SUMMARY

Studies on a collection of fish from Bangalore and Kolar districts, Karnataka have resulted in reliable identification of 29 species, of which *Esomus thermoicos* (Val.) is an addition to Karnataka fauna and *Rasbora labiosa* Mukerji to the Cauvery system. *Amblypharyngodon microlepis* (Bleeker) and *Aplocheilus panchax* (Hamilton) are reported from the wild after a span of 65 years.

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A NOTE ON THE MITES OCCURRING ON MEDICINAL PLANTS IN NORTHEAST INDIA

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INTRODUCTION

Northeast India, due to its interesting geographical location, climatic condition and vegetation shows enormous diversity in the composition of its fauna and flora. It is considered as a unique biological spot which abounds in various interesting species of plants and animals. This region is rich in natural resources of medicinal plants belonging to different families.

In spite of the richness and abundance of fauna in this part of Indian subcontinent the acarine fauna of this region infesting the plants of medicinal importance remained unattended by the acarologists for the reasons best known to them.

A perusal of literature reveals that no such consolidated information on the medicinal plants infested by mites in northeast India is available except the work of Lal and Mukherjee (1977) though the region is sound faunistically. This has prompted the author to undertake the present work chiefly based on published works with a view to get a first hand information. As such, a complete list of mites occurring on medicinal plants in northeast India is provided hereinunder. Consultation of available literature reveals that 45 species of mites infest medicinal plants belonging to 21 species under 14 plant families. In this contribution, the texts are arranged in two sections. In Section–I mite species are arranged according to their families as has been followed by Gupta (1985) and in Section–II, medicinal plants are arranged alphabetically with respective plant family. In Section–I under each family the mite species and their respective host plants are also alphabetically arranged.

The plants considered here as medicinal plants are according to I. C. M. R. publications (1976, 1987) and Chopra *et al.* (1956).

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SECTION–I

Sl No.	Name of Mite	Family	Host Plant	Distribution
1.	*Amblyseius (Amblyseius) Channabasavannai* Gupta & Daniel	Phytoseiidae	*Azadirachta indica* *Mangifera indica*	India : Meghalaya, Kerala, Tamil Nadu, West Bengal.
2.	*Amblyseius (Amblyseius) herbicolus* (Chant)	Phytoseiidae	*Musa paradisiaca*	India : Meghalaya, Arunachal Pradesh, Tripura, West Bengal, Elsewhere : Philippines, Taiwan, Thailand, Japan, U.S.A., Madagascar, South America.
3.	*Amblyseius (Amblyseius) largoensis* (Muma)	Phytoseiidae	*Musa paradisiaca*	India : Meghalaya, Andaman & Nicobar Isls., Arunachal Pradesh, Assam, Andhra Pradesh, Bihar, Gujarat, Himachal Pradesh, Kerala, Orissa, Manipur, Karnataka, Nagaland, Pondichery, Punjab, Tamil Nadu, Tripura, Uttar Pradesh, West Bengal, Elsewhere : Philippines, Taiwan, Thailand, Hong Kong, Israel, Iran, Japan, New Zealand, Kenya, U.S.A., Brazil, Mexico, Jamaica.
4.	*Amblyseius (Amblyseius) mcmurtryi* Muma	Phytoseiidae	*Psidium guajava*	India : Meghalaya, Assam, Elsewhere : Northern and Western Iran.
5.	*Amblyseius (Paraphytoseius) multidentatus* (Swirski & Shechter)	Phytoseiidae	*Mangifera indica*	India : Meghalaya, Andaman & Nicobar Isls., Andhra Pradesh, Assam, Maharashtra, Karnataka, Tamil Nadu, Bihar, Tripura, Uttar Pradesh, West Bengal.
6.	*Amblyseius (Euseius) alstoniae* Gupta	Phytoseiidae	*Cassia occidentalis*	India : Tripura, Jammu & Kashmir, Meghalaya, Bihar, Madhya Pradesh, Punjab, Orissa, Tamil Nadu, Rajasthan.

