वार्षिक प्रतिवेदन
ANNUAL REPORT

2023

भा.कृ.अनु.प. - केंद्रीय द्वीपीय कृषि अनुसंधान संस्थान
ICAR- CENTRAL ISLAND AGRICULTURAL RESEARCH INSTITUTE
Port Blair-744105, Andaman & Nicobar Islands, India

ICAR CERTIFIED TECHNOLOGIES

Dweep Tickure
Technology developers: Dr. Jai Sunder, Dr. T. Sujatha, Dr. A.K. De, Dr. D. Bhattacharya & Dr. E.B. Chakurkar

Nursery protocol for endemic wild banana
Technology developers: Dr. Pooja Bohra & Dr. Ajit Arun Waman

Concept of mini incubator for rural poultry
Technology developers: Dr. T. Sujatha, Dr. Jai Sunder, Dr. S.V. Lal & Dr. E.B. Chakurkar

Dweep Gau Maa Rakshak for Humpsore
Technology developers: Dr. P. Perumal & Dr. A.K. De

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प्रस्तावना

आई.सी.ए.आर-सी.आई.ए.आर.आई., पोर्ट ब्लेयर, अपने चार प्रभागों, अर्थात् बागवानी और फसल सुधार, प्राकृतिक संसाधन प्रबंधन, पशु विज्ञान, मत्स्य पालन विज्ञान और मिनिकॉय, लक्षद्वीप में एक क्षेत्रीय स्टेशन के साथ, विभिन्न प्रौद्योगिकियों के माध्यम से द्वीपय पारिस्थितिकी का अनुसंधान करने और द्वीप के किसानों तक इसका विस्तार करने में देश में सबसे आगे रहा है। अपने 45 वर्षों के अस्तित्व के दौरान, संस्थान ने 40 से अधिक किस्में विकसित की हैं, पांच पशु और कुक्कुट नस्लों को पंजीकृत किया है, और कई प्रौद्योगिकियों और उत्पादों को लाइसेंस दिया है। वर्ष 2023 हमारे संस्थान के लिए बहुत ही उत्पादक और महत्वपूर्ण रहा है, जिसके दौरान संस्थान ने राष्ट्रीय और द्वीप के स्तर पर अत्यधिक ख्याति प्राप्त की है।

हमारे संस्थान को पशु चिकित्सा के सामयिक अनुप्रयोगों के लिए नवीन एसारिसाइड संरचनाओं और उन्हें तैयार करने की विधि; तरल उर्वरक तैयार करने और भूरे समुद्री शैवाल से कैल्शियम एल्गिनेट निकालने की दोहरी प्रक्रिया; एक परजीवी अंडा सांद्रक; और एक नारियल पत्ता विभाजक तैयार करने के क्षेत्रों में चार पेटेंट प्रदान किए गए। इसके अलावा, बंद जल परिसंचरण प्रणाली, दानचीनी की छाल रगड़ने का उपकरण और एयर लेयरिंग बैग, खरगोश (रैबिट) मॉडल के लिए कृत्रिम गर्भाधान गन, खरगोश (रैबिट) मॉडल के लिए कृत्रिम योनि, और खरगोश वीर्य संग्राहक के लिए छह और पेटेंट दायर किए गए।

इसके अलावा, संस्थान की प्रौद्योगिकी प्रबंधन इकाई के माध्यम से, 16 जुलाई, 2023 को इसके स्थापना दिवस के दौरान आईसीएआर द्वारा चार प्रौद्योगिकियों को प्रमाणित किया गया। ये प्रौद्योगिकियां-द्वीप टिक्योर (हर्बल एसारिसाइड), स्थानिक जंगली केले के लिए नर्सरी प्रोटोकॉल, ग्रामीण कुक्कुट पालन के लिए मिनी-इनक्यूबेटर की अवधारणा, और कूबड़ के उपचार और नियंत्रण के लिए द्वीप गौ माँ रक्षक हैं। फैंसी गप्पी मछली के लिए द्वीप लार्वा पालन की एक प्रौद्योगिकी का व्यावसायीकरण किया गया। इसके अलावा, तीन नई प्रौद्योगिकियां, अर्थात् आम अदरक पेस्ट, खेत और पालतू पशुओं में एक्टोपारासाइट के नियंत्रण के लिए संरचना, और परजीवी अंडा सांद्रक व्यावसायीकरण के लिए एग्रीनोवेट को प्रस्तुत की गई हैं।

पहली बार, हमारे संस्थान द्वारा तीन नस्लों अर्थात् अंडमानी बकरी, अंडमानी बत्तख और अंडमानी सुअर को आईसीएआर-एनबीएजीआर, करनाल में पंजीकृत किया गया है। इसके अलावा, पोषण से भरपूर फल और नोनी के बीजों के साथ अत्यधिक उपज देने वाले जीनप्ररूप के एक बौने कद (स्टेच्योर) को आईसीएआर-एनबीपीजीआर के साथ पंजीकृत किया गया है।

जन संपर्क (आउटरीच) कार्यक्रम के तहत, संस्थान ने 61 प्रशिक्षण, प्रदर्शन और प्रक्षेत्र दिवस आयोजित किए, जिससे 2100 से अधिक किसान लाभान्वित हुए। एसटीसी घटक के तहत, कुल 44 प्रशिक्षण और प्रदर्शन कार्यक्रम आयोजित किए गए, जिससे 1519 आदिवासी किसान लाभान्वित हुए। द्वीप और राष्ट्रीय स्तर पर प्रौद्योगिकी का प्रदर्शन; किसान मेला, विश्व पशु चिकित्सा दिवस, कृषि-इकोटूरिज्म पर कार्यशाला, पशु आनुवंशिक संसाधनों के दस्तावेजीकरण पर परिचर्चा सम्मेलन (इंटरफेस मीट), पीआईएसआरएफ और एएसए द्वारा अंतर्राष्ट्रीय सम्मेलन (आईसीएफपीएलएस-2023), और आर्थिक समृद्धि और पारिस्थितिक स्थिरता के लिए मसालों, सुगंधित और औषधीय पौधों पर राष्ट्रीय सम्मेलन (सैंपेप्स)-2023 जैसे कई आयोजनों के माध्यम से किया गया। इन आयोजनों में मुख्यभूमि के गणमान्य व्यक्ति, तीनों जिलों के किसानों का दौरा, कृषि और समवर्गी प्रौद्योगिकियों से संबंधित द्वीप के छात्रों और उद्यमिता और कृषि इकोटूरिज्म के लिए युवाओं का प्रदर्शन शामिल हो सकता है।

हमारे वैज्ञानिकों को कई प्रतिष्ठित पुरस्कार और सम्मान प्रदान किए गए हैं। डॉ. आर. किरुबा शंकर को एलजी प्रशस्ति प्रमाणपत्र प्रदान किया गया; इसके अलावा, हमारी वैज्ञानिक टीम को 20 से अधिक सर्वश्रेष्ठ पेपर या प्रस्तुतीकरण (प्रेजेंटेशन) पुरस्कार प्राप्त हुए। हमारे वैज्ञानिकों ने अत्यधिक प्रतिष्ठित पत्रिकाओं में 56 शोध-पत्र प्रकाशित किए हैं। चालू

वर्ष के दौरान, हमने 4.96 टन प्रजनक बीज, 90,000 से अधिक गुणवत्तायुक्त रोपण सामग्री का उत्पादन किया।

हमारा खेल दल, विशेषकर महिला टीमें श्रीमती कंथम और श्रीमती चंपा रानी दास ने क्षेत्रीय खेल सम्मेलन में पदक जीते। इस वर्ष वैज्ञानिकों की पदोन्नति/नए प्रवेश भी देखने को मिलें, जैसे डॉ. जय सुंदर का पशु विज्ञान प्रभाग के प्रमुख के रूप में चयन किया गया, डॉ. टी.पी. स्वर्णम का भारतीय कृषि प्रणाली अनुसंधान संस्थान, मेरठ के प्रमुख के रूप में चयन किया गया, डॉ. बीए जेरार्ड का आईसीएआर-सीपीसीआरआई, कासरगोड में एआईसीआरपी-ताड़ के परियोजना समन्वयक के रूप में चयन किया गया, डॉ. वी. दामोदरन का वरिष्ठ वैज्ञानिक और प्रमुख, केवीके, उत्तरी और मध्य अंडमान के रूप में चयन किया गया, डॉ. एन. बोम्मयस्वामी का वरिष्ठ वैज्ञानिक और प्रमुख, केवीके, ओल्ड गोवा के रूप में चयन किया गया, डॉ. बी.के. नंदा का वरिष्ठ वैज्ञानिक और प्रमुख, केवीके, दक्षिण त्रिपुरा के रूप में चयन किया गया, डॉ. संतोष कुमार ने वरिष्ठ वैज्ञानिक और प्रमुख, केवीके, निकोबार के रूप में कार्यभार ग्रहण किया और अनुसंधान एवं विकास और विस्तार गतिविधियों को सुदृढ़ करने के लिए पांच नए वैज्ञानिकों ने संस्थान में कार्य ग्रहण किया।

अच्छी अनुसंधान प्रथाओं को सुविधाजनक बनाने के लिए, संस्थान की परिसम्पत्तियों में नए बुनियादी ढांचे, जैसे एक आधुनिक बकरी शेड और एक डेयरी इकाई को जोड़ा गया है। मिनिकॉय, लक्षद्वीप में हमारे क्षेत्रीय स्टेशन ने एक एकीकृत कृषि प्रणाली मॉडल स्थापित करने के क्षेत्र में सराहनीय कार्य किया है जिसमें फसलों और पशुधन के 15 से अधिक घटकों का प्रदर्शन किया गया है।

मै डॉ. हिमांशु पाठक, सचिव (डेयर) और महानिदेशक, आईसीएआर, डॉ. आनंद कुमार सिंह, पूर्व उप महानिदेशक (बागवानी विज्ञान) और डॉ. संजय कुमार सिंह, उप महानिदेशक (बागवानी विज्ञान) को उनके निरंतर समर्थन, सतत मार्गदर्शन और प्रोत्साहन के लिए हार्दिक धन्यवाद देता हूँ।

संस्थान डॉ. वी.बी. पटेल, सहा महानिदेशक (फल एवं बागवानी फसलें), डॉ. विक्रमादित्य पांडे, प्रधान वैज्ञानिक और एसएमडी बागवानी विज्ञान के सभी कर्मचारियों का उनके निरंतर समर्थन और मार्गदर्शन के लिए आभारी है। संस्थान विभिन्न समितियों, जैसे आरएसी, आईएमसी और आईआरसी के अध्यक्ष और सदस्यों का ऋणी है, जिन्होंने संस्थान के समग्र विकास और प्रगति के लिए अपनी सलाह और सुझाव दिए।

मैं अपने संस्थान के सभी स्टाफ सदस्यों को उनके समर्पण और कड़ी मेहनत के लिए धन्यवाद देता हूँ। अंत में, मैं इस प्रकाशन को निर्धारित समय में प्रकाशित करने के लिए संपादकीय समिति के सभी सदस्यों को धन्यवाद देता हूँ।

दिनांक: 02 मई 2024

एकनाथ बी. चाकुरकर
निदेशक (भा.कृ.अनु.प - कें.द्वी कृ.अनु.सं)

Preface

The ICAR-CIARI, Port Blair, with its four divisions, namely, Horticulture and Crop Improvement, Natural Resource Management, Animal Science, Fisheries Science, and one Regional station at Minicoy, Lakshadweep, has been at the forefront of the country, addressing island ecosystem research through various technologies and its extension to island farmers. During its 45 years of existence, the institute has developed over 40 varieties, registered five animal and poultry breeds, and licensed a number of technologies and products. The year 2023 has been very productive and significant for our institute, which has brought many laurels at the national and island levels.

