

Entomology Luminaries @ Kayamkulam



National Seminar
Advances in Biological Suppression of Pests
September 22, 2021
Venue: ICAR-CPCRI RS, Kayamkulam



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भाकृअनुप - केन्द्रीय रोपण फसल अनुसंधान संस्थान
ICAR - CENTRAL PLANTATION CROPS RESEARCH INSTITUTE



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Foreword

I am extremely pleased to understand my colleagues at the Regional Station, Kayamkulam is coming out with an e-bulletin on "*Entomology Luminaries-Kayamkulam*" narrating the professional career and research outcomes of Entomologists, who had empowered the Station. History speaks about the contributions of these distinguished scientists in coconut entomology which took off in 1948 along with the studies on root (wilt) disease, at this Station. This e-bulletin will be ever referred to recollect these entomology luminaries and their research contributions made to the organization. Remembering these legendary figures and co-learning from their studies is always a tradition of ICAR-CPCRI. Furthermore, ICAR-CPCRI reminds the stellar research accomplishments of the first Entomologist Dr. K.K. Nirula, who had in fact described the key pests of coconut and the entomopathogen, *Metarhizium anisopliae* during 1950's in his seminal papers. His first of its kind classical papers on coconut pests are still a valuable knowledge treasury that are well cited. I am equally delighted to mention Dr Chandrika Mohan, Principal Scientist (Agricultural Entomology) is delivering the First Dr. K.K. Nirula Memorial Lecture during the National Seminar on "*Advances in Biological Suppression of Pests*" to be held on virtual platform on September 22, 2021.

I compliment Dr S. Kalavathi, Acting Head of the Regional Station and all organizers for having conceived this innovative idea in recognising the legendary experts in the discipline of Entomology and commemorating their outstanding contributions for the referral for next generation scientists.

I wish the programme a grand success.

22-09-2021

Dr Anitha Karun
Acting Director

Preface

History of any Farm Institute will be recognized by the contributions of stalwarts who have dedicated their career for the cause of science and farmer's welfare. A coconut disease, later christened as root (wilt) disease which prevailed in this region of Peninsular India was first studied by an Imperial Mycologist Sir E.J. Butler, who had published a classical seminal paper entitled "Report on Coconut Palm Disease in Travancore" in 1908 and opened the door of palm disease research. The State Department of Agriculture under the princely State of Travancore established a State Research Laboratory at Quilon and field station at Kayamkulam in 1937 to undertake in depth studies of the disease. Subsequently the Research Laboratory at Quilon and field station at Kayamkulam got transferred to Indian Central Coconut Committee in 1947 and the foundation stone laying ceremony of this Institute was performed by His Highness Marthanda Varma B.A., Elaya Raja of Travancore on 24-04-1947. The coming year 2022 marks the 75th birth anniversary of the Institute coinciding with 75th year of Independence of our Nation. The functional establishment of Central Coconut Research Station (CCRS) at Kayamkulam commenced with effect from 1948. Dr KPV Menon became the first Director of the Institute.

Root (wilt) disease, being a debilitating malady and not lethal in nature; could deteriorate palm health leading to invasion by insect pests, mites, nematodes and rodents. In this scenario three experts viz., Dr TA Davies, Dr KM Pandalai and Dr KK Nirula joined CCRS in 1948 with research focus on Physiology, Biochemistry and Entomology, respectively. Entomology research at this Institute was anchored by Dr KK Nirula. CCRS at Kayamkulam, later became the Regional Station of ICAR-Central Plantation Crops Research Institute in 1971 under the aegis of ICAR, New Delhi with Kasaragod as Headquarters.

