Biota-

A Compendium of Research papers

Editors:
Abhilash E.S. | Thejass P. | Sinitha K.

UGC – HUMAN RESOURCE DEVELOPMENT CENTRE
UNIVERSITY OF CALICUT

UGC – HUMAN RESOURCE DEVELOPMENT CENTRE
UNIVERSITY OF CALICUT

Biota -
A Compendium of Research papers

Editors:
Dr. Abhilash E.S.
Dr. Thejass P.
Dr. Sinitha K.

Nadakkavu, Kozhikode, Kerala
Tel:0495–4020666
www.insightpublica.com|www.bookat.in
e-mail: insightpublica@gmail.com
BIOTA - A COMPENDIUM OF RESEARCH PAPERS
Editors: Dr. Abhilash E.S., Dr. Thejass P., Dr. Sinitha K.
ISBN 978-93-89155-16-7
Published in April 2019

Cover Design: KJ VJ
Published by
Publication: UGC-Human Resource Development Centre
University of Calicut
Insightinpublica Printers & Publishers Ltd.
Printed and bounded in India by
Manipal Technologies Limited, Manipal

₹ 400

17th Life Science Refresher Course, University of Calicut is acknowdged for his constant encouragement and technical support provided to publish this book.

Indeed this is a great achievement of our teachers despite their hectic academic time schedule. We appreciate their endeavor

Lastly, this is a humble initiative from our side, and kindly bear with us, if any mistake overseen has got in without our knowledge.

Dr. Abhilash.E.S, Dr. Thejass.P and Dr. Sinitha.K
Editors of the book

Contents

Plant ecological studies on the moist deciduous forests of Goodrical reserve forest; Southern Western Ghats of India. *Abhilash E.S.* 9

Variability in rice diet among ethnic population around Palakkad City *Dr. K.Abdul Rasheed* 14

Vascular epiphytic plants on a tropical rain forest tree *Elaeocarpus tuberculatus* Roxb in Silent Valley National Park, The Western Ghats, India. *K.S. Anoop Das, V.S. Ramachandran Lalitha Vijayan* 19

Birds of Kottathalachi Mount, Western Ghats, Kannur, Kerala , *Haritha T Nair, Sarangi, N.V. and Sneha, C.* 28

Algal mediated biosynthesis of silver nanoparticles using *Gracilaria textorii* (Suring.) J.ag. (Red seaweed) and evaluation of their antibacterial activity *John Peter Paul, J. Iniya Udhaya, C* 33

Breeding Biology of *Protoribates punctata* on Highly Recalcitrant Coconut Pith *Julie E and Ramani N* 51 - 56

Analysis of the Presence of Bioactive Compounds during the Process of Germination of *Phaseolus aureus* Seeds *Kavitha. O* 57

Documentation of the Alien Invasive Species in and around the Government College Kasaragod, Kasaragod *Maju T. T., Biju P and Krishnakumar K.A.* 63

Study on Nomiinid Bees (Apiformes; Halictidae) of Kerala *Manjusha K.T. and Jobiraj T.* 71

Breeding Biology of *Protoribates punctata* on Highly Recalcitrant Coconut Pith

Julie E
Assistant Professor, Department of Zoology,
Providence Women's College, Calicut
julie.ajai@gmail.com(Corresponding Author)

Ramani N
Professor, Department of Zoology,
University of Calicut

Abstract

In the present study, assessment of the reproductive potential of panphytophagous mites *Protoribates punctata* on highly recalcitrant materials like coconut pith, left behind after coir retting process was made. The study site was a regular retting ground bordered by trees like *Cocos nucifera, Avicennia officinalis* and *Acanthus ilicifolius.* Collected samples were subjected to extraction under a modified Berlese-Tullgren funnel apparatus in the laboratory. Live mites for biological studies were extracted into collecting vials containing water/moistened pith. The pith was found consumed by the adults larva and the nymphs of *P.punctata.* Under laboratory conditions at 30°C and 70% RH, *P. punctata* completed its development from egg to adult within 29.5 -34 days.

