024. A detailed systematic study of the collection made on *Lannea coromandelica* yields a new mite species of the genus *Diptilomiopus* Nalepa, 1916 (see Nalepa 1916) from this region of India. *Lannea coromandelica*, known as the Indian ash tree, is a tropical tree native to Southeast Asia and the Pacific Islands, thrives in humid tropical and subtropical areas growing up to 2 metres in a single growing season with distinctive leaves. (Fig.2A) It has ornamental and medicinal uses, with its bark and root powder used for cough, asthma, and chest pain. (Ghugre 2024, Hamilton 2004) The West African communities use these species as food additives and in pharmaceuticals. The slightly acidic fruits are used in culinary to make sweets and puddings. *L. coromandelica* is acknowledged as one of the pivotal herbs in the biosphere because of its anti-inflammatory, anti-oxidant, and anti-diabetic properties [Galanki *et al.* 2014, Muhaisen HM 2013, Hossain *et al.*, 2018, Imam MZ, Moniruzzaman 2014, M Islam, MT, Tahara S, 2000).

As of February 2025, according to working Catalogue of the Eriophyoidea of the World-Version 1.0 -The catalogue of the Eriophyidae (Joel Hallan ;biocat@ccms.net), altogether 104 valid species of *Diptilomiopus* are known (Craemer *et al.*, 2017; Sur *et al.*, 2018; Amrine : personal communication, Amrine and Stasny 1994, Amrine *et al.*, 2003, Yan-mei yuan and Xiao-Feng Xue 2019, Chakrabarti *et al.*, 2019). So far 9 species of *Diptilomiopus* have been described on plants of the family Moraceae and 5 species on Anacardiaceae (Chakrabarti *et al.*, 2019) from India. One new species is added to the list from this type locality. The registration of the new species is done in Zoo-Bank Account. *Diptilomiopus lanneas* Sarkar, In Press

LSIDurn:lsid:zoobank.org:act:23D9EA03-48C5-4AC1-BBE5-BE0BACB5D6DC

### II. MATERIALS AND METHODS

After collection from the field the mite infested leaves are brought to the laboratory. The leaves are well examined under stereomicroscope. Under stereomicroscope, the mites are picked up from the leaves with the help of a needle and placed onto a

grooved slide containing Kono's medium (Jepsion *et al.*, 1975). The slide is then heated on a hot plate at a temperature of 35° C to clear the mites. Mites are then mounted in Hoyer's medium. The composition of Kono's mixture is Glycerin 10 g, water 50ml, cholral hydrate 100 g, concentrated HCl 1 ml. The specimens are observed under a Letiz Dialux 20 microscope with provision for phase illumination. Camera lucida line drawings are prepared (Lillo *et al.*, 2010, Amrine *et al.*, 2003) using a built in draw tube type prism camera Lucida attached to the microscope. The morphological terminologies and abbreviations used here are given by Lindquist (1996) and the generic classification system followed is that of Amrine *et al.* (2003). All measurements are taken at (10 x 100X) magnification and strictly under phase contrast microscope as described by Amrine and Manson (1996) and de Lillo *et al.* (2010) and are given in micrometres ( $\mu\text{m}$ ). The important taxonomic characters of the specimen that are measured are: width and length of the body, length and width of prodorsal shield, length of gnathosoma, length of legs, length of epigynum length of different seta. Measurements of the holotype are followed by the range of measurements of the paratypes given in brackets. All type specimens are now deposited in the collection of the Entomology Research Unit, Department of Zoology, Serampore College of Calcutta University in India. After publication, holotypes and paratypes will be deposited in the National Zoological Collection, Zoological Survey of India in Kolkata.