Legacy of this Institute and history of entomology research commenced from 1948 onwards, which is one of the pioneering and premier research institutes in crop protection in our country. Research contributions made by distinguished entomologists under the legacy of Dr KK Nirula are outlined in this small bulletin for the new generation to understand and appreciate. The list narrates dedicated entomologists from Dr KK Nirula up to Dr Chandrika Mohan, Principal Scientist and their research accomplishments. On the eve of superannuation of Dr Chandrika Mohan on 01-10-2021, she will be delivering the first Dr KK Nirula Memorial lecture during the National Seminar on Advances in Biological Suppression of Pests on virtual platform on 22-09-2021. The Institute made world class contributions in biological suppression of coconut pests through augmentative release of entomopathogens and parasitoids including conservation biological control for the management of various pests of "Kalpavriksha". The stellar research contributions of the entomology legends at the Institute consist of bionomics of major pests of coconut including the discovery of coreid bug in 1972, coconut eriophyid mite in 1998, sooty mould scavenger beetle in 2018 and nesting whiteflies in 2019.

History will remember the outstanding services of these legends and their research accomplishments in entomological sciences which are being outlined for the new generation to understand and take forward. Being a maiden attempt, editors feel more refinements will be necessary in future editions. We profusely thank Dr Anitha Karun, Acting Director, ICAR-CPCRI, Kasaragod and Dr. S. Kalavathi, Acting Head, ICAR-CPCRI, Regional Station Kayamkulam for their unstinting support.

22-09-2021

Editors

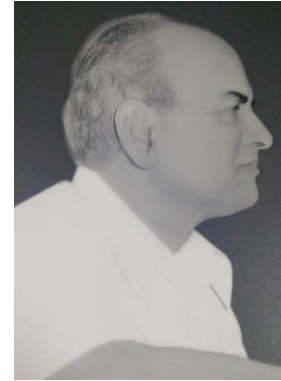
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Entomology Luminaries @ Kayamkulam

I Dr Kanwal Kishan Nirula, M.Sc., Ph.D (05-05-1917)

Born at Jhang city (Punjab, now Pakistan), Dr. K.K. Nirula passed M.Sc (Zoology) Hons. in 1939 from Punjab University, Lahore and Associate IARI, in 1942 from Indian Agricultural research Institute, New Delhi. He started his career as Entomologist at Central Coconut Research Station, Kayamkulam in 1948 along with other luminaries such as Dr. T.A. Davis (Plant Physiology), Dr. K.P.V. Menon (Plant Pathology) and Dr. K.M. Pandalai (Biochemistry). It was the preliminary formative phase of the Institute envisioned by the princely State of Travancore for undertaking research on root (wilt) disease and other pests and diseases on coconut. With his systematic research approach, he had described the biology and management of key pests of coconut, viz., coconut rhinoceros beetle, *Oryctes rhinoceros* Linn., red palm weevil, *Rhynchophorus ferrugineus* (Oliv.), black headed caterpillar, *Opsinia arenosella* (Wlk.), white grub, *Leucopholis coneophora* Burm., slug caterpillar, *Conthyla rotunda* Hamp., rats etc from 1951 to 1957. He was awarded Ph.D. in 1955 by Punjab University, Chandigarh for his brilliant work on coconut pests. His investigation results were published as seminal papers of International repute.



The epizootology and economic significance of the green muscardine fungus, *Metarhizium anisopliae* (Metsch.) infecting *O. rhinoceros* was also first highlighted by him during 1955 and was published in *Indian Coconut Journal*. These outstanding research programmes later formed the building blocks of coconut entomology which was strengthened by other distinguished workers. He was relieved on 18-04-1957 to take up the post of Agricultural Entomologist in the Potato Research Institute, Patna, Bihar.

Dr Nirula was deputed for an International course on Nematology in 1961 at Rothamsted Experimental Station, Harpenden, UK. On return, he took over as Nematologist at ICAR-CPRI, Shimla and published excellent papers on potato nematodes. He was selected as Deputy Director (Training), in Directorate of Plant Protection, Quarantine and Storage and headed the Central Plant Protection Training Institute (Presently NIPHM) at Hyderabad. He was elevated to the post of Project Director and superannuated from there in May 1975. He was re-employed as Plant Quarantine Officer by ICRISAT, Hyderabad and further promoted as Plant Quarantine consultant to FAO, Rome. Dr Nirula visited all Gulf countries to suggest measures for strengthening plant quarantine services to those countries.

He was the architect in formation of Plant Protection Association of India in 1972 and served as the founder President of the Association. He has 120 research papers to his credit. He passed away at Rome on 30th August 1981 while serving on FAO assignment.