Keywords: Panphytophagous mites, Oribatid mites, Panphytophagy.

Introduction

Oribatid mites exhibit a wide variety of nutritional habits (Haq and Prabhoo, 1976). This imposes selection in pattern of their distribution, each species being better adapted to specific habitat which will offer their preferred food in plenty. The diverse feeding trends and wide distribution pattern of these mites helped to consider them as a panphytophagous group (Haq, 1996). Panphytophagy represents a feeding category which is determined by the possession of a combination of several characters of morphological and physiological significance. Possession of this type of diverse feeding trends helps them to explore more habitats to enjoy wider distribution as noted earlier (Behan and Hill, 1978; Haq, 2001). In the present study, assessment of the reproductive potential of panphytophagous mites *Protoribates punctata* on highly recalcitrant materials like coconut pith, left behind after coir retting process was made.

Materials and Methods

The site selected was Feroke, a census town known as the "cradle of the tile industry" in Kerala and located at 11° 11′ 01.38"N, 75° 50′ 54.10"E. The study site was a regular retting ground bordered by trees like *Coco snucifera, Avicennia officinalis* and *Acanthus ilicifolius*. Collected samples were subjected to extraction under a modified Berlese-Tullgren funnel apparatus in the laboratory. Live mites for biological studies were extracted into collecting vials containing water/moistened pith. The process of extraction was carried out for a period of 2-3 days depending upon the moisture content of the samples. Live mites were picked up with a moistened camel hair brush under a stereomicroscope and transferred in to individual culture cells for subsequent rearing. Rearing of selected species of oribatid mites was carried out in the laboratory in plastic chambers based with plaster of Paris- charcoal mixture (4:1). Fresh coconut pith collected from the retting grounds were kept in polythene bags and brought to the laboratory. This was dried in an oven at 103°C for 1-2 days and stored in desiccators for subsequent use as test food item.Food item was offered individually at the center of the culture cell. Regular observation was made regularly thrice a day.

Results and Discussion

Coconut pith has a very high water holding capacity and is very stable because of the presence of high percentage of lignin which takes decades to decompose. The pith was found consumed by the adults larva and the nymphs of *P.punctata*. (Julie and Ramani, 2007). *Protoribates*, in general comprises very active forms with a wide range of tolerance to various environmental factors (Julie and Ramani,2015).Laboratory feeding experiments carried out on *P. punctata* revealed this species as a voracious feeder of coir pith on which it could successfully complete several generations. This species also was recognized as a bisexual species in both field and laboratory conditions.Postembryonic development of *P. punctatus* also initiated with the deposition of spermatophores by males. The deposition of spermatophores in oribatid mites was reported in a number of species by various authors (Shereef, 1977;Julie and Ramani, 2009). Males laid innumerable number of spermatophores singly on and around the food items, 5-8 days after their emergence. The spermatophores of *P. punctatus* appeared as dew drops, ustalked, bearing globular shining heads. The spermatophore head measured 46- 51 µm in length and 35-38 µm in width. Stalk of spermatophores measured 69-73µm. A single male laid 15-25 spermatophores per day. Spermatophore deposition lasted for 25-30 days. The females wandered inside the culture cells with their genital flaps widely opened so as to take up the globular heads of the spermatophores through the genital opening. Several such deheadedspermatophore stalks could be observed in the culture cells/walls of culture cells. The females which actively took up spermatophores started oviposition after 8-9 days. Concealed places in culture chambers were the preferred sites for oviposition. Freshly laid eggs appeared oval in shape and translucent. The incubation period lasted for 5-6 days. As the incubation period progressed, there appeared an area of weakness at the anterior pole, which developed into a slit and got extended in either direction laterally to the posterior pole. Prior to this observation, the egg got changed to reddish to pale brown in colour. The egg case lastly cleaved in to two halves, leading to the emergence of a hexapod larva. The larva appeared highly lethargic soon after hatching and initially it showed slug-gish movement and resumed normal activities and feeding af-ter 10-20 minutes. The active feeding period of the larva lasted