Sl No.	Name of Mite	Family	Host Plant	Distribution
7.	*Amblyseius (Euseius) coccineae* Gupta	Phytoseiidae	*Psidium guajava*	India : Tripura, Andhra Pradesh, Gujarat, Bihar, Tamil Nadu, Jammu & Kashmir, Meghalaya, Madhya Pradesh, Orissa, Pondichery, Uttar Pradesh.
8.	*Amblyseius (Euseius) ovalis* (Evans)	Phytoseiidae	*Luffa acutangula* *Ficus religiosa* *Musa paradisiaca*	India : Tripura, Gujarat, Andaman & Nicobar Isls., Bihar, Manipur, Tamil Nadu, Meghalaya, Pondichery. Elsewhere : Philippines, Taiwan, Malaysia, Japan, Hong Kong, Indonesia, New Zealand, Mauritius, Hawaii, Mexico.
9.	*Amblyseius (Euseius) pruni* Gupta	Phytoseiidae	*Carica papaya*	India : Tripura, Assam, Meghalaya, West Bengal, Himachal Pradesh, Jammu & Kashmir.
10.	*Amblyseius (Neoseiulus) longispinosus* (Evans)	Phytoseiidae	*Luffa acutangula*	India : Tripura, West Bengal, Andaman & Nicobar Isls., Karnataka, Bihar, Punjab, Orissa, Pondichery, Tamil Nadu, Uttar Pradesh, Elsewhere : Philippines, Taiwan, Indonesia, Malaysia, Japan, Hong Kong, New Zealand, Jamaica, Hawaii, South Africa.
11.	*Amblyseius (Typhlodromips) meghalayensis* Gupta	Phytoseiidae	*Psidium guajava*	India : Meghalaya. Elsewhere : Pakistan, Thailand, Philippines, Madagascar, Malaya, Nigeria, Hong Kong.
12.	*Amblyseius (Typhlodromips) suknaensis* Gupta	Phytoseiidae	*Mangifera indica*	India : Meghalaya, Andaman & Nicobar Isls., Assam, Kerala, West Bengal.
13.	*Amblyseius (Typhlodromips) syzygii* Gupta	Phytoseiidae	*Psidium guajava*	India : Tripura, West Bengal, Uttar Pradesh, Orissa, Meghalaya, Bihar, Elsewhere : Thailand.

Sl No.	Name of Mite	Family	Host Plant	Distribution
14.	*Acarus farris* Oudemans	Acari	*Cocos nucifera* *Musa paradisiaca*	India : Tripura, Meghalaya, Elsewhere : England, Netherland, Wales, Scotland, U.S.A., Germany, Kenya, Czechoslovakia.
15.	*Aponychus baghensis* Prasad	Tetranychidae	*Musa paradisiaca*	India : Meghalaya, Bihar.
16.	*Agistemus garrulus* Chaudhri, Akbar & Rasool	Stigmaeidae	*Morus alba*	India : Meghalaya, Elsewhere : Pakistan.
17.	*Agistemus gamblei* Gupta	Stigmaeidae	*Machilus gamblei*	India : Arunachal Pradesh.
18.	*Agistemus fleschneri* Summers	Stigmaeidae	*Mangifera indica*	India : Arunachal Pradesh, Suji, Assam, Manipur, Tripura, Agartala.
19.	*Agistemus macrommatus* Gonzalez-Rodriguez	Stigmaeidae	*Carica papaya*	India : Arunachal Pradesh,
20.	*Agistemus edulis* Gupta	Stigmaeidae	*Macheles edulis*	India : Arunachal Pradesh,
21.	*Brevipalpus phoenicis* (Geij)	Tenuipalpidae	*Psidium guajava*	India : Meghalaya, Assam, Bihar, Delhi, Himachal Pradesh, Karnataka. Maharashtra, Orissa, Punjab, Tamil Nadu, West Bengal. Elsewhere : Kenya, Tanganayika, Okinawa Isl., Australia, Holland, Spain, Portugal, Syria, Italy, U.S.A, Trinidad, Argentina, Brazil.
22.	*Bdellodes grandiflora* Gupta	Bdellidae	*Thunbergia grandiflora*	India : Arunachal Pradesh
23.	*Bdella angustifolius* Gupta	Bdellidae	*Canthium angustifolium*	India : Manipur
24.	*Bdella khasyana* Gupta	Bdellidae	*Litsaea khasyana*	India : Arunachal Pradesh
25.	*Cunaxa anacardae* Gupta	Cunaxidae	*Mangifera indica*	India : Tripura, West Bengal
26.	*Cunaxa lambusae* Gupta & Ghosh	Cunaxidae	Wood apple (*Feronia elephantum*)	India : Tripura, West Bengal Andaman & Nicobar Isls.