Four patents have been granted to our institute, in the fields of novel acaricide compositions for veterinary topical applications and the method of preparation thereof; a dual procedure for the preparation of liquid fertilizer and the extraction of calcium alginate from brown seaweed; a parasitic egg concentrator; and a coconut leaf separator. Moreover, six more patents were filed for: closed water circulatory system, cinnamon bark rubbing tool, air layering bag, artificial insemination gun for rabbit model, artificial vagina for rabbit model and rabbit semen collector.

Further, through the Institute's Technology Management Unit, four technologies were certified by ICAR during its Foundation Day on July 16, 2023. The technologies are Dweep Tickure (herbal acaricide), nursery protocol for endemic wild banana, concept of mini-incubator for rural poultry, and Dweep Gau Maa Rakshak for treatment and control of humpsore. One technology for Dweep larval rearing for fancy guppy fish was commercialized. Further three new technologies, namely mango ginger paste, formulation for control of ectoparasite in farm and pet animals, and parasitic egg concentrator have been submitted to Aggrinovate for commercialization.

For the first time, three breeds *viz*. Andamani goat, Andamani duck and Andamani pig, have been registered at ICAR-NBAGR, Karnal, by our institute. Besides, a dwarf stature with a high yielding genotype with nutritionally rich fruit and seeds of noni has been registered with ICAR-NBPGR, New Delhi.

Under the outreach programme, the institute conducted 61 trainings, demonstrations, and field days, wherein, more than 2100 farmers were benefited. Under the STC component, a total of 44 trainings and demonstrations were conducted, benefiting 1519 Tribal farmers. Technology showcasing at the island and national level was done through the conduct of numerous events like; Kisan Mela, World Veterinary Day, Workshop on Agro-Ecotourism, Interface Meet on Documenting Animal Genetic Resources, International Conference (ICFPLS-2023) by PISRF and ASA, and National Conference on Spices, Aromatic, and Medicinal Plants for Economic Prosperity and Ecological Sustainability (SAMPEPES)-2023. The events could witness dignitaries from the mainland, visits of farmers from all three districts, exposure to island students on agriculture and allied technologies and youths for entrepreneurship and agro ecotourism.

Our scientists are bestowed with many prestigious awards and honours. Dr. R. Kiruba Sankar

was awarded a LG Commendation Certificate; besides, more than 20 best papers or presentation awards were bagged by our scientific team. Our scientists have published 56 research papers in journals of high repute. During the current year, we produced 4.96 tonnes of breeder seeds, more than 90,000 quality planting materials.

Our sports contingent, especially the women team Smti. Kantham and Smti. Champa Rani Das, won medals at the Zonal Sports Meet. This year could also witness promotion/new entrants of the scientists, namely Dr. Jai Sunder selected as Head, Division of Animal Science, Dr. T.P. Swarnam selected as Head at Indian Institute of Farming System Research, Meerut, Dr. B. A. Jerard as Project Coordinator, AICRP-Palms at ICAR-CPCRI, Kasargod, Dr. V. Damodaran selected as Sr. Scientist and Head, KVK, North & Middle Andaman, Dr. N. Bommayaswamy selected as Sr. Scientist and Head, KVK, Old Goa, Dr. B.K. Nanda selected as Sr. Scientist and Head, KVK, South Tripura, Dr. Santosh Kumar joined as Sr. Scientist and Head, KVK, Nicobar and five new scientists joined the institute to strengthen the R&D and extension activities.

To facilitate good research practices, new infrastructure *viz*. a modern goat shed, and a dairy unit has been added to the institute assets. Our regional station at Minicoy, Lakshadweep, has done commendable work in the field of establishing an integrated farming system model wherein more than 15 components of crops and livestock have been demonstrated.

I place on record our sincere thanks to Dr. Himanshu Pathak, Secretary (DARE) & Director General, ICAR, Dr. Anand Kumar Singh, former Deputy Director General (Horticultural Science), and Dr. Sanjay Kumar Singh, Deputy Director General (Horticultural Science), for their continued support, constant guidance and encouragement.

The institute is grateful to Dr. V.B. Patel, ADG (Fruits and Plantation Crops), Dr. Vikramaditya Pandey, Pr. Scientist, and all the staff of the SMD (Horticultural Science) for their constant support and guidance. The institute is indebted to the chairman and members of various committees *viz*. RAC, IMC, and IRC, for rendering their advice and suggestions for the overall development and progress of the institute.

I thank all the staff members of our institute for their dedication and hard work. Finally, I thank all the members of the editorial committee for bringing out this publication within the stipulated time.

Date: 02 May, 2024

Dr. Eaknath B. Chakurkar
Director

2. कार्यकारी सारांश

बागवानी फसल सुधार एवं संरक्षण प्रभाग

- कुंदरू के बारह जीनप्ररूप और मिर्च के तीन जीनप्ररूप दक्षिण अंडमान से एकत्र किए गए।
- स्थानिक गार्सिनिया धनिखरीएंसिस का एक फील्ड जीन बैंक स्थापित किया गया।
- गार्सिनिया धनिखरीएंसिस के सात जीनप्ररूपों, मालाबार इमली और फ्लैकोर्टियामोंटाना के छह जीनप्ररूपों का लक्षण-वर्णन किया गया।
- विदेशी सूरीनाम चेरी के बीजों को जीए$_3$ (500 पीपीएम) में भिगोने से अंकुरण में 75.5% तक सुधार हुआ।
- आईसीएआर-सीआईएआरआई से जारी सुपारी और नारियल की किस्मों का एक न्यूक्लियस बीज उद्यान गाराचार्मा फार्म में स्थापित किया गया।
- दालचीनी की चौबीस पौध संततियो (सीडलिंग प्रोजीनी) और तेजपत्ते के छह जीनप्ररूपों का रूपात्मक और प्रमुख जैवरासायनिक मापदंडों के लिए अध्ययन किया गया।
- पाइपर सरमेंटोसम और लौंग के प्रत्येक के छह-छह जीनप्ररूपों और असली दालचीनी के पांच जीनप्ररूपों का लक्षण-वर्णन किया गया।
- तटीय-लवणीय मृदाओं के लिए सीएआरआई (CARI) धान 5 की एक बहु-प्रतिरोधी (जीवाणु अंगमारी-प्रतिरोधी और लवणता-सहिष्णु) चावल किस्म विकसित की गई।
- बहु-जनकीय उन्नत पीढ़ी अंतर संकरण (इंटर-क्रॉस) (मल्टी-पैरेंटल एडवांस्ड जेनरेशन) (MAGIC) के माध्यम से प्राप्त बासठ पुन: संयोजक अंत:प्रजात वंशक्रमों का मूल्यांकन उपज और उपज को जिम्मेदार ठहराने वाले विशषकों के लिए किया गया।
- अवायवीय (एनएरोबिक) परिस्थितियों में 85% से अधिक अंकुरण वाले चावल के सात मैजिक (एमएजीआईसी) वंशक्रमों की पहचान की गई।
- मूंग की किस्मों की तुलना में उड़द की किस्में बाढ़ के प्रति अधिक सहनशील पाई गई।

प्राकृतिक संसाधन प्रबंधन प्रभाग

- अंडमान द्वीप समूह में मृदा और जल संरक्षण के अध्ययन से पता चला है कि भौगोलिक क्षेत्र का लगभग 5.2% अर्थात् 26,420 हेक्टेयर क्षेत्र गंभीर और बहुत गंभीर मृदा के कटाव की सम्भावना वाला क्षेत्र है, और उपयुक्त संरक्षण प्रथाओं के लिए इसे प्राथमिकता दी जानी चाहिए। द्वीपों में क्रमश: लगभग 25% और 20% कृषि बंजर भूमि में मृदा (कंटूर/श्रेणी मेड़बंदी, सीढ़ीदार और चौड़ी क्यारी और खूड) और जल (फार्म तालाब और चेक बांध) संरक्षण प्रथाओं को अमल में लाने की क्षमता है। द्वीपों में जल संरक्षण प्रथाएं अविकसित (37%) थीं।
- नारियल+बकरी+मुर्गी सह मत्स्य घटकों वाली नारियल आधारित एकीकृत कृषि प्रणाली ने वर्ष-^{1} में हे 1 से. 1.43 लाख रुपये का कुल शुद्ध प्रतिलाभ दर्ज किया और वर्ष-^{1} में 204 मानव दिवसों का रोजगार सृजन किया।
- नारियल की जैविक खेती से पता चला कि FYM + अपशिष्ट पुनर्चक्रण (वर्मीकम्पोस्टिंग) + हरी खाद के माध्यम से नाइट्रोजन की अनुशंसित खुराक के उपयोग से 3 वर्षों के बाद नारियल की थोड़ी अधिक उपज (74 नट/पेड़/वर्ष) दर्ज की गई।
- विभिन्न जैविक स्रोतों में, रॉक पीओ$_4$ और बायोपोटाश + बीएफ और पंचगव्य स्प्रे के माध्यम से वर्मीकम्पोस्ट (75% एन) + बायो ग्रेन्यूल्स (25% एन) + पी एवं के के अनुप्रयोग से बैंगन (5.7 टन/हेक्टेयर) और भिंडी (6.0 टन/हेक्टेयर) में अधिक उपज दर्ज की गई जो अजैविक उर्वरकों के माध्यम से 100% आरडीएफ से 30-35 प्रतिशत कम हैं।
- नमी के दबाव की स्थिति में, प्लास्टिक की पलवार (मल्चिंग) के साथ ड्रिप सिंचाई से टमाटर (8.2 टन हेक्टेयर $^{-1}$), बैंगन (11.2 टन हेक्टेयर $^{-1}$) और लोबिया (6.6 टन हेक्टेयर $^{-1}$) में अधिक पैदावार दर्ज की गई। इसी प्रकार, हाइड्रोजेल + के और सीए पर्ण स्प्रे के अनुप्रयोग से टमाटर (8.0 टन हेक्टेयर $^{-1}$),

बैंगन (11.1 टन हेक्टेयर $^{-1}$) और लोबिया (6.4 टन हेक्टेयर $^{-1}$) में अधिक पैदावार दर्ज की गई और यह हाइड्रोजेल + के पर्ण स्प्रे के बराबर हुई।