II Sri J. Antony, M.Sc. (Kerala) (16-05-1920)

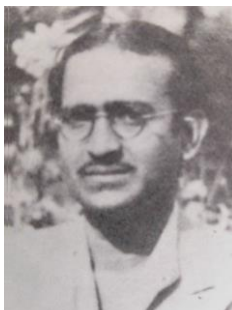


Sri. J. Antony was born at Pulincunnoo, Kuttanad, Alappuzha district. He joined the Central Coconut Research Station, Kayamkulam as Junior Parasitologist on 03-11-1948 and worked under the guidance of Dr K.K. Nirula. He did his pioneering work on parasite breeding under PL-480 programme and played an important role in popularizing parasite breeding and bio-control of coconut pests. He was instrumental in the setting up of Insect proof house (Insectary) and Parasite breeding laboratory at Kayamkulam. The fundamental aspects on parasitoid

breeding for the management of black headed caterpillar, *O. arenosella* were initiated at the Institute by him. He was trained at Commonwealth Institute of Biological Control, Bangalore. He has contributed immensely on biology and biological control of coconut pests. Introduction and colonisation of the exotic reduviid predator, *Platyeris laevicollis* Dist. for the biological suppression of the coconut rhinoceros beetle was attempted by him. He superannuated from service on 31-07-1981 as Scientist-S2 (Senior Scientist) after distinguished service for 33 years. He was a recipient of ICAR Diamond Jubilee of Coconut Research in India (1916-1976) Award in 1976 for his valuable contributions in coconut entomology.



III Dr. Chandy Kurian M.Sc. (Zoology Agra), Ph.D (Zoology Agra). (24-02-1925)



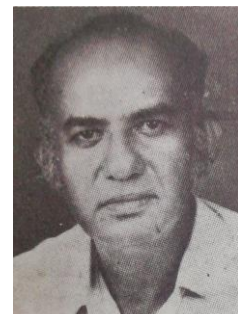
Dr Chandy Kurian started his career as a Research Associate and as a lecturer in Zoology at the School of Entomology, St John's College, Agra from 1948 to 1955. He joined Central Coconut Research Station, Kayamkulam as Entomologist in 1955. The valuable taxonomic information for the Bethylidae, Chrysididae, Dryinidae and Formicidae described by Dr Kurian has been reported by Sudhir Singh *et al.* 2021 as Rediscovery of Kurian's types of Hymenoptera at Forest research Institute, Dehradun, India with notes on Indian Bethylid fauna *Zootaxa* August

5019(1): 1-90. A review of Bethylidae from India and a tribute to Dr Chandy Kurian has also been provided. During his research career he published more than 80 research papers and described 104 new taxa with 77 species of Hymenoptera (Insecta), 21 of Malacostraca (Crustacea) and six of Siphonostomatoida (Crustacea): 45 of Bethylidae (Hymenoptera); 03 of Dryinidae (Hymenoptera); 01 of Chrysididae (Hymenoptera); 22 of Eulophidae (Hymenoptera); 01 of Eupelmidae (Hymenoptera); 01 of Formicidae (Hymenoptera); 04 of Pteromalidae (Hymenoptera); 13 of Bodotriidae (Malacostraca); 06 of Caligidae (Malacostraca); 02 of Diastylidae (Malacostraca); and, 06 of Caligidae (Siphonostomatoida). He reported the occurrence of leaf weevil, *Mylloceris curvicornis* Fab. in 1968 and nut crinkler (coreid bug), *Paradasynus rostratus* Dist. as a new pest on coconut in 1972. His classical compilation along with colleagues "Insect and Mites associated with the Coconut Palm (*Cocos nucifera* Linn.) during 1979 in the Technical Bulletin No 2 of ICAR-CPCRI entitled "Nematodes, Fungi, Insects and Mites

associated with the coconut palm" pp 96-218 is a stellar masterpiece reference material even today enlisting insect and mite pests of coconut from >70 coconut growing countries. Dr. Kurian initiated investigations on the insecticidal management of coconut pests. He has also worked on the management of red palm weevil using sterile male release technique in collaboration with BARC, Trombay. He was the PI of PL480 scheme entitled Methods of control of coconut rhinoceros beetle, *Oryctes rhinoceros* and participated in first and second FAO conferences on coconut. He was a Fellow of Royal Entomological Society, London and Zoological Society of India and served as a member of ESI.