### III. RESULTS AND DISCUSSION

Based on taxonomic analysis and differential diagnosis with the earlier recorded species of this genus reveals this mite species as a new to Science. The etymology of the new name of the species is strictly followed the Rules of International Code of Zoological Nomenclature. Registration of new species in ZooBank is done and approved by ICZN. The LSID of New species is

#### 3.1 Description of Parent Genus: *Diptilomiopus Nalepa 1916*

Body is robust, spindle shaped. Gnathosoma and chelicerae large and set at perpendicular or strongly recurved in between the leg I. Prodorsal shield wider than long, without frontal lobe, scapular tubercles and setae usually absent, in some species scapular tubercles without seta may be present. Legs with distinct genu or fused with femur, genual seta absent; only tarsal setae present on legs; tarsal empodium deeply divided. Coxae I may or may not be separated, with less prominent sternal line; 1b tubercles absent; opisthosoma sub circular in cross section with 1 to 3 ridges just behind the prodorsal shield; seta *c2* missing, often tubercles present; epigynum may be smooth or provided with longitudinal ribs or lines and granules or tubercles; internal apodeme normal in length.

Type species: *Diptilomiopus javanicus* Nalepa, 1916.

#### 3.2 Description of new species : *Diptilomiopus lanneas* sp. nov.

Female (n= 54 , 1 hootype and 53 paratpes) : Body (Fig. 1A) 205.3 (177.3-205.3) long, 80.2 (79.3-82.1) wide, robust, fusiform with 4 ridges and 3 grooves running up to two-third of the body length, reddish in colour. Gnathosoma 23.3 (22.4-23.3) long, curved down, dorsal pedipalp genual seta *d* 1.8 (1.8-2.3) long, sub apical pedipulp tarsal seta *v* 3.7 (3.4-3.7) long,

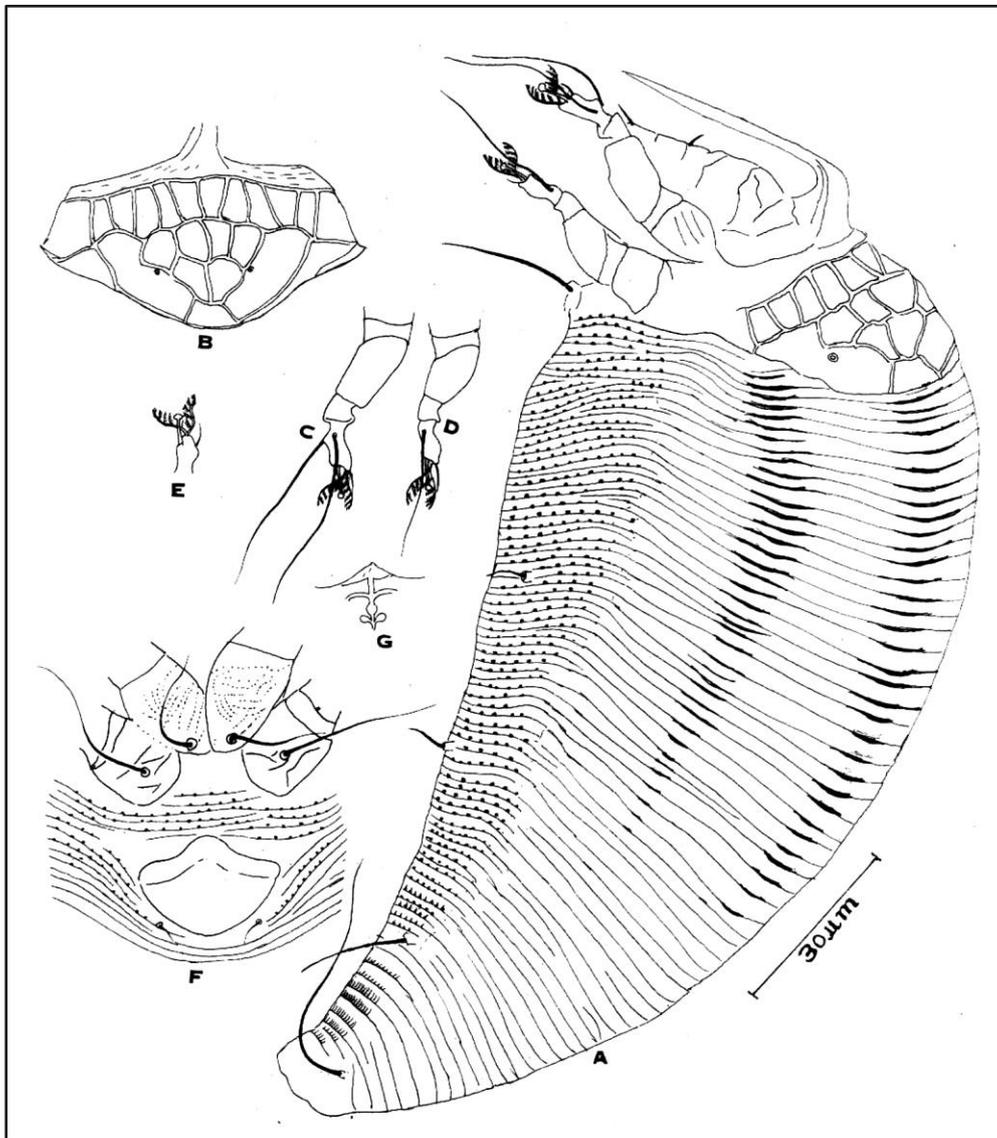
Prodorsal shield (Fig. 1B) 32.6 (31.7-32.6) long , 57.8 (56.0-57.8) wide with a very narrow shield lobe; prodorsal shield design present complete network of cells, median line completely bisect the central cell and absent in posterior most cell, admedian and submedian lines forming complete cells in 4tires; anterior tire with 12 cells, second tire with 4cells and third tire with 2 cells and fourth tire with 3 cells including two lateral rectangular cells containing scapular tubercles without scapular seta *sc*, scapular tubercles present at about two-third of the shield length, distance between the dorsal tubercles 22.4 (21.9-23.4).