- नाशीजीवनाशी अवशेषों के विश्लेषण के लिए, सब्जियां (72%) और फल (28%) को शामिल करते हुए, 241 नमूने अंडमान द्वीप समूह के विभिन्न गांवों के फार्म गेट और प्रमुख बाजारों में विक्रेताओं से एकत्र किए गए और ये निर्यात निरीक्षण एजेंसी (ईआईए), कोलकाता को भेजे गए।
- संरक्षित खेती (100 मीटर^2) के तहत सब्जियों की खेती और वर्मीकम्पोस्ट उत्पादन से औसत वार्षिक शुद्ध आय रु. 65000-72000 दर्ज की गई।
- 25% और 15% पर समुद्री खरपतवार तरल उर्वरक के अनुप्रयोग से क्रमश: मूंग (975 किग्रा हेक्टेयर $^{-1}$) और खीरे (620 ग्राम/पौधा) में काफी अधिक पैदावार दर्ज की गई।
- नियंत्रण और डीएपी स्प्रे जैसी अन्य पारंपरिक प्रथाओं की तुलना में 1% ह्यूमिक एसिड के अनुप्रयोग से सीआईएआरआई मूंग-3 (978 किग्रा हेक्टेयर $^{-1}$) की पैदावार में काफी सुधार हुआ।
- चावल के लिए कार्बन फुट प्रिंट बहुत अधिक > 10 Mg CO2 eq/ha था, जबकि यह अन्य कृषि योग्य फसलों में केवल 2 Mg Co2 eq/ha से कम दर्ज किया गया।
- वर्ष के दौरान बहु-विषयक सलाहकार टीम की मदद से कृषि उत्पादन के सभी पहलुओं को शामिल करते हुए कृषि मौसम संबंधी कुल 102 बुलेटिन जारी किए गए।
- अंडमान और निकोबार द्वीप समूह में जल बजट विश्लेषण से पता चला कि सभी क्षेत्रों की वर्तमान वार्षिक मांग को पूरा करने के लिए कुल लगभग 32.78 एमसीएम पानी की आवश्यकता है। यह भी अनुमान लगाया गया है कि वर्ष 2031, 2041 और 2051 तक विभिन्न कृषि और गैर-कृषि क्षेत्रों की मांग को पूरा करने के लिए क्रमश: 38.12, 45.2 और 53.06 एमसीएम पानी की आवश्यकता होगी।
- डिगलीपुर, मायाबंदर, मध्य अंडमान, बाराटांग, दक्षिण अंडमान और निकोबार वन प्रभागों के लिए राज्य सीएएमपीए निधि से किए गए निर्माण-कार्यों की तीसरे पक्ष (थर्ड पार्टी) से निगरानी करवाई गई।
- टेरोकार्पस डेलबर्गियोइड्स आधारित अनुक्रमिक फसल प्रणाली पर प्रारंभिक अवलोकनों में, अंतरफसलों ने अच्छा प्रदर्शन किया और 10 मीटर^2 क्षेत्र से 35 किलोग्राम टैपिओका कंद की खेती की गई और 10 मीटर^2 क्षेत्र में सब्जी लोबिया की 2.2 किलोग्राम पैदावार हुई।
- नारियल के बागान के तहत बहुउद्देश्यीय वृक्ष प्रजातियों का कुल बायोमास अच्छा पाया गया और सबसे अधिक कुल शुष्क बायोमास कैलोफिलुमिनोफिलम (21.54 किलोग्राम) में दर्ज किया गया, इसके बाद टेरोकार्पस डेलबर्गिओइड्स (8.65 किलोग्राम) में दर्ज किया गया।
- द्वीप की परिस्थिति के तहत नारियल के बागानों को समृद्ध करने के लिए हरे बायोमास: डेंड्रोलोबियम अम्बेलैटम (एल.) मृदा पोषक तत्व संवर्धन; सेसबानिया ग्रैंडिफ्लोरा, ल्यूकेना ल्यूकोसेफला, विंड ब्रेक; कैलोफिलुमिनोफिलम और बहुइनियास्प के स्टेक के लिए केसुरीना इक्विसेटिफोलिया जैसी प्रजातियों की सिफारिश की गई।
- पैंडनस टेक्टोरियस, पी. लेरम और पी. ओडोरिफर से प्राप्त बीज के तेल का फैटी एसिड प्रोफाइल के लिए विश्लेषण किया गया। परिणामों से पता चला कि पी. टेक्टोरियस बीज तेल में 40.09% का उच्चतम संतृप्त फैटी एसिड देखा गया।
- पैंडनस लेरम के कच्चे और पके गूदे और बीजों की पोषण और पोषण विरोधी गतिविधियों का विश्लेषण किया गया और परिणामों से पता चला कि कच्चे गूदे से सबसे अधिक कार्बोहाइड्रेट सामग्री (41%) देखी गई और पके हुए गूदे में 31% कार्बोहाइडेट दर्ज की गई।
- तीन पैंडनस प्रजातियों (पी. लेरम, पी. टेक्टोरियस और पी. ओडोरिफर) के लिए विशिष्ट एकरूपता और स्थिरता विश्लेषण किया गया और 15 वृक्षों और पत्तियों, 1-1 फूल, जड़ और 8 फल और बीज के लक्षणों का दस्तावेजीकरण किया गया।
- फाइटोकॉन्स्टिट्यूएंट प्रोपेनोइक एसिड, 3-नाइट्रो-, मिथाइल एस्टर एक जैविक एसिड व्युत्पन्न है, जबकि इसकी जैविक गतिविधि अभी तक रिपोर्ट नहीं की गई

है। सामूहिक रूप से पी. लेरम के फाइटोसंघटकों में विभिन्न दिलचस्प औषधीय गतिविधियां पाई गईं।

- मैंग्रोव समुदाय जोनेशन मैपिंग, निकोबार द्वीप समूह के लिए आईआरएस लिस (एलआईएसएस) IV के 9 दृश्यों का चयन किया गया था और इनका इमेजरी प्रसंस्करण, आर्कजीआईएस सॉफ्टवेयर में किया गया।
- दो पादपों के खोजपूर्ण सर्वेक्षण किए गए (नानकॉरी और कार निकोबार द्वीप समूह) और पांडनस लेरम के 6 एक्सेशन, एक नारियल एक्सेशन, पांच पांडनस टेक्टोरियस एक्सेशन और एक चैम्पेरियामैनिलाना एक्सेशन, चार डायोस्कोरियालाटा, तीन कोलोकेसिया एस्कुलेंटा और तीन पांडनस लेरम एक्सेशन एकत्र और संरक्षित किए गए और आईसीएआर-एनबीपीजीआर, नई दिल्ली से इनके आईसी नंबर प्राप्त किए गए।
- मोरिंडासिट्रिफोलिया एल का उपयोग करके कपास के लिए सर्वोत्तम रंगाई पैरामीटर स्थापित करने के लिए लकड़ी के रंग निकालने हेतु विभिन्न रंगाई परिस्थितियों के साथ इष्टतम अध्ययन किए गए।
- एक अंडमानी बौनी सुपारी (आईएनजीआर23064) और एक नोनी (मोरिंडासिट्रिफोलिया) (आईएनजीआर 22093) आईसीएआर, नई दिल्ली में पंजीकृत किए गए।
- 90 x 60 सेमी के पादप घनत्व के साथ उच्च घनत्व के तहत जिमीकंद रतालु याम की उल्लेखनीय रूप से उच्चतम कॉर्म पैदावार (43.89 टन/हेक्टेयर) दर्ज की गई।

पशु विज्ञान प्रभाग

- अंडमान और निकोबार द्वीप समूह (अंडमानी बकरी और टेरेसा बकरी) की स्वदेशी बकरियों की आनुवंशिक विविधता, आबादी संरचना और उत्पत्ति की जांच माइटोकॉन्ड्रियल चिह्नकों (मार्करों) के माध्यम से की गई। यह पाया गया कि अधिकांश बकरी हैप्लोटाइप हैप्लोग्रुप ए से संबंधित थीं, इसके बाद हैप्लोग्रुप बी और हैप्लोग्रुप डी से संबंधित थीं। फाइलोजेनेटिक विश्लेषण ने खराब भौगोलिक संकेत को दर्शाया; जिससे संकेत मिलता है कि इन बकरियों को या तो बहुदिशात्मक प्रसार या दिशाहीन (यूनिडायरेक्शनल) प्रसार के माध्यम से इन द्वीपों में आयात किया गया था।
- रेस्ट्रिक्शन फ्रैगमेंट लेंथ पॉलीमोर्फिज्म (आरएफएलपी) मार्कर का उपयोग करके अंडमान और निकोबार द्वीप समूह की बकरियों के आनुवंशिक संरचना विश्लेषण से संकेत मिलता है कि निकोबार बकरी आबादी दक्षिण अंडमान और उत्तरी और मध्य अंडमान से संबंधित बकरी आबादी की तुलना में अधिक अलग समूह है। आणविक विचरण (AMOVA) विश्लेषण की जांच से संकेत मिलता है कि आनुवंशिक स्तर पर, टेरेसा बकरी और अंडमानी बकरी में 2% का अंतर है।
- संपूर्ण जीनोम विश्लेषण के बाद जीनोम-व्यापी एसोसिएशन के अध्ययन (जीडब्ल्यूएएस) ने अंडमान बकरी की आबादी में बकरी प्रजनन क्षमता से जुड़े पांच सकारात्मक और एक नकारात्मक डीएनए मार्कर की पहचान की।
- अंडमान पशुओं का जीनप्ररूपण, पोलीमरेज चेन रिएक्शन-प्रतिबंध खंड लंबाई बहुरूपता (पीसीआर-आरएफएलपी) पद्धति द्वारा बीटा-कैसिइन जीन के आधार पर किया गया था। संकर नस्ल, देशी और मवेशियों के कुल नमूने में जीनोटाइपिक A2A2 की आवृत्ति क्रमश: 53.81, 92 और 67.04 थी। A1A1 जीनप्ररूप के लिए कोई भी पशु समयुग्मजी (होमोजाइग्स) नहीं पाया गया। प्राप्त A1 और A2 जीन की आवृत्ति क्रमश: 16.48 और 83.52 थी।
- उच्च थ्रूपुट आई लूमिना (I llumina) अनुक्रमण प्लेटफॉर्म का उपयोग करके निकोबारी सुअर की आंत की माइक्रोबियल विविधता और संरचना की जांच की गई। फाइलम स्तर पर, आंत माइक्रोबायोटा में फर्मिक्यूट्स, एक्टिनोबैक्टीरिया, टीएम7, प्रोटीओबैक्टीरिया, बैक्टेरॉइड्स और क्लोरोफ्लेक्सी का प्रभुत्व था। क्रम स्तर पर, जेजुनम, इलियम और सीकुम में लैक्टोबैसिलेल्स सबसे अधिक प्रचलित था और बड़ी आंत में सबसे प्रचलित क्रम क्लोस्ट्रीडियल्स का था।
- हर्बल पौधों की एसारिसाइडल गतिविधि को देखने के प्रयास में, खाद्य और कृषि संगठन (एफएओ) द्वारा अनुमोदित पाले (इन विट्रो) परख यानी लार्वा पैकेट परीक्षण (एलपीटी) किया गया। कुल छह हर्बल पौधों

का उनकी एसारिसाइडल गतिविधि के लिए परीक्षण किया गया। वे हैं करकुमा लोंगा, एकोरस्केलमस (वसंभु), पाइपर नाइग्रम (काली मिर्च), ओसीमम सैंक्टम (तुलसी), एकलिफेन्डिका (अकैलिफा) और ल्यूकासास्पेरा (ल्यूकास)। इनका अलग-अलग रूप से और संयोजन में परीक्षण किया गया। अलग-अलग जलीय अर्क ने आंशिक प्रभाव दिखाया लेकिन पॉलीहर्बल संयोजन ने 100% एसारिसाइडल प्रभावकारिता प्रदर्शित की।