Sl No.	Name of Mite	Family	Host Plant	Distribution
27.	*Cunaxa crista* Gupta	Cunaxidae	*Caesalpinia crista*	India : Arunachal Pradesh.
28.	*Cunaxa curassavica* Gupta	Cunaxidae	*Asclepias curassavica*	India : Arunachal Pradesh.
29.	*Cheyletus malaccensis* Oudemans	Cheyletidae	*Michaelia champaca*	India : Meghalaya, Kerala, Karnataka, West Bengal.
30.	*Eupodes* sp.	Eupodidae	*Mangifera indica*	India : Meghalaya, Songsok, Tripura.
31.	*Hemicheyletia indica* Gupta	Cheyletidae	*Pavetta indica*	India : Arunachal Pradesh
32.	*Iphiseius andamanicus* Gupta	Phytoseiidae	*Musa paradisiaca*	India : Tripura, Andaman & Nicobar Isls., Karnataka.
33.	*Ledermulleria parryorum* Gupta	Stigmaeidae	*Mussandra parryorum*	India : Arunachal Pradesh.
34.	*Oligonychus gossypii* (Zacher)	Tetranychidae	*Mangifera indica*	India: Tripura. Elsewhere: Africa (Togo, Senegal, Sierra, Leone, Nigeria, Cameroon, Zaire, Angola).
35.	*Oligonychus indicus* (Hirst)	Tetranychidae	*Musa paradisiaca*	India : Meghalaya, Delhi, Andhra Pradesh, Punjab, Haryana, Karnataka, Orissa, Tamil Nadu. Elsewhere : Pakistan.
36.	*Oligonychus mangiferus* (Rahman & Sapra)	Tetranychidae	*Morus alba*	India : Meghalaya, Delhi, Gujarat, Haryana, Karnataka. Elsewhere : South Africa, New Zealand, U.S.A.
37.	*Oligonychus biharensis* (Hirst)	Tetranychidae	*Ficus religiosa*	India : Tripura, Bihar, Andaman & Nicobar Isls., Gujarat.
38.	*Panonychus citri* (McGregor)	Tetranychidae	*Carica papaya* *Morus alba*	India : Meghalaya, Tripura, Andaman & Nicobar Isls., Assam, Jammu & Kashmir, West Bengal. Elsewhere : Thailand, New Zealand, China, Middle East, Japan, South Africa, U.S.A., Argentina, Cuba, Bermuda.
39.	*Panonychus ulmi* (Koch)	Tetranychidae	*Musa paradisiaca*	India : Meghalaya, Himachal Pradesh, Uttar Pradesh, Jammu & Kashmir. Elsewhere : Europe.