IV Dr. K. Mathen, M.Sc. Ph.D (29-03-1930)

Dr Mathen served as Demonstrator and lecturer in Zoology in SN College, Quilon during 1951-1958. He joined Central Coconut Research Station, Kayamkulam as Research Assistant on 02-06-1958, became Senior Research Assistant during 1964-72, later as Junior virus entomologist in 1972 and superannuated as Principal Scientist at Kayamkulam on 31-03-1990. He had worked on the biology and management of insect pests and nematodes infesting coconut. He reported star scale, *Vinsonia stellifera* Westwood and the bagworm *Manatha albipes* Moore during 1962. He has recorded the burrowing nematode, *Radopholus similis* and 14 other phytonematodes in coconut system including five newly described nematode species. He had studied the biology and management of lace bug, *Stephanitis typica* and established the vectoral role of *S. typica* in the transmission of root (wilt) disease using electron microscopy. He has identified mirid bugs, *Stethoconus praefectus* (Distant) and *Apollodoitus praefectus* Distant as predators on lace bug. The pivotal role played by Dr Mathen and his associates in establishing the vectoral role of tingid bug, *S. typica* and also the plant hopper, *P. moesta* as the vector of root (wilt) disease is a landmark event in the etiology of the disease.



V Sri G Bhaskaran Pillai M.Sc (Zoology Kerala) Ph.D (03-12-1931)



Sri GB Pillai completed M.Sc. Zoology from SN College, Quilon and joined as Research Assistant on 01-03-1958 at CCRS, Kayamkulam and later got promoted and served as Senior Research Assistant from 1963 to 1972. Thereafter, he was appointed as Entomologist at CPCRI, Kasaragod under AICRP on Cashew and Spices. He later joined back ICAR-CPCRI, Regional Station, Kayamkulam on 01-07-1977 and superannuated as Principal Scientist at Kayamkulam on 31-12-1991. Initially he has worked on bionomics and management of insect pests of cashew and spices. He has specialized on ecology and biological control of *Opisina arenosella* and standardized techniques for the mass production of the pupal parasitoid,

Brachymeri nosatoi and *Xanthopimpla nana nana*. He was associated with sampling and estimation of field population and release of parasitoids. He studied on the entomopathogen, *Metarhizium anisopliae* and successfully introduced baculovirus of *O. rhinoceros* in Minicoy and Androth, Lakshadweep Island. He has published a total of 97 research papers in National / International Journals. He was the recipient of Dr CS Venkataram Memorial Award (1986), served as Life Member and Executive Councillor of ISPC (1972-74) and Member, Editorial Board, JPC (1980-84). He was also a member of ISBA and IUSSI.

VI Captain C.P. Ramachandran, M.Sc . (09-07-1934)

Captain Ramachandran joined Central Coconut Research Station, Kayamkulam as Senior Research Assistant in 1958 and superannuated as Senior Scientist during 1994. He studied the insecticidal control of *Oryctes rhinoceros* and developed a method for crop loss estimation. He studied the strain variability of red palm weevil collected from various geographical regions of India. He also found that the release of male sterile weevils is one of the viable options for management of red palm weevil. He was associated with the development of electronic detector for early diagnosis of red palm weevil infestation. He also developed a rearing technique for *Stethocorus* sp. a potential predator of *S. typica*, a vector of root (wilt) disease. He was the recipient of Samaj Seva Star (1965), Rakhsha Medal (1965) and Sainya Seva Medal during his service as Captain in Indian Army.