- पालन-पोषण की गहन प्रणाली में द्वीप की परिस्थिति में इष्टतम प्रोटीन स्तर और पोषक तत्वों की आवश्यकता का पता लगाने के लिए अंडमानी सुअर में भोजन और विकास संबंधी परीक्षण किए गए। जब कुल आहार प्रोटीन स्तर (18.5%) 5% और 10% कम हो गया, तो आहार (फीड) सेवन, पोषक तत्वों की पाचनशक्ति, औसत दैनिक लाभ, फीड रूपांतरण अनुपात और रक्त जैव-रसायन पर अवलोकन एक समान पाए गए। हालांकि, प्रोटीन का स्तर कम होने से शव की गुणवत्ता में काफी सुधार आया।
- बैसिलस मेसेन्टेरिकस, बैसिलस कोगुलांस, एंटरोकोकस फेकेलिस और क्लोस्ट्रीडियम ब्यूटिरिकम युक्त मल्टी-स्ट्रेन बैसिलस-आधारित प्रोबायोटिक संरचना के पूरक ने घेंटे (पिगलेट) के दूध छुड़ाने के दबाव को कम कर दिया, जिससे फीड सेवन शरीर का वजन, प्रतिआक्सीकारक गतिविधि, लिपिड प्रोफाइल, प्रणालीगत और म्यूकोसल रोग प्रतिरोधक क्षमता और अंडमान और निकोबार द्वीप समूह की गर्म और आर्द्र जलवायु परिस्थितियों में दूध छुड़ाए हुए घेंटों के समग्र विकास के प्रदर्शन में सुधार हुआ। इसलिए, दूध छुड़ाने के दबाव को कम करने के लिए दूध छुड़ाए हुए घेंटों में मल्टी-स्ट्रेन प्रोबायोटिक यौगिक की सिफारिश की जा सकती है।
- शुष्क गर्मी के मौसम में प्रजनन वाले हिरन शारीरिक और ऑक्सीडेटिव तनाव, हार्मोनल असंतुलन और बांझपन से पीड़ित होते हैं। मेलोटोनिन अनुपूरण ने इन दबावों को कम किया और अंडमानी बकरी में अंडकोश और वृषण (टेस्टीकुलर) बायोमेट्रिक्स, कामेच्छा, प्रतिआक्सीकारक, हार्मोन और वीर्य गुणवत्ता प्रोफाइल में सुधार किया।
- कुल दस पशु आहार के नमूने, दस खाद के नमूने और सात सब्जियों के नमूने एकत्र किए गए और ई. कोली, स्टैफिलोकोकस, क्लेबसिएला, साल्मोनेला, कैम्पिलोबैक्टर और लिस्टेरिया की उपस्थिति के लिए इनकीजांचकीगई।चारेसे,तीनक्लेब्सिएलापन्यूमोनिया, चार स्टैफिलोकोकस, एक-एक साल्मोनेला और ई. कोली अलग किए गए। दस खाद के नमूनों से केवल तीन साल्मोनेला प्रभेद अलग किए गए। सात सब्जियों के नमूनों (धनिया, चौलाई) की जांच में छह लिस्टेरिया, दो क्लेबसिएलापमोनिया और एक साल्मोनेला विलगनक (आइसोलेट्स) की उपस्थिति देखी गई। प्रारंभिक अध्ययनों से प्राणीरूज्जा (जूनोटिक) संबंधी रोगजनकों अर्थात् पशु आहार, पशु खाद और पत्तेदार सब्जियों में लिस्टेरिया, साल्मोनेला, स्टैफिलोकोकस और क्लेबसिएला की उपस्थिति का पता चला।
- समीक्षाधीन अवधि के दौरान, अंडमान और निकोबार द्वीप समूह से पैर और मुंह के रोग (एफएमडी) का कोई नैदानिक मामला सामने नहीं आया। डीआईवीए-ईएलआईएसए (DIVA-ELISA) (टीकाकरण किए हुए से संक्रमित को अलग करना) परीक्षण द्वारा 3rAB3 प्रतिरक्षी (एंटीबॉडी) की उपस्थिति के लिए कुल 1053 पशुओं के सीरा नमूनों की जांच की गई। डीआईवीए सकारात्मकता 0.66% पाई गई। एनएडीसीपी-तीसरे दौर के टीकाकरण वाले सीरा नमूनों की सीरो-मॉनिटरिंग के लिए कुल 952 नमूनों की जांच की गई और सुरक्षात्मक एंटीबॉडी टाइटर क्रमश: टाइप 0 के लिए 73.1%, टाइप ए के लिए 66.81% और टाइप ए-1 के लिए 74.84% पाया गया।
- रोज बंगाल प्लेट टेस्ट द्वारा ब्रुसेलाबोर्टस एंटीबॉडी की उपस्थिति के लिए कुल 292 पशु सीरा नमूनों की जांच की गई। कोई भी नमूना सकारात्मक (पॉजिटिव) नहीं पाया गया पेस्ट डेस पेटिट्सरुमिनेंट्स वायरस एंटीबॉडी (पीपीआरवी) की उपस्थिति के लिए जांच किए गए 182 बकरी सीरा नमूनों में से कोई भी नमूना सकारात्मक नहीं पाया गया। अंडमान और निकोबार द्वीप समूह में बकरियों में 14.42% की आक्रमण दर के साथ संक्रामक (एक्टिमा (ओआरएफ) के तीन प्रकोप और

12.02% की आक्रमण दर के साथ बकरियों में केसियस लिम्फैडेनाइटिस के दो प्रकोपों की सूचना मिली।

- बकरी सुधार पर अखिल भारतीय समन्वित अनुसंधान परियोजना के तहत, पोर्ट ब्लेयर, बाराटांग और निंबुडेरा के गोद लिए गए समूहों से कुल 6032 बकरियों का पंजीकरण किया गया है। इस विधि के दौरान, एकाधिक जन्म का प्रतिशत 51.51% था। कुल 1307 बच्चों का जन्म टपिंग प्रतिशत 86% और किडिंग दर 1.57 के साथ हुआ। 6, 9 और 12 महीनों में शरीर का वजन उच्च आनुवंशिकता दर्शाता है। इसलिए, आनुवंशिकता और आनुवंशिक सहसंबंध दोनों को ध्यान में रखते हुए, 6 महीने के शरीर के वजन के आधार पर अंडमानी बकरी का चयन करना उपयुक्त हो सकता है।

मत्स्य विज्ञान प्रभाग

- दूर स्थित कार निकोबार द्वीप से नागरिक विज्ञान-आधारित आंकड़े एकत्र किए गए, जिसमें हरे कछुए (चेलोनिया माइडास), हॉक्सबिल कछुए (एरेटमोचेलीस इम्ब्रिकाटा), और ओलिव रिडले कछुए (लेपिडोचिल्स ओलिवेसिया) जैसे समुद्री कछुए के आवास और स्थानीय पारिस्थितिक ज्ञान का पता चला। मीठे पानी के कछुए (कुओरा प्रजाति) के स्थानीय रिकॉर्ड के साथ निकोबर जनजातियों का स्थानीय पारिस्थितिक ज्ञान कार निकोबार द्वीप में मीठे पानी की धारा से पता चला।
- खुले समुद्र में पिंजरे में मछली पालन की गतिविधियों को शुरू करने के लिए स्थल उपयुक्तता मानचित्र, विश्लेषणात्मक पदानुक्रम प्रक्रिया (एएचपी) का उपयोग करके तैयार किए गए। ये मानचित्र द्वीपों में खुले समुद्र में पिंजरे में मछली पालन के लिए स्थान आवंटित करने में उपयोगी होंगे।
- फ्लैट बे, सिप्पीघाट, वांडूर और ओग्राब्रज में जलमग्न स्थलों के मानचित्र भी मत्स्य पालन विभाग, अंडमान और निकोबर प्रशासन के साथ साझा किए गए ताकि भूमि के प्रकार का सीमांकन किया जा सके और जलमग्न क्षेत्रों में खारे पानी की जलीय कृषि मछली पालन गतिविधियों को शुरू करने के लिए पट्टे की प्रक्रिया को आगे बढ़ाया जा सके। जलमग्न जल निकायों को पट्टे पर देने पर एक दिशानिर्देश भी तैयार किया गया और आगे के कार्यान्वयन के लिए इसे अंडमान और निकोबार प्रशासन को प्रस्तुत किया गया।
- कुल मिलाकर, अंडमान और निकोबार द्वीप समूह में वायरल, बैक्टीरियल, परजीवी, फंगल संक्रमण और पानी की गुणवत्ता के मुद्दों के कारण मछली और शेलफीश में बीमारी के 32 मामले सामने आए। लिम्फोसिस्टिस रोग वायरस (एलसीडीवी) का पहली बार भारतीय ग्लास मछली (परमबासिसरंगा) से पता चला।
- अंडमान और निकोबार द्वीप समूह में स्थित 1277 मीठे पानी के मछली फार्मों के भू-संदर्भ विवरण को मान्यता दी गई, जो अंडमान और निकोबार द्वीप समूह में अंतर्देशीय जलीय मछली कृषि क्षेत्र की योजना और प्रबंधन के लिए डेटाबेस के रूप में काम करेगा। ये विवरण द्वीप जियो पोर्टल में शामिल करने के लिए भी प्रदान किए गए।
- पाले (इन विट्रो) बायोएक्टिव और जीवाणुरोधी क्षमता में उल्लेखनीय रूप से उच्च, समुद्री शैवाल नामत: ग्रेसीलेरियाडुलिस (रोडोफाइसी), पैडिना टेट्रास्ट्रोमैटिका (फियोफाइसी) और हेलीमेडा ओपंटिया (क्लोरोफाइसी) द्वारा प्रदर्शित किया गया, जो इम्यूनोस्टिमुलेंट के प्राकृतिक स्रोत के रूप में भविष्य में अनुप्रयोग के लिए उनकी क्षमता को प्रकट करता है।
- मछलियों में एंटीपैरासिटिक उपचार के रूप में उपयोग के लिए चयनित पादपों की प्रजातियों में फाइटोकेमिकल्स के विश्लेषण से पता चला कि सबसे अधिक टैनिन सामग्री बदाम की पत्तियों में पाई गई, इसके बाद यह काजू और अमरूद में पाई गई। अधिकतम सपोनिन सामग्री अमरूद की पत्तियों में पाई गई और काजू की पत्तियों में काफी अधिक मात्रा में फिनोल पाई गई इसके बाद यह बादाम की पत्तियों और अमरूद की पत्तियों में पाई गई।
- अंडमान द्वीप समूह में मीठे पानी के 21 मछली परपोषियों में से परजीवियों की कुल 19 प्रजातियां दर्ज की गई हैं। मीठे पानी के कुल आठ मछली रोगजनकों के लिए डीएनए बारकोड तैयार किए गए और एनसीबीआई जीनबैंक में जमा किए गए।