Sl No.	Name of Mite	Family	Host Plant	Distribution
40.	*Phytoseius (Pennaseius) kapuri* (Gupta)	Phytoseiidae	*Psidium guajava*	India : Tripura, West Bengal, Bihar, Andaman & Nicobar Isls., Orissa, Punjab, Rajasthan, Tamil Nadu, Gujarat, Jammu & Kashmir, Meghalaya, Uttar Pradesh.
41.	*Phytoseius (Phytoseius) roseus* (Gupta)	Phytoseiidae	*Psidium guajava*	India : Tripura, Punjab, Gujarat, Tamil Nadu, Jammu & Kashmir, West Bengal, Uttar Pradesh. Elsewhere : Pakistan.
42.	*Typhlodromus (Amblydromella) darjeelingensis* Gupta	Phytoseiidae	*Michaelia champaca*	India : Meghalaya, Tamil Nadu, Karnataka, Uttar Pradesh, Punjab, West Bengal, Tripura.
43.	*Typhlodromus (Amblydromella) gopali* Gupta	Phytoseiidae	Banana (*Musa paradisiaca*)	India : Tripura, West Bengal, Rajasthan, Punjab, Himachal Pradesh.
44.	*Tydeus* sp.	Tydeidae	*Mallotus philippensis*	India : Meghalaya.
45.	*Walzia indiana* Smith-Meyer & Uckermann	Stigmaeidae	*Morus alba*	India : Meghalaya, West Bengal

SECTION–II

Sl No.	Name of Plant	Family	Name of Mite
1.	*Asclepias curassavica*	Asclepiadaceae	*Cunaxa curassavica*
2.	*Azadirachta indica*	Meliaceae	*Amblyseius (Amblyseius) channabasavannai*
3.	*Canthium angustifolium*	Rubiaceae	*Bdella angustifolius*
4.	*Carica papaya*	Caricaceae	*Amblyseius (Euseius) pruni, Agistemus macrommatus, Panonychus citri*
5.	*Cassia occidentalis*	Fabaceae	*Amblyseius (Euseius) alstoniae*
6.	*Cocos nucifera*	Palmae	*Acarus farris*
7.	*Feronia elephantum*	Rutaceae	*Cunaxa bambusae*
8.	*Ficus religiosa*	Moraceae	*Oligonychus biharensis*
9.	*Litsaea khasyana*	Lauraceae	*Amblyseius (Neoseiulus) longispinosus, Bdella khasyana*

Sl No.	Name of Plant	Family	Name of Mite
10.	*Luffa acutangula*	Brassicaceae	*Amblyseius (Euseius) ovalis*
11.	*Macheles edulis*	Lauraceae	*Agistemus edulis*
12.	*Machilus gamblei*	Lauraceae	*Agistemus gamblei*
13.	*Mallotus philippensis*	Euphorbiaceae	*Tydeus* sp.
14.	*Mangifera indica*	Anacardiaceae	*Amblyseius (Typhodromips) suknaensis, Amblyseius (Paraphytoseius) multidentatus, Amblyseius (Amblyseius) channabasavannai, Agistemus fleschneri, Oligonychus gossypii, Cunaxa anacardae, Amblyseius (Typhlodromips) syzygii*
15.	*Michaelia champaca*	Magnoliaceae	*Typhlodromus (Amblydromella) darjeelingensis, Cheyletus malaccensis*
16.	*Morus alba*	Moraceae	*Agistemus garrulus, Panonychus citri, Oligonychus mangiferus, Walzia indiana*
17.	*Musa paradisiaca*	Musaceae	*Amblyseius (Amblyseius) herbicolus, Amblyseius (Amblyseius) largoensis, Aponychus baghensis, Panonychus citri, Panonychus ulmi, Oligonychus indicus, Amblyseius (Euseius) ovalis, Typhlodromus (Amblydromella) gopali, Acarus farris, Iphiseius andamanicus*
18.	*Mussandra parryorum*	Rubiaceae	*Ledermulleria parryorum*
19.	*Pavetta indica*	Rubiaceae	*Hemicheyletia indica*
20.	*Psidium guajava*	Myrtaceae	*Amblyseius (Typhlodromips) meghalayensis, Amblyseius (Amblyseius) mcmurtryi, Brevipalpus phoenicis, Amblyseius (Euseius) coccineae, Phytoseius (Pennaseius) kapuri, Phytoseius (Phytoseius) roseus*
21.	*Thunbergia grandiflora*	Acanthaceae	*Bdellodes grandiflora*

SUMMARY

A total of 45 species of mites occurring on 21 species of medicinal plants under 14 families from Northeast India are listed in the paper. It includes distribution of each mite species both in India and elsewhere. Lists of mite-host plant and host plant-mite are also incorporated in the paper under Section-I and II respectively.