Leg I ( Fig. 1C) from base of trochanter 28.0 (28.0-28.9) long; femur 17.7 (16.8-17.7) long, without basiventral femoral seta *bv*; genu fused with femur; tibia 3.7 (3.7-4.6) long, without paraxial tibial seta *l'* ; tarsus 6.5 (5.6-6.5) long; two identical tarsal setae-paraxial fastigial tarsal setae *ft'* and antaxial fastigial tarsal seta *ft''* 32.6 (31.7-32.6) long; paraxial unguinal tarsal seta *u'* 4.6 (3.7-4.6) long, tarsal solenidion  $\omega$  almost straight, knobbed and 5.6 (4.6-5.6) long, 5 rayed divided tarsal empodium *em* 7.4 (6.5-7.4) long.

Leg II (Fig.1D) from base of trochanter 27.0 (27.0-28.0) long; genu fused with femur, femur 14.0 (13.0-14.0) long, without basiventral femoral seta *bv* ; tibia 4.6 (3.7-4.6) long, without paraxial tibial seta *l'*; tarsus 8.4 (7.4-8.4) long, paraxial fastigial tarsal setae *ft'* 27.0 (26.1-27.0), antaxial fastigial tarsal seta *ft''* absent, paraxial unguinal tarsal seta *u'* 4.6 (3.7-4.6); tarsal solenidion  $\omega$  almost straight 5.6 (4.6-5.6) long; tarsal empodium ( Fig.1E) 5 rayed divided tarsal empodium *em* 7.4 (6.5-7.4) long. Coxae I 20.5 (19.6-20.5) long and contiguous; coxal surface ornamented with granulations; 1b tubercles and seta absent; 1a tubercles with seta present a little ahead of line across the 2a tubercles with seta; seta 1a 27.0 (27.0-28.0) long; coxa II ornamented with many curve lines and 14.0 (14.0-16.8) long, seta 2a 37.3 (36.4-37.3) long.

Opisthosoma ( Fig 1A) with 68(67-68) smooth dorsal annuli and 91 (89-91) microtuberculed ventral annuli; micro tubercles rounded and located on anterior margin of ventral annuli; last 9 ventral annuli have micro striation, seta *c2* absent, seta *d* 10.2 (10.2-11.2) long on annulus 35 (35-36); setae 5.6 (5.6-6.5) long on ventral annulus 56 (54-56); seta *f* 23.3 (23.3-24.2) long on ventral annulus 82 (79-82); seta *hl* absent, seta *h2* 51.3 (47.7-51.3) long.