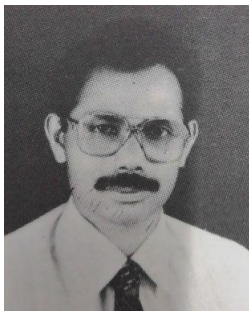
VII Dr. B. Sathiamma M.Sc., Ph.D (22-03-1939)



Dr Sathiamma joined as Research Assistant in 1964 at CCRS, Kayamkulam and initiated work on coconut pests. From 1974 to 1978, she worked at ICAR-CPCRI, Regional Station, Vittal on pests of cashew particularly on tea mosquito bug. She returned back to Kayamkulam during 1979 and superannuated as Principal Scientist on 31-03-1999. Initially she worked on insect and mite pests of coconut and recorded three new mite species. She also developed chemical management strategy for *O. rhinoceros*, *O. arenosella*, *S. typica* and studied biological suppression of phytophagous mites. She has transformed the biological suppression method for black headed caterpillar using stage specific parasitoids, into a classical success story. She has reported a wide array of spiders attacking black headed caterpillar and the norms for the release of larval, pre-pupal and pupal parasitoids of *Opisina arenosella*. She discovered the exotic coconut eriophyid mite, *Aceria guerreronis* Keifer from immature nuts of coconut from Kochi, Kerala during 1998. She has undertaken external aided projects funded by ICAR Cess Fund and DBT as Principal Investigator. She was a life member of ISPC, AAE and a member, Acarological Society of India.

VIII Dr. V.A. Abraham, M.Sc (Agriculture), Ph.D (29-05-1940)

Dr Abraham joined Central Coconut Research Station, Kayamkulam on 20-03-1965 as Research Assistant and superannuated from service on 31-05-2000 as Principal Scientist. During 1972-1975, he had worked on pests of black pepper, ginger, turmeric, cashew, arecanut and cardamom. He returned back to Kayamkulam, and further worked on the bio-ecology and management of white grub, *Leucopholis coneophora*, red palm weevil, *Rhynchophorus ferrugineus*, slug caterpillar, *Conthyla rotunda*, coreid bug, *Paradasynus rostratus*. He has identified the earwig, *Chelisoche morio* F. as a predator on eggs and early-instar grubs of red palm weevil. He was deputed to Saudi Arabia as a special consultant for the area-wide management of red palm weevil infesting date palms where he could demonstrate the successful management of the pest using pheromone traps. He is the recipient of NRDC Award for the invention of insecticide granule applicator and a life member of ISPC.

**IX Sri A.S. Sukumaran, M.Sc. (23-01-1946)**

Dr A. S. Sukumaran joined as Scientist at Kayamkulam in 1974 and superannuated as Principal Scientist from ICAR-CPCRI, Kasaragod in 2006. He served as Extension Entomologist and organized training courses, Lab to Land and Operational Research Projects, research cum demonstration plot and led diagnostic farm field visits and delivered technical advice. He has also estimated crop loss in coconut due to pests and diseases. He conducted varietal evaluation trials in root (wilt) affected areas to test its reaction to root (wilt) disease.

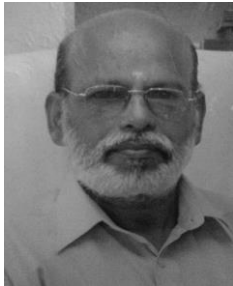
X Dr. K.N. Ponnamma M.Sc., Ph.D (23-02-1947)

Dr Ponnamma joined as Research Assistant at Kayamkulam in 1972 and superannuated as Principal Scientist from ICAR-CPCRI, Regional Centre, Palode. During 1972 to 1983 at Kayamkulam, she has evolved effective management strategies for the suppression of black headed caterpillar, *Opisina arenosella* and coried bug, *Paradasynus rostratus*. She had extensively studied on the exotic parasitoid, *Spoggosia (Stomatomyia) bezziana* and the exotic predator, *Platyeris laevicollis*. She could find close association of coconut leaf weevil, *Myloccerus curvicornis* on root (wilt) disease palms. She reported *Syntomis passalis*, as a new pest on coconut. She was transferred to ICAR-NRCOP, RC, Palode on 1983. She worked on putative vectors of arecanut yellow



leaf disease (YLD) and established the role of the plant hopper, *Proutista moesta* as the vector of arecanut YLD. She is a Member, ISPC.