for 2-3 days. At the end of its active feeding period, gradually it became swollen in appearance, sluggish in habit and stopped feeding. This inactive phase was recognized as the first quiescent phase. The duration of the quiescent phase was the same as that of the active period. The end of quiescence was marked by the moulting process which lasted for 2 hours. Moulting of the larva was found completed following the same pattern and it was found initiated by the development of a posterolateral slit on either side of the notogaster and each slit gradually extended to meet medially. After about 45 minutes, the prodorsum of the emerging nymph was found protruded through the slit, as a consequence of its wriggling movements. Progressive up and down movements of moulting instar resulted in the lifting off of the dorsal half of the exuvium and the release of protonymph, leaving behind the exuvium. The protonymph emerged was slightly larger than the larva and was an octapod. Newly moulted nymph remained stationary for 15-25 minutes near the exuvium and initiated wandering in search of food. On reaching the food item i.e., the coconut pith, the protonymph started feeding. The active period of the protonymph lasted for 3-4 days and then it entered in to second quiescent phase of 2.25-3.00 days duration. Subsequent moulting of protonymph led to the emergence of the deutonymph which was larger than the previous stage. The feeding period of the deutonymph lasted for 3 to 5 days, and after which it passed through a quiescent phase of 3-4 days duration. On subsequent moulting of the IIIrd quiescent phase, the tritonymph emerged, which was the largest among the juveniles. Tritonymph was creamy yellow in colour with brown legs and was observed to feed voraciously on the pith for 4-6 days. On the 3rd or 4th day of its quiescent phase, the colour of the nymph got changed to light brown. Subsequent to this colour change, moulting of the tritonymph took place and the adult emerged. The newly emerged adult was less sclerotized. Within 2-3 days of emergence, the colour of the body of the adult got changed into dark brown. The intense feeding activity of oribatid mites on the pith helped to fragment the pith into single fibers and heaps of faecal pellets. Continued feeding activity of the immatures and the adults of this species confining them to the pith resulted in the formation of small cavities, burrows and holes filled with faecal pellets, eggs and immatures. Generally, the feeding efficacy of the immature stages of oribatid

mites is comparatively greater than that of the adults (Haq and Ramani, 1984). The nymphal stages of the species studied were proved highly voracious feeders on their respective favourable items of food given. This suggests that the role of immatures in the turnover of nutrients is comparatively greater than that of the adult mites.

Conclusion

Under laboratory conditions at 30°C and 70% RH, *P. puncta-ta* completed its development from egg to adult within 29.5 -34 days on highly recalcitrant material like coconut pith.. The newly emerged males started deposition of spermatophores within 4-6 days and the newly emerged females initiated oviposition after 8-9 days of active feeding on pith. Thus, the F_1 generation was completed within 37.5-43 days.

References

Behan- Pelletier, V.M. and Hill, S.B. 1978. Feeding habits and spore dispersal of oribatid mites in the North American arctic. *Revue-d'Ecologie- et-de-Biologie-du-sol.* 15(4): 497-516.

Haq, M.A. 1996. Nutritional diversity of oribatid mites in relation to soil fertility. *J. Karnataka Univeristy, Science Special Issue*, 76-91.

Haq, M.A. 2001. Oribatidmites strategies in relation to environment. *Entomon.*,26: 305-309.

Haq, M.A. and Prabhoo, N.R. 1976. Observations on the feeding habits of Oribatid mites from the soils of Kerala (Acarina: Gyptostigmata)-Panphytophages. *Entomon*, 1(2): 133-137.

Haq, M.A. and Ramani, N. 1984. Post Embryonic development of *Paramellobatesbengalensis* (Acari: oribatei) parasitic on *Dioscoriaalata*. In: D.A. Griffths and C.E. Bowman (Eds.) Acarology VI, 2 Ellis Hopwood Ltd. Chichester, England. 819-825.

Julie, E. and Ramani, N.2007. Role of oribatid mites in the degradation highly recalcitrant solid wastes on retting grounds. *J. Acarol.* 27-28.

Julie, E. and Ramani,N.2009. Studies on spermatophore depo-