Genitalia or epigynum (Fig.1F) ( 19.6 (18.6-19.6) long, 26.1 (25.2-26.1) wide; epigynium smooth except two curve line at anterior margin of epigynium which has a beak like elevation with two lateral depressed notch ; seta *3a* 4.6 (3.7-4.6)long. Internal genitalia (Fig1G) shows transverse apodeme with two rounded spermatheca. MALE: Not observed as most of taxonomic character variables are found in female individuals.



**Figure 1.** *Diptilomiopus lanneas* sp.nov, holotype, no. 1360/56/2024: A-Antero-dorsal mite (AD); B- Antero-Dorsal mite (AD); C- Leg I (L1); D- Leg II (L2); E- Tarsal empodium of LI (em); F- Coxal-genital region (CG); G- Internal genitalia of female.

### 3.2.1 Holotype and Paratype

Holotype: Female (marked) on slide (no. 1360/56/2024), India: West Bengal: Malda, English bazar, Latitude: 24°50'40" N and Longitude: 87°55'50" E, 09.9.2024 from *Lannea coromandelica* Merr. (Anacardiaceae), Coll. S. Sarkar. Paratypes: 8 females on slide bearing Holotype, 21 females on 3 slides (nos. 1361-1363/56/2024), 14.9.2024, 24 females on 3 slides (nos. 1364-1366/56/2024), 17.9. 2024, localities of collections same as in Holotype.

### 3.2.2 Etymology

The binomial nomenclature is done strictly following the International Code of Zoological Nomenclature. The specific epithet '*lanneas*' derived from '*Lannea*' genus of the host plant. The word given for the specific epithet reflects the name of the host plant that harbors the parasitic mite.

### 3.2.3 Relation to host

Mite occurs in considerable numbers on the ventral surface of leaves and located near the mid vein (fig.2C). During feeding, the mite inserts its tiny oral styles into the epidermis of leaf tissue and sucks the phloem sap. Due to this particular mode of feeding this mite produces yellowish brown patchy areas on leaves of the host plant as visible damage symptoms (Fig. 2B).

Figure 2.A: *Lannea coromandelica*

Figure 2B. Mite infested leaf

Figure 2C. Photomicrograph of Mite

### 3.3 Taxonomic Diagnosis

The new species resembles *Diptilomiopus ficicolus* Sarkar in presence of closed central cell on prodorsal shield with scapular tubercles. It differs from *Diptilomiopus ficicolus* in its 5 rayed tarsal empodium. In having 5 rayed tarsal empodium this species comes close to *D. artocarpa* Mohanasundaram, *D. integrifoliae* Mohanasundaram ; *D. leeasis* Chakrabarti, Ghosh and Das *D. thangaveli* Mohanasundaram . However, differs from *D. javeremovici* by the absence of seta *h1*, from *D. artocarpa* by the absence of genu and antaxial genual setae, from *D. integrifoliae* by smooth texture of epigynium, from *D. leeasis* by having median line in central cell on prodorsal shield and from *D. thangaveli* by smooth texture of epigynium and presence of median line in central cell on prodorsal shield.

### IV. CONCLUSION

The new mite parasite discovered from this area is erected as new species to Science and is considered as a potential pest of *Lannea coromandelica*, a medicinal plant in India. As of 2024, altogether 106 species of this genus are known from different plants in all over the world. The 107<sup>th</sup> species is recorded to the list of eriophyoid fauna from this type locality in India. The significant outcome of this study lies in the fact that this new species of the genus *Diptilomiopus* is observed first time recorded from the sub Himalayan region of India. This parasitic mite causes damage to the plant by its phytophagy habit and parasitic mode of life. The relationship of this mite to its host may provide a key to the species identification of this group of mites. This research finding may be helpful to plant protection department for proper diagnosis of the plant viral diseases as the are known to transmit various viruses to plant tissues during their feeding on it. The identification of the pest species will be easier for taxonomist working in this group of mite. For proper pest management one should know the pest status and its biology, so in this point of view, this research findings may certainly help to the plant protection department. This findings may provide the basis to the further taxonomic study including DNA Barcoding.

