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Review Article

A NEW SPECIES OF PREDATORY MITE OF THE GENUS *AMBLYSEIUS* (ACARI: PHYTOSEIIDAE) FROM KERALA, INDIA

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ABSTRACT

Consumers worldwide are now strongly demanding agricultural products grown with few or no chemicals. Many farmers are aware of the dangers of excessive use of chemicals and are now trying to replace chemicals with natural enemies or organic pesticides. Predatory mites deserve special mention in an agricultural country like India, where agriculture is always under the threat of constant pest attack. Among the different families of predatory mites, family Phytoseiidae includes members that have received maximum attention globally. They have been successfully employed in the control of agricultural pest population below economic injury level. Despite their importance in the suppression of pest population below economic injury level in varied ecosystems, predatory mites have not acquired adequate recognition so far in India, particularly in Kerala. Considering the above lacuna, a survey was conducted (October 2015 to March 2016) to unravel the predatory mite fauna on vegetable crops from various districts of North Kerala. The result of the survey yielded an adult female of predatory mite of the family Phytoseiidae *viz., Amblyseius manasi* nov. sp. is described and illustrated here.

Keywords: Acari; *Amblyseius*; Kerala; New species; Phytoseiidae; Predatory mite

INTRODUCTION

Predatory mites deserve special mention in an agricultural country like India, where agricultural is always under the threat of constant pest attack. Predatory mites of the family Phytoseiidae constitute a highly significant beneficial group on account of their vital role in the maintenance of pest population below economic injury level. Predatory mites are now valued with growers worldwide as natural enemies that provide effective pest control in greenhouses and on agricultural crops (Bjorson, 2008). Predatory mites of the family Phytoseiidae are of economic importance because they efficiently control pest mites in many crops around the world (Sabelis, 1985). Biological control of phytophagus mites by predatory mites (Family: Phytoseiidae) had been proved as successful alternative to conventional chemical control especially on greenhouse crops (Gerson *et al.,* 2007).

Faunistic studies on Phytoseiidae of the country has fairly well progressed, 189 species have been reported from the country compared to 2280+ species from the world (Mallik *et al.,* 2010). Gupta & Karmakar (2015) prepared an updated checklist of Indian Phytoseiid mite. Genus *Amblyseius* was erected by Berlese (1914) and *Zercon obtuses* Koch (1939) was designated as its type species. Denmark and Mumma (1989) revised the genus and described 136 species. Genus *Amblyseius* consists of different groups; they are *americanus, largoensis, obtusus, pusillus* and *sundi*. The *amaricanus* group with Z_4 longer, the *largoensis* group with the female ventrianal sheild vase shaped or divided into seperate ventral and anal shield, the *obstosus* group with setae z_4 shorter, the *pusillus* group with setae J_2 absent and the *sundi* Z_1 absent (Chant & McMurtry, 2004).

The genus *Amblyseius* is further diagnosed in having a slightly scerotized dorsal shield, female ventrianal sheild with variety of shapes, chelicerae with many teeth, leg I, II, III with macrosetae, spermatheca highly variable in form, seta s_4, Z_4 and Z_5 usually greatly elongated with a few exceptions and caudoventral setae ZV_3 unstable and absent on a number of species, *Amblyseius* is the largest group of species in the subfamily Amblyseiinae with 367 nominal species and out of them 25 are known from India (Chant & McMurtry, 2007).

Despite the relevance of predatory mites, they have not yet acquired desired recognition in many parts of the world, especially in Kerala. Hence a systematic survey was undertaken to unravel the occurence of Phytoseiidae (Genus: *Amblyseius*) from various districts of North Kerala.

MATERIALS AND METHODS

The predatory mite fauna (Genus: *Amblyseius*) harbouring various species of vegetable crops were collected by making extensive surveys covering different

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localities in Wayanad, Kozhikode, Kannur, Malappuram and Palakkad districts from October 2015 to March 2016.