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SUITABILITY OF WATER QUALITY FOR IRRIGATION. A CASE STUDY OF KONDAKARLA LAKE, ANDHRA PRADESH

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INTRODUCTION

Water quality refers to the degree of suitability for a specific purpose and it largely depends on the physico-chemical composition of its water. The suitability of water for irrigation purposes should therefore be assessed on the basis of its ability to create favourable conditions for crop growth. Irrigation water contains measurable quantities of dissolved salts originating from different sources. Eaton (1950), Szaboles and Daras (1968), Rhoades (1972), Sreerama Murthy *et al.*, (1995) are some of the attempts made on the water quality for irrigation in general.

Kondakarla Lake is situated at 50 km. south-west of Visakhapatnam in Andhra Pradesh and stretched between latitudes 17°35'30" and 17°36'02" N and longitudes 82°59'27" and 83°01'0" E. Though located at about 20 kms. away from the Bay of Bengal, the lake water is the main source of irrigation to the surrounding agricultural fields, where sugar cane is the major crop (75%) followed by paddy (15%) and vegetables (5%). This paper assumes significance due to its maiden attempt in analysing suitability of the water for irrigation.

MATERIAL AND METHODS

Water samples have been collected on 22.04.2000 from three sites of the lake where the crop density is much in its surroundings, *viz.*, Kondakarla village, Vadrepalle and Haripalem. These samples have been analysed for 13 parameters required for the study. The factors like Sodium Absorption Ratio (SAR), Residual Sodium Carbonate (RSC) and Percent Sodium (PS) have been calculated with the following formula :

$$SAR = Na \Big/ \sqrt{\left(\frac{Ca + Mg}{2}\right)}$$

$$RSC = (Co_3 + HCo_3) - (Ca + Mg)$$

$$PS = \frac{100\,Na}{Na + Ca + Mg + K}$$

RESULTS AND DISCUSSION

Results of the 13 parameters analysed together with its tolerance limits are given in Table I. Suitability of irrigation water depends primarily upon the silt and salt constituents. The total concentration of soluble salts, the proportion of sodium to other cations, bicarbonate concentration and calcium with magnesium concentration are the important factors for assessing the suitability of water quality for irrigation.

pH : The water is found alkaline with pH value 8.5 at all the three spots of the water body. The tolerance limits of this factor is 6.0 to 8.5. Accordingly, this water is suitable for agricultural purposes.

Electric conductivity : This parameter ranged from 990 (Vadrepalle) to 1450 micro mhos/cm (Kondakarla Village). Waters below the level of 2,250 are found to be suitable for good crop growth with proper management and drainage conditions, but saline conditions may develop if leaching and drainage are inadequate. Irrigational water with electric conductivity between 750–2250 is classified as C3 water and accordingly Kondakarla lake water falls under this class.

Bicarbonates : Abnormal quantity of bicarbonates affects the uptake and metabolism of nutrients by plants and it varies in different species. Calcium and magnesium precipitate as carbonates in waters having more concentration of bicarbonates and also increase the exchangeable sodium percentage. Bicarbonates in the ecosystem was found from 3.6 to 5.2 m.eq/L.

Chloride : Abundance of chlorides may be toxic to fruit crops and injurious to leaves. Maximum tolerable limit of this factor is 17 m.eq/L. and this value in the ecosystem is found between 4–7. The rate of accumulation of this parameter in soil does not have any relation with its concentration in irrigating waters. Silty clay loams accumulate more chlorides in a given time than sandy loams and sands.

Sodicity : Concentration of sodium relative to other cations is called sodicity. Sodium, magnesium, chloride and sulphate are abundantly found in saline waters. Magnesium is one of the important criteria in determining the irrigational waters and high magnesium absorption affects the soil unfavourably. (Szaboles and Daras, 1968).