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### REFERENCES

- [1] Abdel-Khalek A A. and Momen F M2022. Biology and life table parameters of *Proprioseiopsis lindquisti* on three eriophyid mites (Acari: Phytoseiidae: Eriophyidae). *Persian Journal of Acarology*, 11(1):59-69. <https://doi.org/10.22073/pja.v11i1.68574>
- [2] Amrine J.W. Jr. and Stasny T. A. 1994. *Catalog of the Eriophyoidea (Acarina: Prostigmata) of the world.*, Indira Publishing Houses; Michigan, 798 pp.
- [3] Amrine J.W.Jr., Manson D.C.M. 1996. Preparation, mounting and descriptive study of Eriophyoid mites. In: Lindquist E.E., Sabelis M.W., Bruin J. (Eds.). *Eriophyoid mites. Their Biology, Natural Enemies and Control.* World Crop Pests, 6, Elsevier Science Publishers, Amsterdam, Netherlands, 383-396. doi:10.1016/S1572-4379(96)80023-6
- [4] Amrine J.W. Jr., Stasny T.A and Flechtmann C.H.W. 2003. *Revised keys to world genera of Eriophyoidea (Acari: Prostigmata).*, Indira Publishing Houses; Michigan, 244 pp.
- [5] Brown, M.S, C.K Blubaugh, and J.H Chong. 2021. Biology and management of eriophyid mites in turfgrass. *Journal of Integrated Pest Management*, 12(1): 25. <http://dx.doi.org/10.1093/jipm/pmab020>.
- [6] Chakrabarti S., Mondal S. 1983. An Account of the Genus *Diptilomiopus* Nalepa (Acarina: Eriophyoidea) from India with Descriptions of three new species and key to Indian species, *Acarologia*, XXIV (3): 299-308.
- [7] Chakrabarti S., Sur S., Roy S., Sarkar S. 2017. Two new genera and two new species of Eriophyoid mites (Acari: Eriophyoidea) from North Bengal, India, *Zootaxa*, 4236 (1):172 - 182 doi:10.11646/zootaxa.4236.1.10
- [8] Chakrabarti S, Sur S, Sarkar S, 2019. Two new species of *Diptilomiopus* Nalepa (Acari: Eriophyoidea) from India. *Acarologia*: 59 : 3 p: 383-394 <https://doi.org/10.24349/acarologia/20194337>