- 90% जीवित रहने की दर के साथ द्वीप की परिस्थिति में सफेद हाफ-मून बेट्टा मछली का बड़े पैमाने पर सफल उत्पादन हासिल किया गया है। विशाल बेट्टा मछली का पहली बार 70% जीवितता के साथ सफलतापूर्वक प्रजनन किया गया है।
- अंडमान द्वीप समूह में मीठे पानी में सजावटी मछली के पालन के माध्यम से रोजगार और उद्यमिता के अवसरों की दिशा में एक स्थानीय उद्यमी के लिए 'फैंसी गप्पी मछलियों के लिए द्वीप लार्वा पालन प्रौद्योगिकी' का व्यावसायीकरण किया गया है।
- एक द्वीपजियोपोर्टल विकसित किया जा रहा है जिसका उद्देश्य अंडमान और निकोबार द्वीप समूह और लक्षद्वीप में सभी हितधारकों के लिए कृषि और समवर्गी क्षेत्रों से संबंधित भू-स्थानिक डेटा तक पहुंच प्रदान करना है। यह प्लेटफॉर्म भू-संदर्भित डेटा की एक विस्तृत श्रृंखला तक पहुंच प्रदान करता है, जिसमें आधार परतें और प्रमुख फसलों के क्षेत्र, उत्पादन और उत्पादकता पर जानकारी शामिल है। एक उपयोगकर्ता-अनुकूल इंटरफेस का विकास पूरा हो चुका है, जो विभिन्न विषयगत परतों के विजुअलाइजेशन को सक्षम बनाता है।
- मिनिकॉय द्वीप समूह में ट्यूना पोल और मछली पकड़ने के साथ-साथ सहायक जीवित चारा मछली पकड़ने में व्यापक संक्रमणकालीन परिवर्तन का अध्ययन किया गया। चारा मछली संसाधनों के संरक्षण के लिए समुदाय आधारित मत्स्य प्रबंधन का सर्वेक्षण किया गया और इसे रिकॉर्ड किया गया। ट्यूना पोल और लाइन मछली पकड़ने की जगह पर पाले गए तिलापिया फिंगरलिंग के साथ चारा मछली के विकल्प पर एक प्रयोग किया गया। साइट पर ट्यूना द्वारा वैकल्पिक चारे की स्वीकृति का एक सकारात्मक संकेत देखा गया।
- द्वीप पारिस्थितिकी के लिए उपयुक्त एकीकृत कृषि प्रणाली (आईएफएस) प्रदर्शन प्लॉट को आईसीएआर-सीआईएआरआई क्षेत्रीय स्टेशन, मिनिकॉय में डिजाइन और विकसित किया गया। उपयुक्त नस्लों और विभिन्न प्रकार के पशुओं और पादपों के साथ नारियल आधारित बकरी-मछली-मुर्गा-सब्जी-चारा प्रणाली शुरू की गई। हितधारकों के लाभ के लिए आईएफएस पर विभिन्न कौशल विकास प्रशिक्षण और जागरूकता कार्यक्रम आयोजित किए गए।
- व्यावहारिक प्ररिप्रेक्ष्य पर 2022-23 में किए गए खोजपूर्ण अध्ययन से पता चला कि 51.80 प्रतिशत किसान उत्तरदाताओं ने खेती के प्रति सुदृढ़ रूझान प्रदर्शित किया। सामाजिक भागीदारी, आर्थिक प्रेरणा और वैज्ञानिक अभिमुखीकरण जैसे स्वतंत्र प्रभावकारी मूल्य (वेरिएबल) अत्यधिक महत्वपूर्ण थे और उन्होंने कृषि के प्रति अनुकूल दृष्टिकोण में योगदान दिया। कृषि में रूचि कम होने के पांच शीर्ष कारण थे: श्रम की कमी, औसत लिकर्ट स्कोर (3.88), इसके बाद इनपुट की कमी (3.84), उच्च उत्पादन लागत (3.6), आयु कारक (3.57) और कम उत्पादकता (3.52)। कृषि-पर्यावरण पर्यटन को बढ़ावा देना, क्षेत्र विशिष्ट फसल बीमा, स्कूल स्तर की कृषि शिक्षा, इनपुट लागत पर सब्सिडी और व्यावहारिक तथा रोजगारपरक उच्च कृषि शिक्षा का कार्यान्वयन किसानों में कृषि के प्रति सकारात्मक दृष्टिकोण विकसित करने का भावी पथ है।
- युवाओं की श्रेणी में खेती के प्रति अनुकूल रूझान 44.4% था। जनसांख्यिकीय के तहत, प्रभावी कारक (पुल फैक्टर) यानी बेहतर शिक्षा के अवसर (90.91%), सामाजिक-संस्कृति के तहत, प्रेरक कारक (पुश फैक्टर) यानी, दोस्त/रिस्तेदार भी शहर की ओर चले गए (65.66%) और आर्थिक पक्ष के तहत, बेहतर आय (75.75%) जैसे प्रभावी कारक युवाओं के प्रवासन को प्रभावित करने वाले प्रमुख कारण थे। प्रवासन पर काबू पाने और भविष्य में युवाओं को कृषि में बनाए रखने के सुझावों में - गांव में उदयशीलता पैकेज/मॉडल के उपलब्ध अवसर (97.98%), नवीन खेती और सम्बद्ध उद्यम शुरू करने के लिए प्रोत्साहन/पुरस्कार प्रणाली का प्रावधान (93.94%), उच्च गति वाली इंटरनेट सुविधाएं (92.93%), जल संभर (वाटरशेड) प्रबंधन/सिंचाई सुविधाएं (92.92%) और बेहतर अस्पताल सुविधाएं (90.91%) शामिल है।
- आईसीएआर के राष्ट्रीय विस्तार कार्यक्रम के तहत, सब्जियों अर्थात् पालक किस्म ऑल ग्रीन, पालक किस्म पूसा भारती और भिंडी किस्म ए-5, जो 0.52 हेक्टेयर

को कवर करता है, पर खरीफ मौसम के दौरान 5 क्लस्टर गांवों में 27 प्रदर्शन आयोजित किए गए। किसानों की प्रतिक्रिया से यह अनुमान लगाया जाता है कि पालक किस्म पूसा ऑल ग्रीन को इसकी छोटी और पतली पत्तियों, नाशीजीव और बीमारियों के संक्रमण के प्रति सहनशीलता और अधिक निधानी आयु के कारण स्थानीय किस्म की तुलना में अधिक पसंद किया जाता है। भिंडी किस्म A5 में तुलनात्मक रूप से आकर्षक गहरे फलों के साथ पौधे की ऊंचाई बेहतर होती है।

- आईसीएआर-सीआईएआरआई ने मीठे जल में जलजीव पालन और समुद्री जीव संवर्धन क्षेत्र के लिए नीति दिशानिर्देश और नीतिपरक रोडमैप तैयार करने में अग्रणी पहल की और अंडमान और निकोबार प्रशासन को नीति मसौदा प्रस्तुत किया।

कृषि विज्ञान केन्द्र

- किसानों और कृषक महिलाओं, ग्रामीण युवाओं और विस्तार कार्यकर्ताओं के लिए 37 प्रशिक्षण कार्यक्रम आयोजित किए गए। प्रशिक्षण कार्यक्रम से कुल 737 पुरूष एवं 693 महिलायें लाभान्वित हुईं।
- प्रौद्योगिकी के सफल प्रदर्शन के बाद, प्रौद्योगिकी के और अधिक प्रसार के लिए किसानों के खेत में 27 प्रक्षेत्र दिवसों का आयोजन किया गया। उपरोक्त कार्यक्रमों से कुल 56 पुरूषों और 62 महिलाओं को लाभ हुआ।
- लगभग 15,570 किलोग्राम सब्जी की पौध (बैंगन, मिर्च, टमाटर, नारियल और सुपारी) का उत्पादन किया गया और इसकी बिक्री की गई।
- खाद्य प्रसंस्करण और मूल्य संवर्धन में लघु उद्यम स्थापित करने के लिए ''पलाश'' नामक स्वयं सहायता समूह को तकनीकी मार्गदर्शन, सहायता और प्रशिक्षण प्रदान किया गया।
- कुल 22 जागरूकता और अन्य विस्तार कार्यक्रम आयोजित किए गए। उपरोक्त कार्यक्रमों में कुल 8587 पुरूषों और 12020 महिलाओं ने भाग लिया।
- कुल 4 ज्ञान-वर्धक दौरे (एक्सपोजर विजिट) आयोजित किए गए। इससे कुल 50 पुरूष और 209 महिलाएं लाभान्वित हुईं।

2.1 Executive Summary

Division of Horticulture and Crop Improvement

- Twelve genotypes of ivy gourd and three genotypes of chilli were collected from South Andaman.
- A field gene bank of endemic *Garcinia dhanikhariensis* was established.
- Seven genotypes o f *Garcinia dhanikhariensis*, six genotypes of Malabar tamarind and *Flacourtia montana were* characterized.
- Soaking of seeds of exotic Surinam Cherry in GA_3 (500 ppm) improved the germination to 75.5 %.
- Twenty-four seedling progenies of true cinnamon and six genotypes of Tejpat were studied for morphological and key biochemical parameters.
- Six genotypes each of *Piper sarmentosum* and clove, and five genotypes of true cinnamon were characterized.
- A multiple-resistant (bacterial blight-resistant and salinity-tolerant) rice variety of CARI Dhan 5 was developed for coastal-saline soils.
- Sixty-two recombinant inbred lines derived through Multi-parental Advanced Generation Inter-Cross (MAGIC) were evaluated for yield and yield attributing traits.
- Seven MAGIC lines of rice with >85 % germination under anaerobic conditions were identified.
- Black gram varieties were found to be more tolerant to flooding than green gram varieties.

Division of Natural Resource Management

- Soil and water conservation studies in Andaman Islands revealed that about 5.2% of geographical area *i.e.,* 26,420 ha area is prone to severe and very severe soil erosion, and it should be prioritized for suitable conservation practices. The water conservation practices were underdeveloped (37%) in the Islands.
- Coconut based integrated farming system having coconut + goat + poultry cum fish components recorded a total net return of Rs.1.43 lakhs ha^{-1} $year^{-1}$ and generated an employment of 204 mandays ha^{-1} $year^{-1}$.
- Organic farming in coconut revealed that application of recommended dose of nitrogen through FYM + Waste recycling (vermicomposting) + green manure recorded slightly higher yield of coconut (74 nuts/tree/year) after 3 years.
- Among different organic sources, application of vermicompost (75 % N) +Bio granules (25% N) + P &K through Rock PO_4 & Biopotash + BF and Panchagavya spray recorded higher yield in brinjal (5.7 t/ha) and Okra (6.0 t/ha), which are 30-35 percent lesser than the 100% RDF through inorganic fertilizers.
- Under moisture stress condition, drip irrigation with plastic mulching recorded higher yield in tomato (8.2 t ha^{-1}), brinjal (11.2 t ha^{-1}) and cow pea (6.6 t ha^{-1}). Similarly, application of hydrogel + K & Ca foliar spray recorded higher yield in tomato (8.0 t ha^{-1}), brinjal (11.1 t ha^{-1}) and cow pea (6.4 t ha^{-1}) .
- Vegetable cultivation and vermicompost production under protected cultivation (100 m^2) recorded an average annual net income of Rs. 65,000-72,000/-.
- Application sea weed liquid fertilizer at 25% and 15% recorded significantly higher yield in mung bean (975 kg ha^{-1}) and cucumber

(620 g/plant) respectively.