Phytoseiid mites of comparatively larger size and fast moving nature were collected directly from the field with the help of hand lens and camel hair brush. They were preserved in 70% alcohol until permanent slides were prepared. Beside this, infected plant parts were randomly collected in polythene bags and transported to the laboratory and screened under a stereozoom microscope. Quite often mite infested plant parts were beaten over a dark coloured rexin sheet and the mites thus dislodged were picked up with a moistened camel hair brush. They were stored in 70% alcohol containing few drops of lactic acid. They were then upgraded in alcohol series and then mounted in Hoyer's medium permanently. Detailed structural studies and illustrations were made using Olympus CX31 research microscope attached with drawing tube. The classification system used is that of Chant and McMurtry (2007), setal nomenclature is of Rowel *et al.,* (1978). All the measurements are given in microns. All the type specimens have been deposited in the Acarological collections maintained in the P G & Research Department of Zoology, Malabar Christian College, Calicut, which will be later transferred to Zoological survey of India, Calicut, Kerala.

RESULT AND DISCUSSION

Amblyseius manasi Sp.nov

Female: Dorsal shield smooth, 340 long and 210 wide with 17 pair of smooth setae (Figure 1). Measurement of setae: j_1-30, j_3-50, Z_4- 150, Z_5- 285, S_4-110, other setae like j_4, j5, j6, J2, J5, z2, z4, z5, S2, S4, S5, r3 and R1 are minute. Distance between j1-17, j3-50. Ventrally, sternal shield 80 long, 70 wide, smooth, slightly concave anteriorly with 3 pairs of setae. Setae ST1- 30, ST2- 28 and ST3- 25, ST4-20, ST5-30. ST4 on metasternal plate measuring 20. Distance between ST1- 64, ST2- 64, ST3- 70, ST4- 75. Genital shield is 80 wide with ST5. A clear integumental shield present between genital and ventrianal shield. Ventrianal shield 120 long and 70 wide, pentagonal, smooth with 3 pairs of preanal setae measuring JV1-15, ZV2- 12, JV2-12 and a pair of elliptical pores. 4 pairs of setae present on the area around the ventrianal shield. Setae JV4- 12, JV5-90, ZV1- 15, ZV3- 13. Two pairs of metapodal plates present. Primary one 17 long and accessory one 7 long. Peritreme extends anteriorly up to j1and curves down. Spermatheca with long, tubular cervix (15 long), undifferentiated atrium, wide major duct and also with visible minor duct. Fixed digit of chelicera 33 long with 4 teeth anterior to *pilus dentilis* 6 teeth posterior to it; movable digit 37.5 long with 4 teeth. Macrosetae present on leg IV- genu-110, tibia- 60, tarsus 70.

Leg chaetotaxy: genu II $2\ \frac{2}{0}\ \frac{2}{0}\ 1$, tibia II $1\ \frac{1}{1}\ \frac{2}{1}\ 1$;

genu III $1\ \frac{1}{1}\ \frac{2}{1}\ 1$, tibia III $1\ \frac{2}{1}\ \frac{1}{1}\ 1$.

Male: Unknown

Habitat: *Capsicum frutescens* (L.), *Amaranthus dubius* (Mart. Ex Thell), *Momordica charantia* (L.)

Material examined: **Holotype**: Female, INDIA: KERALA: Kakkodi (11° 19′ 56″ N, 75° 47′ 18″ E),