- [9] Craemer C., Amrine J.W.Jr., Childers C.C., Rogers M.E., Achor D.S. 2017. A new eriophyoid mite species, *Diptilomiopus floridanus* (Acari: Eriophyoidea: Diptilomiopidae), from citrus in Florida, USA, Systematic & Applied Acarology, 22 (3): 386-402 doi:10.11158/saa.22.3.5
- [10] de Lillo E., Craemer C., Amrine J.W.Jr., Nuzzaci G. 2010. Recommended procedures and techniques for morphological studies of Eriophyoidea (Acari: Prostigmata), Experimental & Applied Acarology, 51: 283-307. doi: 10.1007/s10493-009-9311-x. doi:10.1007/s10493-009-9311-x
- [11] Druciarek T., Lewandowski M. and Tzanetakis 2019. A new, sensitive and efficient method for taxonomic placement in the Eriophyoidea and virus detection in individual eriophyoids. Exp Appl Acarol. , 78(2):247–61
- Galanki V, Venkatesham A, Chitturi D. Antidiabetic activity of *Lannea coromandelica* Houtt leaves in alloxan-induced diabetic rats. Int J Pharm Biol Sci 2014;4:108-14.
- [12] Ghuge N, Shegar D, Jadhav S. and Nagare V. International Journal of Pharmaceutical Sciences. 2024. 02(12) doi.org/10.5281/zenodo.1441137. Article Id IJPS/240212052
- [13] Hamilton AC. 2018. Medicinal plants, Conservation, and Livelihoods. Biodiv. Conserv. 2004, 13:1477-1517.
- Hossain J, Biswas S, Shahriar M, Chowdhury MM, Islam S. Chowdhury RA. Phytochemical screening, antimicrobial activity, antioxidant capacity, and in vivo anticancer activity of *Lannea coromandelica* bark extracts. IOSR J Pharm Biol Sci 2018;13:19-25.
- [14] Imam MZ, Moniruzzaman M. Antinociceptive effect of ethanol extract of leaves of *Lannea coromandelica*. J Ethnopharmacol 2014;154:109-15.
- [15] Islam MT, Tahara S. Dihydroflavonols from *Lannea coromandelica*. Phytochemistry 2000;54:901-7.
- [16] Jeppson L.R, Keifer H.H. and Baker E.W. (1975). *Mites Injurious to Economic Plants*. Univ. Calif. Ber. Los. Arg. London. 614pp.
- [17] Joel Hallan(biocat@ccms.net)2025. A Working Catalogue of the Eriophyoidea of the World. Version 1.0. The Catalogue of the Eriophyidae . Accessed on 05 March.
- [18] Keiffer, H.H. 1960. Eriophyid studies B-1. Bur. Entomol., Calif. Dept. Agr., 20 pp.
- [19] Keiffer, H.H. 1962. Eriophyid studies B-7. Bur. Entomol., Calif. Dept. Agr., 20 pp.
- [20] Keiffer, H.H. 1969. Eriophyid studies C-1. ARS-USDA, 24 pp.
- [21] Keifer, H., Baker, E.W., Kono, T, Delfinado, N. and Styer, W.E. 1982, *An illustrated guide to plant abnormalities caused by Eriophyid mites in North America*. U.S. Dept. Agri. Agricultural Hand Book No. 573. pp.178.
- [22] Lindquist E.E. External anatomy and notation of structures. In: Lindquist E.E., Sabelis M.W. & Bruin J. (Eds.), Eriophyoid mites: their biology, natural enemies and control. World Crop Pests, Vol. 6, Elsevier Science Publishers, The Netherlands, 1996, pp. 3–31.
- [23] Muhaisen HM. Chemical constituents from the bark of *Lannea acida* rich (Anacardiaceae). Pharm Chem 2013;5:88-96.
- [24] Nalepa A. 1916. Neue Gallmilben (32. Fortsetzung). Anzeiger der kaiserlichen Akademie der Wissenschaften, Mathematisch-naturwissenschaftliche Klasse, Wein, 53 (22): 283-284.
- [25] Oldfield G, Skoracka A., Smith L., Cristofaro M., Amrine, J.W.Jr. 2010- Host-plant specificity and specialization in eriophyoid mites and their importance for the use of eriophyoid mites as biocontrol agents of weeds. Exp. and Appl. Acarol., 51: 93-113. doi:10.1007/s10493-009-9323-6
- [26] Sarkar S. 2011, Eriophyoid mites (Acari) of Malda and Dakhin Dinajpur of West Bengal, India [Phd. Thesis]- University of Kalyani, India, pp.160.
- [27] Sarwar M. Mite (Acari acarina) vectors involved in transmission of plant viruses. Applied Plant Virology, 2020. 257-273.Elsevier. <http://dx.doi.org/10.1016/B978-0-12-818654-1.00020-7>
- [28] Stephan D, I Moeller, A Skoracka, F. Ehrig, and E. Maiss.. Eriophyid mite transmission and host range of a Brome streak mosaic virus isolate derived from a full-length cDNA clone. Archives of Virology. 2008, 153:181–185. <https://doi.org/10.1007/s00705-007-1065-3>
- [29] Shukla A. Mites. Polyphagous Pests of Crops, 2021, 409-455.
- [30] Sur S., Roy S., Chakrabarti S. 2018- Two new eriophyoid mites (Acari: Eriophyoidea) from West Bengal, India, Zootaxa, 4434:193-200. doi:10.11646/zootaxa.4434.1.13
- [31] Vervaet L., R De Vis., P De Clercq. And T Van Leeuwen. Is the emerging mite pest *Aculops lycopersici* controllable? Global and genome-based insights in its biology and management. Pest Management Science, 2021, 77(6): 2635- 2644. <https://doi.org/10.1002/ps.6265>.
- [32] Yan-mei yuan Xiao-Feng Xue. Two new species of eriophyid mites (Acari: Eriophyidae) from Malaysia, , Zootaxa 4613, 2019 (1):152 DOI: 10.11646/zootaxa.4613.1.8