XI Dr. C.P. Radhakrishnan Nair, M.Sc (Agriculture), Ph.D (15-05-1947)



Dr CPR Nair joined ICAR-CPCRI, Kasaragod as Senior Research Scientist on 01-07-1972 and worked on storage pests of cashew and nematological aspects of plantation crops. He worked for a decade at ICAR-CPCRI, Regional Station, Vittal and worked on insect pests of cocoa and bioecology and management of cashew pests. He joined Kayamkulam in 1985 and associated with studies on insect transmission of coconut root (wilt) disease. As Head of Regional Station from 2003 to 2009, he has undertaken investigations on coconut eriophyid mite, red palm weevil, leaf eating caterpillar and also associated with the transfer of technology programmes conducted by the Extension Section of the Institute. He superannuated as Principal Scientist and Head of ICAR-CPCRI, RS, Kayamkulam on 31-05-2009. He had put on 37 years of illustrious career in entomology of plantation crops. He acted as Technical Member in the National Team constituted by Government of India for the estimation of incidence and crop loss by coconut eriophyid mite. He had been the Principal Investigator of two International Projects funded by World Bank, FAO and APCC, Jakarta on Integrated Pest Management in Coconut and Integrated management of coconut eriophyid mite, respectively. Under a DBT-funded project, he had area-wide demonstrated the IPM technologies developed by the Institute for coconut pests in various agro-climatic zones of India. He had more than 130 publications including research papers, popular articles, presentation in National and International symposia, book chapters and project reports. He has visited major coconut growing countries of South East Asia as a National Coordinator in reviewing the coconut pest management approaches in the participating countries. He was instrumental in the establishment of a New Bio-control Laboratory at Kayamkulam. The investigations undertaken by Dr Nair and his associates Sri P. Rajan, Dr Chandrika Mohan, Dr P. Anithakumari and Dr Murali Gopal were bestowed upon with the Best Team Work Award of ICAR-CPCRI in 2010. He is a Fellow of ISPC.

XII Sri P. Natarajan M.Sc (Agri) (24-06-1948)

He has joined as Assistant Entomologist at ICAR-CPCRI, Regional Station, Kayamkulam. He studied the magnitude of rat damage and vertebrate pests in coconut garden and evolved possible control measures: He was also involved in the management of coconut rhinoceros beetle and leaf eating caterpillar.

XIII Sri P. Rajan, M.Sc (Zoology) (23-05-1950)

Sri P Rajan joined as an ARS Scientist on 05-09-1977 at ICAR-CPCRI, Research Centre, Appangala and joined the Regional Station, Kayamkulam in 1983, and superannuated as Principal Scientist on 31-05-2012. At Appangala, he undertook studies on the vectoral role of the aphid, *Pentalonia nigronervosa* in the transmission of *Katte virus* disease in small cardamom. He had catalogued the insect vectors of root (wilt) disease in coconut and identified the leaf hopper, *Sophonia greeni* and the plant hopper, *Proutista moesta* with the disease. He also established the vector role of lace bug, *Stephanitis typica* by disease transmission studies. For a brief stint, he served as the Head, ICAR-CPCRI, Regional Centre, Kannara. He has popularised IPM in coconut and published a Technical Bulletin of classical nature. He had sensitized the potential invasive coconut leaf beetle, *Brontispa longissima* among all stakeholders. He was the FAO consultant and visited Sri Lanka as part of diagnosis of Weligama Leaf Wilt Disease. He has made in depth studies on coreid bug, *Paradasynus rostratus* infesting nuts on palms and refined the pheromone traps of coconut rhinoceros beetle.