- Application of humic acid at 1% significantly improved the yield of CIARI Mung-3 (978 kg ha^{-1}) as compared to control and other conventional practices like DAP spray.
- Carbon foot print was much higher for rice > 10 Mg CO_2 eq/ha, while other arable crops recorded less than 2 Mg CO_2 eq/ha only.
- A total of 102 agromet bulletins were issued covering all aspects of agriculture production with the help of multidisciplinary advisory team during the year.
- The water budget analysis in A&N Islands revealed that a total of about 32.78 MCM of water is needed to meet current annual demand by all sectors.
- Initial observations on *Pterocarpus dalbergioides* based sequential cropping system, the intercrops were performed well and harvested 35 kg of Tapioca tubers from 10 m^2 area and vegetable cowpea yielded of 2.2 kg in an area of 10 m^2.
- Total biomass of the Multi Purpose Tree Species under coconut plantation was observed good and highest total dry biomass was recorded in *Callophyllum inophyllum* (21.54 kg) followed by *Pterocarpus dalbergioides* (8.65 kg).
- To enrich the coconut plantations under Island condition the species such as *Dendrolobium umbellatum* (L.), *Sesbania grandiflora* and *Leucaena leucocephala* for soil nutrient enrichment, *Callophyllum inophyllum* for wind break and *Bahuinia* spp., *Casuarina equisetifolia* for staking were recommended.
- Seed oil from *Pandanus tectorius*, *P. lerum* and *P. odorifier* analyzed for their fatty acid profile. The results revealed that the highest saturated fatty acid of 40.09 % was observed in *P. tectorius* seed oil.
- Nutritional and anti nutritional activities of raw and cooked pulp and seeds of *Pandanus lerum* were analysed and the results revealed that the highest carbohydrate content was observed in the raw pulp (41%) and cooked pulp recorded 31% carbohydrate.
- Distinctness, Uniformity and Stability analysis conducted for three Pandanus species (*P. lerum*, *P. tectorius* and *P. odorifer*) and documented for 15 tree and leaf, 1 each of flower, root and 8 fruit and seed characters.
- Mangrove community zonation mapping, 9 scenes of IRS LISS IV were selected for Nicobar Islands and the Imagery processing was done at ArcGIS software.
- Two plant exploratory survey were undertaken (Nancowrie and Car Nicobar Islands and collected 6 accessions of *Pandanus lerum*, one coconut accession, five *Pandanus tectorious* accessions and one *Champeria manillana* accession, four *Dioscorea alata*, three *Colocasia esculenta* and three *Pandanus lerum* accessions were collected and conserved.
- To establish the best dyeing parameters for cotton using *Morinda citrifolia* L, optimization studies with different dyeing conditions were carried out for wood dye extract.
- One Andaman Dwarf Arecanut (INGR23064) and one Noni (*Morinda citrifolia*) (INGR22093) were registered in the ICAR-NBPGR, New Delhi.
- Significantly highest corm yield (43.89 t/ha) of Elephant Foot Yam under high density was recorded with plant density of 90 × 60 cm.

Division of Animal Science

- The genetic diversity, population structure and origin of indigenous Andamani goat

and Teressa goat was investigated through mitochondrial markers. It was found that the majority of goat haplotypes belonged to haplogroup A, followed by haplogroup B and haplogroup D.

- Genetic structure analysis of goats of Andaman and Nicobar Islands using Restriction Fragment Length Polymorphism (RFLP) marker indicated that the Nicobar goat populations are a more isolated group as compared to goat populations belonging to South Andaman and North and Middle Andaman.
- Whole genome analysis followed by a genome-wide association study (GWAS) identified five positive and one negative DNA marker associated with goat fecundity in Andaman goat populations.
- Genotyping of Andaman cattle was done based on beta-casein gene by polymerase chain reaction-restriction fragment length polymorphism (PCR-RFLP) methodology. The genotypic A2A2 frequency in the cross bred, native and total sample of cattle were 53.81, 92.00 and 67.04 respectively. No animals were found homozygous for A1A1 genotype.
- Gut microbial diversity and composition of Nicobari pig was investigated by using high throughput Illumina sequencing platform. At phylum level, gut microbiota was dominated by Firmicutes, Actinobacteria, TM7, Proteobacteria, Bacteroides and Chloroflexi.
- In an attempt to see the acaricidal activity of herbal plants, an *in vitro* assay *i.e*. larval packet test (LPT) was done. A total of six herbal plants were tested individually as well as in combinations. Individual aqueous extract showed partial effect but polyherbal combination exhibited 100% acaricidal efficacy.
- Feeding and growth trials in Andamani pig were performed to ascertain optimum protein level and nutrient requirement in intensive system of rearing. When total dietary protein level (18.5%) was reduced, the observations on feed intake, nutrient digestibility, average daily gain, feed conversion ratio and blood bio-chemistry were found to be similar. However, carcass quality was significantly improved on reduced protein level.
- Supplementation of a multi-strain Bacillus-based probiotic formulation minimized the weaning stress of the piglets, thereby improving the feed intake, bodyweight, antioxidant activity, lipid profile, systemic and mucosal immunity, and overall growth performance of the weaned piglets.
- Melatonin supplementation mitigated stresses and improved the scrotal and testicular biometrics, libido, antioxidants, hormones and semen quality profiles in Andamani goat.
- A total of ten animal feed samples, ten manure samples and seven vegetable samples were collected and screened for the presence of *E. coli, Staphylococcus, Klebsiella, Salmonella, Campylobacter and Listeria*. From feed, three *Klebsiella pneumoniae*, four *Staphylococcus*, one each of *Salmonella* and *E. coli* were isolated. Only three *Salmonella* strains were isolated from ten manure samples. Screening of seven vegetables samples (coriander, amaranthas) showed the presence of six *Listeria*, two *Klebsiella pneumoniae* and one *Salmonella* isolates.
- During the reporting period, no clinical case of foot and mouth disease (FMD) was reported from Andaman and Nicobar Islands.
- A total of 292 cattle sera samples were

screened for the presence of *Brucella abortus* antibodies. None of the sample was found positive. Out of 182 goat sera samples screened for the presence of *peste des petitsruminants virus* antibodies (PPRV), none of the sample was found positive. Three outbreaks of contagious ecthyma (Orf) in goats with attack rate of 14.42% and two outbreaks of caseous lymphadenitis in goats with attack rate of 12.0% were reported from of Andaman and Nicobar Islands.

- Under the All India Coordinated Research Project on Goat Improvement, a total of 6032 goats have been registered from the adopted clusters of Port Blair, Baratang and Nimbudera. During the period, the percentage of multiple birth was 51.51%. A total of 1307 kids were born with the tupping percentage of 86% and kidding rate of 1.57.

Division of Fisheries Science

- Citizen science-based data were collected from the remotely located Car Nicobar Island which revealed the habitats and local ecological knowledge of sea turtle such as Green turtle (*Chelonia mydas*), Hawksbill turtle (*Eretmochelys imbricata*), and Olive ridley turtle (*Lepidochelys olivacea*). Local ecological knowledge of Nicobar tribes with locational records of the freshwater turtle (*Cuora* sp.) was reported from a freshwater stream in Car Nicobar Island.
- Site suitability maps for undertaking open sea cage culture activities were prepared using Analytical Hierarchy Process (AHP). The maps will be useful for allocating spaces for undertaking open sea cage culture in the Islands.
- Maps of the inundated sites in Flat Bay, Sippighat, Wandoor and Ograbraj were shared with the Department of Fisheries, Andaman and Nicobar Administration to demarcate the land type and further leasing process to undertake brackish water aquaculture activities in the inundated areas.
- Altogether, 32 numbers of disease cases were reported from the fish and shellfishes due to viral, bacterial, parasitic, fungal infections and water quality issues in Andaman and Nicobar Islands. Lymphocystis Disease Virus (LCDV) was reported for the first time from Indian glass fish (*Parambassis ranga).*
- Validated the geo-reference details of 1277 numbers of freshwater fish farms located at Andaman and Nicobar Islands. Also provided these details for incorporation in Dweep Geo Portal.
- Significantly higher *in vitro* bioactive and antibacterial potential was exhibited by the seaweeds namely, *Gracilaria edulis* (Rhodophyceae), *Padina tetrastromatica* (Phaeophyceae) and *Halimeda opuntia* (Chlorophyceae) which reveals their potential for future application as the natural source of immunostimulants.
- Analysis of phytochemicals in selected plant species for their usage as antiparasitic treatment in fishes revealed that the highest tannin content was found in badam leaves followed by cashew and guava. The highest flavonoid content was found in *Andrographis paniculata* followed by badam leaves. The highest saponin content was found in guava leaves and the phenol content was significantly higher in cashew leaves followed by badam leaves and guava leaves.
- A total of 19 species of parasites have been recorded from 21 freshwater fish hosts in Andaman Islands. DNA barcodes were generated for a total of eight freshwater fish

pathogens and submitted in NCBI GenBank.

- Successful mass production of white half-moon betta fish has been achieved under Island condition with 90% survival rate. The Giant betta fish has been successfully bred for the first time with 70% survival.
- Dweep Geo Portal is being developed which aims to provide access to geo-spatial data pertaining to agriculture and allied sectors for all the stakeholders in Andaman and Nicobar Islands and Lakshadweep.
- The comprehensive transitional change in the tuna pole and fishing along with the subsidiary live bait fishing were studied in the Minicoy Islands. The community based fisheries management for the conservation of baitfish resources were surveyed and recorded. An experiment on bait fish alternative was done with the cultivated tilapia fingerlings at tuna pole and line fishing site. A positive sign of acceptance of the alternative bait by tuna was observed in the site.
- Integrated Farming System (IFS) demonstration plot suitable for Island ecosystem developed at Regional Station, Minicoy. The coconut based Goat-Fish-Poultry-Vegetable-Fodder system was introduced with suitable breeds and variety of animals and plants.
- An exploratory study on behavioral perspective revealed that 51.80 percent of farmer's respondents exhibited strong attitude towards farming. Five top reasons for fading interest in agriculture were lack of labour with mean Likert score of (3.88), followed by lack of input (3.84), high production cost (3.6), age factor (3.57) and less productivity (3.52).
- In the category of youths favorable attitude towards farming was 44.4%. Under demographic, pull factor *i.e.,* better education opportunities (90.91%), under socio-culture, push factor *i.e.,* friends/relatives also migrated to city (65.66%) and under economic, pull factor like better income (75.75%), were the top reasons influencing the migration of youths.
- Under the National Extension Programme of IARI, 27 demonstrations in 5 cluster villages were conducted during Kharif season on vegetables covering 0.52 ha. Farmers' feedback infers that Palak var. Pusa All Green is preferred over the local variety. Bhendi var. A5 has better plant height with attractive dark green fruits comparatively.
- ICAR-CIARI took the initiative in the preparation of policy guidelines and strategic roadmap for the freshwater aquaculture and mariculture sector and submitted the policy drafts to the Andaman and Nicobar Administration.

Krishi Vigyan Kendra

- Conducted 37 training programmes for practicing farmers and farm women, rural youth and extension functionaries. Total 737 number of male and 693 number of females were benefitted from the training programme.
- After successful demonstration of technology, organized 27 fields days at farmer's fields for further spread of the technology. A total of 56 males and 62 females benefitted from the above programmes.
- Around 15,570 vegetable seedling (brinjal, chilli, tomatoes), coconut and arecanut were produced and sold.
- Provided technical guidance, support and training to SHG "Palash" for establishing a small-scale enterprise in food processing and value addition.

- A total of 22 awareness and other extension activities were conducted. A total 8587 number of males and 12020 females participated in the above programmes.
- A total of 4 exposure visits were conducted and 50 males and 209 females benefitted.

3. Introduction

ICAR -Central Island Agricultural Research Institute (CIARI)

ICAR-Central Island Agricultural Research Institute (CIARI) formerly Central Agricultural Research Institute (CARI) was established on 23rd June 1978 by merging different Regional Research Stations of the ICAR Institutes at Port Blair *viz*., Central Marine Fisheries Research Institute, Indian Veterinary Research Institute, Indian Agricultural Research Institute, and Central Plantation Crops Research Institute. During October 1989, the Regional station of CPCRI located at Minicoy, Lakshadweep Islands was merged to this Institute to serve as a Regional Station of CARI. This Lakshadweep centre was later transferred to CPCRI in late 1994 and then again brought back under CIARI from April 2017 as Regional Station.