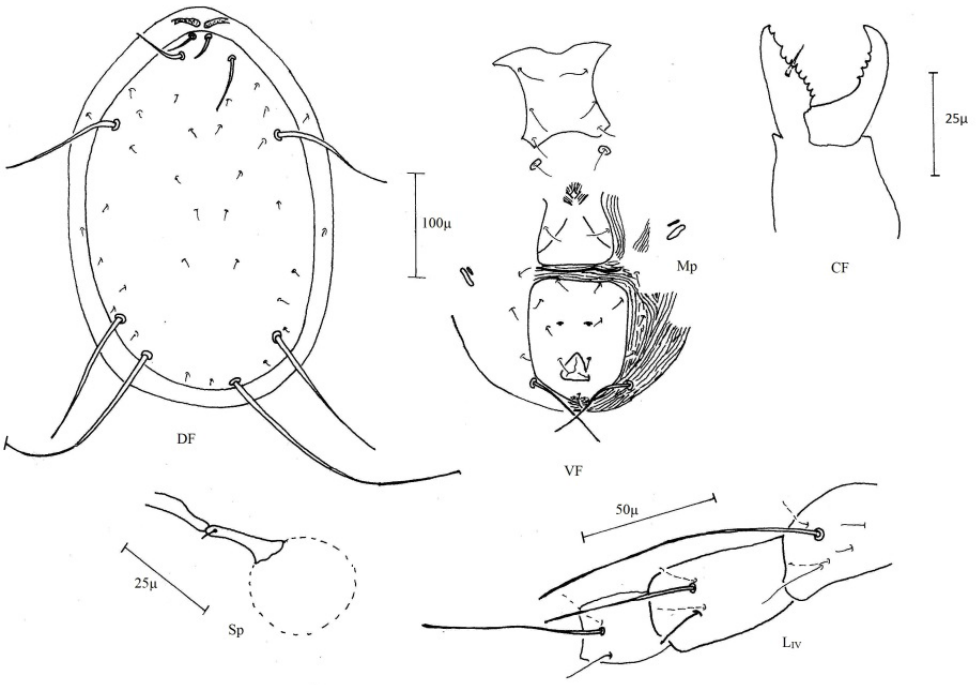

Figure 1: *Amblyseius manasi* Sp.nov.

Abbreviations: CF: Chelicera of Female; DF: Dorsal view of Female; L_{IV}: Leg IV showing setation; Mp: Metapodal plate; Sp: Spermatheca; VF: Ventral view of Female.

Kozhikode District, 30.vii.2015, ex: *Capsicum frutescens* (L.), Coll. Rahul (No. A.87/1).

Paratype: Two Paratype females, collection details same as holotype (No. A.87/2, A.87/3). One paratype female from Kavumvattam (11° 27' 49.2" N, 75° 43' 49.8"E), Kozhikode District, 24.x.2015, Ex: *Amaranthus dubius* (Mart. Ex Thell), Coll. Rahul (No. A.154). One female from Pattambi (10° 45′ 21.72″ N, 76° 34′ 23.18″ E) Palakkad District, 5.xi.2015, ex: *Momordica charantia* (L.), Coll. Rahul (No. A165).

Remarks: This new species closely resembles *Amblyseius paraaerialis* Muma, 1967 in general appearence and shape of ventrianal shield but differs from it by the following characters:

- The length of setae s_4 (110), Z_4 (150) and Z_5 (285) are much longer than *A. paraaerialis* s_4 (72), Z_4 (89) and Z_5 (161)
- Number of teeth on the movable digit of chelicera is 4 in the new species instead of 3 in *A. paraaerialis*
- Number of the teeth on fixed digit of chelicera posterior to *pilus dentilis* is 6 in the new species instead of 1-2 in *A. paraaerialis*
- Spermatheca with long, tubular cervix and rounded atrium, major ducts are widely separated with clear minor duct, whereas in *A. paraaerialis* it is tubular looped cervix and undifferentiated atrium.
- Ventral setae JV_5 (90) long whereas in *A. paraaerialis* it is 65 long.
- Striations are present around the ventrianal shield as well as two sides of genital shield in the new species whereas it is absent in *A. paraaerialis.*
- Longer nature of macrosetae on leg IV genu, tibia and tarsus- Genu-110, Tibia- 60 and Tarsus- 70 in the new species whereas it is 70,49 and and 52 respectively in *A. paraaerialis*.
- A clear fold is seen in between ventrianal shield and genital shield in the new species but it is absent in *A. paraaerialis.*

This new species also resembles *Amblyseius guianensis* De Leon, 1966 in relation to the size of body, general appearance and number of teeth on movable and fixed digits of chelicera but differs from it by the possession of the following features:

- Length of the setae j_3(50), Z_4(150), Z_5(285) and S_4(110) in the new species are larger when compared with *A. guianensis* 33, 111, 221 and 90 respectively.
- Spermatheca with long, tubular cervix (15) and undifferentiated atrium in the new species whereas in *A. guianensis* cervix is weakly vessicular (24) with nodular atrium.
- Measurement of macrosetae on legIV genu (109) is larger in the new species whereas it is shorter in *A. guianensis* (99)

Etymology: Name in honour of Prof. Manasa Nambiar.

CONCLUSION

A survey was conducted study to unravel the species diversity of predatory mites inhabitating vegetable crops grown in various districts of North Kerala. Family Phytoseiidae is a vast group under the order Mesostigmata and some of them are recognized as efficient predators used in biocontrol programmes against phytophagous mites and other small insects in various agro-ecosystems. As far as knowledge on the phytoseiid mites of Kerala is concerned, it is in its infancy. This shows that a vigourous research in this field is highly warranted. In this context, result of the present study yielded 15 species of predatory mites under the genus *Amblyseius.* Of these one species *Amblyseius manasi* is illustrated.

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