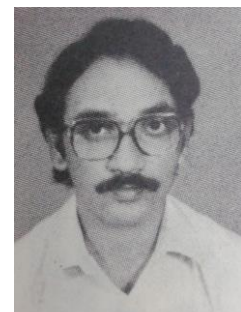
XIV Dr. K.S. Mohan M.Sc., Ph.D (14-12-1952)



Dr Mohan served as Scientist and Senior Scientist at ICAR-CPCRI, Regional Station, Kayamkulam for about eight years. He had isolated the Indian variant of *Oryctes rhinoceros* baculovirus (OBV) and used it as the biocide for the management of coconut rhinoceros beetle. He had partially characterized the genome of OBV and constructed physical map for six restriction endonucleases. He had isolated the *Metarhizium anisopliae* from the infected grubs of rhinoceros beetle and evolved mass cultural methods. He is a member of ISBA and AMI.

XV Dr. T.K. Dangar M.Sc., Ph.D (30-10-1955)

Dr Dangar served as Scientist and Senior Scientist at ICAR-CPCRI, Regional Station, Kayamkulam for about five years. He had standardized the mass production of *M. anisopliae* in coconut water that is wasted in copra industry. He reported a yeast infection in red palm weevil and a eugregarine protozoan pathogen of the coconut root grub *Leucopholis coneophora*. He also reported an infection of the coconut palm beetle *Xylotrupes gideon*, by a non-occluded baculovirus. He is a life member of Society of Biological Chemists and member, AMI and ISPC.



XVI Dr. Murali Gopal M.Sc. (Agri), Ph.D (IARI) (12-12-1967)

Dr Murali Gopal started his career as Agriculture Research Service scientist in 1995 at ICAR-CPCRI, Regional Station, Kayamkulam, Alappuzha District in Biological Control Section of the Institute. He has contributed to revival of microbial control of rhinoceros beetle by recovering *Oryctes rhinoceros* nudivirus (earlier *Oryctes baculovirus*) culture from live grubs and adults collected from Lakshadweep Islands and *Metarhizium anisopliae* from culture collection. He has unravelled the ecological interaction among *OrNV*, *M. anisopliae* and opportunistic bacterial pathogen *P. alkaligenes*, and the use of the fungal entomopathogen for pest management in coconut leaf vermicomposting technology. He has studied the microbiota associated with coconut eriophyid mite for its management. He served at Kayamkulam between August 1995 and March 2002.

XVII Dr. Chandrika Mohan, M.Sc (Zoology), Ph.D. (Zoology) (25-05-1961)

Dr. Chandrika Mohan has completed her M.Sc and M. Phil from Calicut University, Kerala and Ph.D. from Kerala University under the guidance of Dr. B Sathiamma. She has joined as Scientist at ICAR-Indian Lac Research Institute, Namkum, Ranchi, Bihar in 1986 and later moved to ICAR-Central Plantation Crops Research Institute during 1989. During her professional research career, she has standardized techniques for sampling white grub infestation in coconut, biological control of coconut pests as the non-chemical mode of insect pest management accentuating biodiversity conservation, developed a simple, low cost, farmer-friendly production technology of *Metarhizium anisopliae* using rice media, refined mass production techniques of stage-specific parasitoids, isolated and documented the acaropathogenic fungus, *Hirsutella thompsonii* and standardized mass production technology of the fungus in coconut water, established the insect growth regulatory activity of *Clerodendrum infortunatum* and employed it against Black beetle as well as documented arecanut whitefly *Aleurocanthus arecae* and non native nesting whitefly, *Paraleyrodes minei*. She has contributed towards development and validation of bio-control strategies for sustainable pest management in coconut palm. She was associated with projects funded by NATP, CDB, ICAR-AP Cess fund, ICAR-out reach network projects, DBT and CFC/ DFID/APCC/FAO on various IPM aspects of coconut. She has published more than 200 technical articles including more than 50 peer reviewed research articles in National and International Journals and has edited /contributed chapters in more than 10 books. She has received several scientific awards including Fr. Gabriel Memorial Gold medal for securing First Rank in the University. She is also a recipient of Dr C S Venkataram Memorial Prize (ISPC) during XX PLACROSYM 2012. She has functioned as focal point expert from India in International Workshops organized by SAARC and FAO on coconut pest management. She is the Fellow of Association of Advancement of Pest Management in Horticultural Ecosystems and life member in six scientific societies.



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CCRS - ICAR (1960)
Kavamkulam Photo courtesy-Dr. Johny Antony



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