ICAR- CIARI is conducting research work for the farming community of these Islands. The Institute has four research divisions *viz*., Horticulture and Crop Improvement, Animal Science, Fisheries Science and Natural Resource Management.

The main research-cum-residential complex located at Garacharma, 9 Km away from Port Blair houses the Director's Office, Administrative Block and a Central Laboratory Building besides research farm. The Institute has four research farms. (i) Garacharma farm of 62 ha. area, where works on field crops, horticulture, animal sciences and fresh water fisheries are carried out. (ii) Sippighat farm having an area of 32 ha. where research work on horticulture is carried out. (iii) Bloomsdale Farm which has flat lands of 3.5 ha. and this is used for research works of natural resource management and field crops divisions. (iv) Marine Hill Research Laboratory has a sea front hatchery facility and a fisheries informatics lab. The Institute has three KVKs, one at Port Blair established in 1993, another at Nicobar established in 2010 and at Nimbudera established in 2012.

The Institute also has various Central facilities for smooth functioning of the Institute *viz*. (i) Central Instrumentation Facility (ii) Priority Setting, Monitoring & Evaluation Cell (iii) Hindi Cell, (iv) AKMU (v) Library (vi) ITMU (vii) PG Cell & (viii) ATIC.

Mission

To provide decent livelihood to farm youth from agriculture in a fragile Island ecosystem on sustainable basis.

Vision

The Institute envisages developing agri horticulture, livestock and fisheries sector in a sustainable way through technological innovation in the changing climatic scenario to ensure decent livelihood in the fragile Island ecosystem.

Mandate

- To provide a research base to improve the productivity of agri-horticulture, livestock and fisheries of Andaman & Nicobar and Lakshadweep group of Islands through basic, applied and adaptive research
- Conservation, characterization and sustainable utilization of natural resources and harnessing through post harvest and value addition.
- To standardize technologies for health coverage and bio security of plant, animal and fishery resources.
- To standardize techniques for capture and

culture fisheries including coastal aquaculture
- Vulnerability studies of Island ecosystem and adaptive strategies to develop climate resilient agriculture.
- Transfer of technology, capacity building, policy support and market intelligence to stake holders

Thrust Areas

Broad research programmes are as under:

- Conservation and utilization of Island biodiversity
- Enhancing the productivity of agriculture, livestock and fisheries sector
- Management of biotic and abiotic stress
- Frontier research for knowledge and increased productivity
- Post-harvest technology and value addition
- Water resource development and utilization
- Capacity building andsocio-economic development

Organisational Set Up

Administration of the institute rests with the Director, who receives support from both research divisions and administration. The Research Advisory Committee (RAC), Institute Management Committee (IMC) and Institute Research Council (IRC) reviews and monitor the research programmes and facilitates to identify new research thrust areas for the Institute.

Staff position

Sl. No.	Category	Sanctioned	Filled
1	**Scientist**	44+1	27+1
2	**Technical**	44	24
3	**Administrative**	27	20
4	**Supporting**	66	49
Total		**182**	**121**

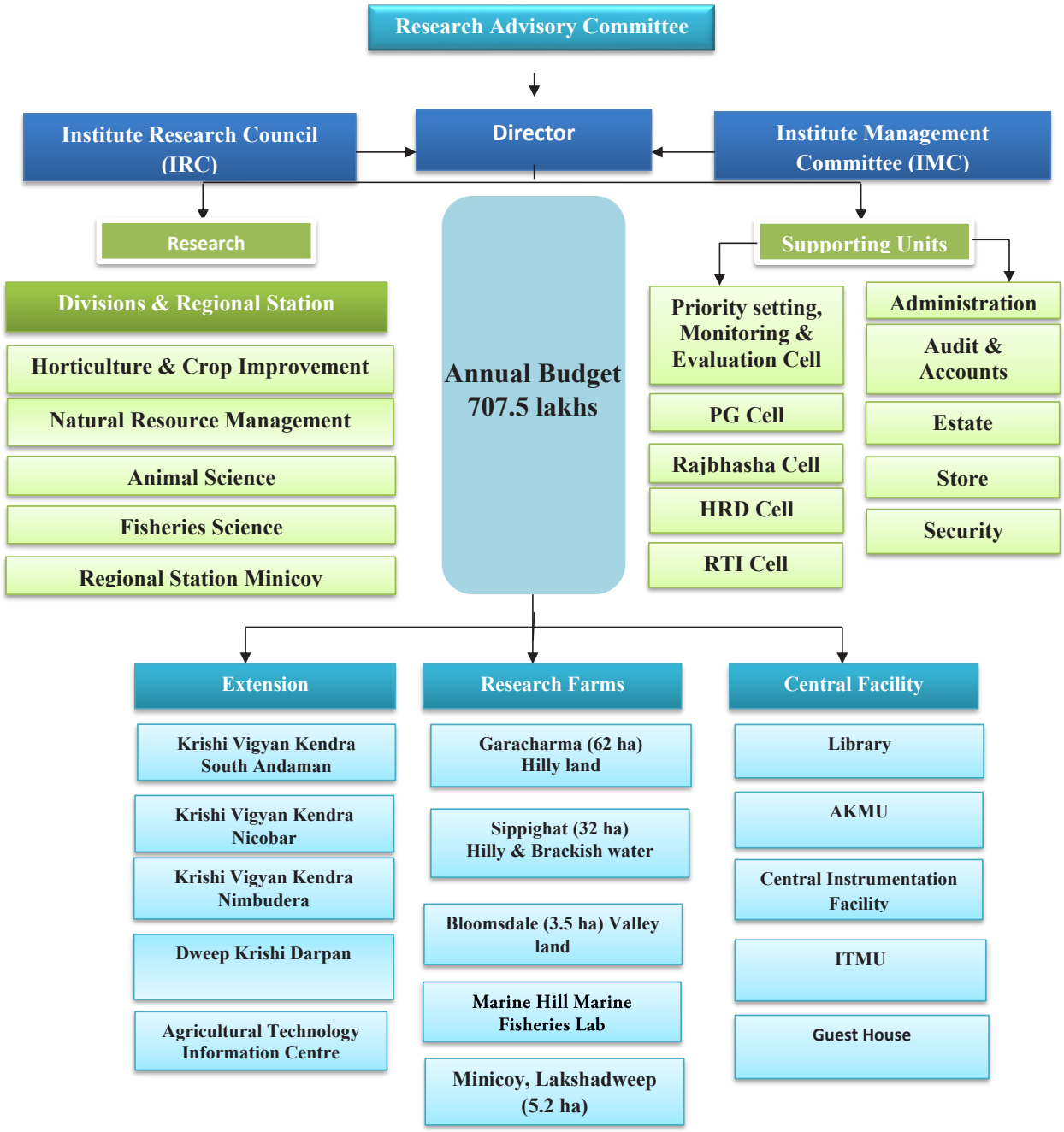
Budget Utilization During 2023-2024

Head	Sanction (in lakhs)	Expenditure
Grant-in aid Capital	117.50	117.08
Grant in aid – Salary	1938.70	1871.79
Grant in aid – General	819.06	814.51

Revenue (Rs. In Lakhs)

Target	Achieved
62.27	84.29

Organogram


Research Advisory Committee
Institute Research Council (IRC)
Director
Institute Management Committee (IMC)
Research
Divisions & Regional Station
Horticulture & Crop Improvement
Natural Resource Management
Animal Science
Fisheries Science
Regional Station Minicoy
Annual Budget 707.5 lakhs
Supporting Units
Priority setting, Monitoring & Evaluation Cell
PG Cell
Rajbhasha Cell
HRD Cell
RTI Cell
Administration
Audit & Accounts
Estate
Store
Security
Extension
Krishi Vigyan Kendra South Andaman
Krishi Vigyan Kendra Nicobar
Krishi Vigyan Kendra Nimbudera
Dweep Krishi Darpan
Agricultural Technology Information Centre
Research Farms
Garacharma (62 ha) Hilly land
Sippighat (32 ha) Hilly & Brackish water
Bloomsdale (3.5 ha) Valley land
Marine Hill Marine Fisheries Lab
Minicoy, Lakshadweep (5.2 ha)
Central Facility
Library
AKMU
Central Instrumentation Facility
ITMU
Guest House

RESEARCH ACHIEVEMENTS

DIVISION OF

HORTICULTURE & CROP IMPROVEMENT

Division of Horticulture and Crop Improvement

Collection and conservation efforts in plant genetic resources

Nucleus seed gardens of arecanut and coconut

Nucleus seed garden of released varieties from ICAR-CIARI was established in the Garacharma farm under AICRP on Palms project. Growth parameters were recorded in these plants. Arecanut var. Samruddhi had plant height of 752.7 ± 23.24 cm, plant girth of 60.4 ± 1.84 cm, trunk height of 262.2 ± 10.14 cm and mean number of leaves per palm of 10.9 ± 0.23. In case of four varieties of coconut studied, variations were observed for plant height (245.7 cm to 379.6 cm), palm girth (35.0 cm to 59.01 cm) and mean number of leaves (7.8 to 10.4 per palm). The highest values for these growth parameters were observed in variety CIARI-Annapurna.

Mango germplasm

The wild mango species *M. andamanica* showed first fruiting during March to April 2023.

Plate 1. Fruiting in wild mango species *Mangifera andamanica*

Garcinia species

Seven endemic germplasm of *Garcinia* collected from various regions of the Andaman Islands received IC numbers. This included one accession of *Garcinia andamanica* (IC-0647383) and six accessions of *G. dhanikhariensis* (IC-0647377 to IC-0647382). For the purpose of establishing a mother block for graft production, grafts from two elite collections of Malabar tamarind, namely GG-01 and GG-05, were successfully established at Garacharma farm. Additionally, eight collections of the endemic *G. dhanikhariensis* were planted in an exclusive field gene bank (Plate. 2a) for conservation and systematic evaluation.

Plate 2a. A view of field gene bank of endemic *Garcinia dhanikhariensis*

Vegetable crops

A total of 15 distinct accessions of vegetables, comprising 12 accessions of Ivy gourd (*Coccinia*

Plate 2b. A Field view of Ivy gourd (*Coccinia grandis)*

grandis) and 3 accessions of chilli (*Capsicum annuum*), were collected from South Andaman (Plate 2b). These germplasm were conserved at the institute's research farm for further evaluation.

Field crop

A diverse set of over 280 genotypes encompassing rice, green gram, black gram, triticale lines, advanced lines, and Recombinant Inbred Lines (RILs) are being maintained, evaluated, and judiciously utilized in ongoing research and breeding efforts.

Characterization, evaluation and utilization of plant genetic resources

Evaluation of true cinnamon seedling collections

Twenty-four shortlisted seedling progenies of true cinnamon were studied for their leaf morphological and key biochemical parameters. Analysis of data suggested wide variations (Fig 1.) for leaf length (9.3 to 14.4 cm), leaf width (4.2 to 7.4 cm), leaf weight (0.8 to 1.9 g) and petiole length (1.2 to 1.8 cm), while the general means for these parameters were 11.8 cm, 5.6 cm, 1.2 g and 1.5 cm, respectively. Oleoresin content in leaf samples varied between 8.75% and 17.46% within the collections, while essential oil content in leaves varied between 0.84% - 2.80%. Eugenol content in the leaf oil varied between 59.54% (Cv/L/09) and 85.67% (Cv/Lib/18). Four collections showed Eugenol content of less than 70%, while three collections showed more than 85% Eugenol in them.

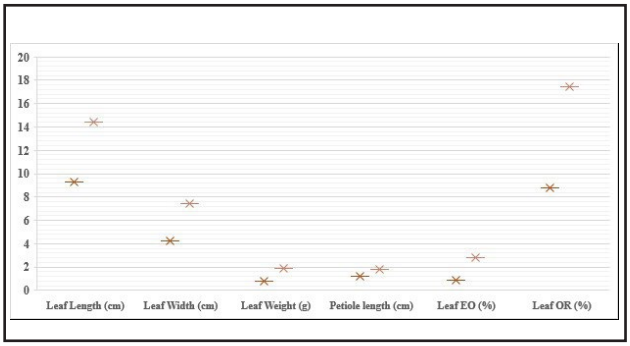


Fig. 1 Variability for morphological and key biochemical parameters in leaves of 24 seedling progenies of true cinnamon

Morphological and biochemical evaluation of tejpat germplasm

With the aim to identify superior germplasm of Indian Bay Leaf for promoting cultivation in the islands, morphological and biochemical studies was carried out during this year as well in six identified collections. Results revealed differences among the collections for drying percentage (45.20 to 54.22%) and essential oil content (0.40 to 0.45%). Photosynthetic pigments in fresh and dried leaves also showed variations among the studied collections. Essential oil profiling of the collections showed that Eugenol content varied between 38.52 to 44.96%. These collections were multiplied through air layering and planted.in the field conditions.

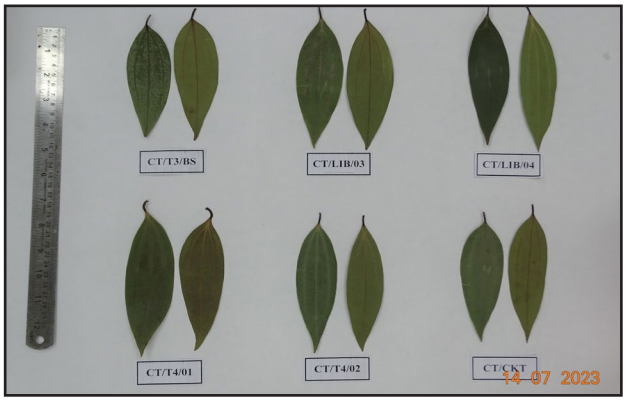


Plate 3. Collections of Indian Bay leaf being evaluated

Characterization of collections of *Piper sarmentosum*

In order to identify superior collections of of *Piper sarmentosum*, six germplasm were collected from different parts of the islands and planted in pots for characterization. With regard

to fruit morphology, significant differences were noticed among the collections for fruit length (26.900 to 29.180 mm), fruit width (6.615 to 7.130 mm), fresh fruit weight (1.075 to 1.358 g) and dry fruit weight (0.261 to 0.339 g). The oleoresin content, which is an important quality parameter, was estimated using acetone as a solvent. The content varied between 3.43% and 10.05% among the collections. Further, significant variations were also observed in piperine content, which was determined using ASTA Method 12.1.

Characterization of clove germplasm

Clove is a popular tree spice in Andaman Islands; however, so far improved varieties are not available for its cultivation. Efforts were made to identify superior germplasm and six promising types have been shortlisted. In continuation, morphological characterization was taken up, which revealed significant differences for leaf, bud, cluster and tree characters.

Evaluation of guava varieties under Island condition

Fruiting was observed third year after planting the varieties in guava (Plate 4). Number of fruits were the highest in the variety Shweta (82.4 per tree) with the highest fruit weight of 130.2 g. The yield per tree was also the highest in the variety Shweta (11.2 kg) with maximum TSS of 10.2 ^{o}Brix.

Evaluation of sapota varieties under Island condition

The sapota varieties *viz*. PKM 1, PKM 2 and PKM 3 were evaluated for their growth and yield performance. Fruiting was observed six years after planting the grafts under Island condition. Number of fruits were the highest in PKM 1 (573 numbers/tree) with maximum yield of 49.8 kg/tree. The fruit weight was the highest in PKM 3 (107.4 g per fruit), while maximum TSS was recorded in PKM 2 (25 ^{o}Brix).

Evaluation of banana dwarf cavendish clones

Planting of TBM 9 and Phule Pride along with the check Grand Naine was done during July, 2023. The varieties have been established well in the field and are in the initial period of vegetative growth.

Plate 4. Field evaluation banana clones under Island conditions

Characterization of Malabar tamarind collections

Over the past two years, harvesting season in different collections exhibited similar pattern; wherein, GG-05 was the distinctly earliest one. Variations were also recorded in harvesting duration. GG-02 and GG05 had comparatively longer harvesting period than the other collections (Fig 2). The longest leaves were observed in GG-04 (13.1 cm). In case of leaf width, consistently narrow leaves were observed in the collection GG-05 (4.4 cm) in this year also, while the widest leaves were recorded in GG-04 (5.1 cm). Peel thickness was highest in the collection GG-01 (13.2 mm). Significantly thinnest peel was recorded in GG-05 (5.7 mm), which was similar to that recorded during the year 2022 (5.4 mm). Longer harvesting period and thinner peel make it a suitable candidate for cottage scale processing due to ease of handling.

Collection	Year	Harvesting duration*																	
		Apr			May			Jun			Jul			Aug			Sept		
		E	M	L	E	M	L	E	M	L	E	M	L	E	M	L	E	M	L
GG-01	2022							■	■	■	■	■	■	■					
	2023								■	■	■	■	■	■	■	■			
GG- 02	2022								■	■	■	■	■	■	■	■	■	■	
	2023							■	■	■	■	■	■	■	■	■	■	■	
GG- 04	2022										■	■	■	■	■	■			
	2023											■	■	■	■	■			
GG- 05	2022			■	■	■	■	■	■	■	■	■	■						
	2023			■	■	■	■	■	■	■	■	■							
UUF- 01	2022							■	■	■	■	■	■	■					
	2023								■	■	■	■	■						
UUF- 03	2022								■	■	■	■	■	■					
	2023									■	■	■	■						

*E: Early, M: Mid, L: Late

Fig. 2 Variations in harvesting duration of Malabar tamarind collections

Characterization of Andaman Kokum collections

Seven collections of *Garcinia dhanikhariensis* were characterized and various leaf, fruit and seed parameters were recorded. Significant variations were recorded for leaf parameters and fruit parameters such as fruit length (28.50-34.25 mm), fruit width (32.67-38.53 mm), fruit weight (14.79-31.25 g), pedicel length (2.13-5.36 mm), number of stigmatic lobes per fruit (5.70-6.95), peel weight per fruit (7.53-17.05 g), number of mature seeds per fruit (2.5-4.6), seed length (14.62-16.04 mm), seed width (6.87-8.60 mm), seed thickness (3.10-4.57 mm) *etc*. The studied collections also differed significantly for parameters such as peel dry recovery, total soluble solids content, pH, total anthocyanin content *etc*. Hydroxycitric acid was identified as the dominant compound in all the collections, content of which varied from 180.78 mg/g to 289.76 mg/g.

All India Coordinated Research Project on Vegetables

A set of 25 trials focusing on four vegetable crops *viz*. brinjal, bottle gourd, garden pea and tomato were conducted during this year. The trials encompassed various cultivars and hybrids within each crop, facilitating a thorough examination of their performance. The specific trials conducted for each vegetable crop are outlined as follows.

Brinjal: Brinjal long IET, Brinjal long AVT-I, Brinjal (Long) AVT-II, Brinjal (Round) IET, Brinjal (Round) AVT-I, Brinjal (Round) AVT-II, Brinjal Hybrid Long-AVT-I, Brinjal Hybrid Long-AVT-II, Brinjal Hybrid Round-IET, Brinjal Hybrid Round-AVT-I and Brinjal Hybrid Round-AVT-II.

Bottle gourd: Bottle gourd IET and Bottle gourd AVT-II.

Garden Pea: Garden Pea (Early) IET, Garden Pea (Mid) IET, Garden Pea (Early) AVT-II and Garden Pea (Mid) AVT-II.

Tomato: Cherry Tomato IET, Tomato (Determinate) IET, Tomato (Determinate) AVT-II, Tomato Hybrid Det. AVT-I, Tomato Hybrid Det. AVT-II, Tomato Hybrid Det. IET, Tomato (ToLCV) Hybrid AVT-I and Tomato (ToLCV) Hybrid AVT-II.

Evaluation of native ornamentals for cut foliage/ cut greens

The conserved native ornamental species like *Davallia denticulata, Pteris vittata, Nephrolepis exaltata, Propiphys amboinensis, Asplenium falcatum, Achrostichum aureum, Flemingera strobilifera, Calamus* sp., *Pollia* sp. and *Stachyphrynium repens* were evaluated for the ornamental utility as cut greens. All the species were highly suitable to use as fillers. *Flemingera strobilifera* is a shrub and can be utilized as a hedge plant, shrubbery and specimen plant. During evaluation, the highest shelf life of 12.8 days was observed in *Achrostichum aureum* (Table 1).

Table 1. Foliage characteristics and shelf life of collected native ornamentals

Native ornamental species	Foliage characteristics	Shelf life (days)
Davallia denticulata	Triangular fronds, divided into three or four pinnae, which are again divided into many fine pinnules	8.4
Pteris vittata	Fronds are with numerous pinnae, middle ones are the longest and basal ones gradually reduced	7.2
Nephrolepis exaltata	Arching frond divided into narrow pinnae	6.3
Asplenium falcatum	Fronds tufted with pinnate lamina	5.1
Achrostichum aureum	Leathery thick leaves	12.8
Propiphys amboinensis	Round heart shaped, shiny dark green leaves	5.8
***Calamus* sp.**	Blunted tip of leaves, long, thick and shiny	10.7
***Pollia* sp.**	Attractive shiny green leaves	6.2
Stachyphrynium repens	Striped shiny leaves with attractive green colour	8.0
Flemingera strobilifera	Erect shrub, 5 to 10 ft height with terete branches	-

Breeding studies in Torch ginger *(Etlingera elatior)*

Six combinations of crosses were done in three accessions of torch ginger bearing flower of variable colours (Plate 6) - Red (TG-1), Pink (TG-2) and Light Pink (TG-3). Maximum seed set percentage was observed in the cross TG-2 × TG-3 (82.6%). Seed germination was also maximum in this cross (71.8%), followed by TG-1 × TG-2 (62.4%).

Plate 5. Germplasm of torch ginger used for crossing and the resultant seedlings emerged from cross TG-2 × TG-3

Evaluation of anthurium under Island ecosystem

Six anthurium genotypes were evaluated for their growth and yield performance.Variation was observed among the different genotypes with respect to vegetative characters and floral attributes. Among the different genotypes evaluated, maximum plant height (40.2 cm), number of leaves per plant (20), stalk length (39.5 cm), spathe length (12.88 cm), spathe width (10.1 cm), spadix diameter (0.49 cm) and more number of flowers per plant (7.3) were observed in the variety Tropical Red. Early flowering was also observed in this variety.

Table 2. Growth and yield attributes of Anthurium genotypes

Variety	Plant height (cm)	No of leaves/ plant	Stalk length (cm)	Spathe length (cm)	Spathe width (cm)	Spadix diameter (cm)	No of days for first flowering	No of flowers/ plant
Tropical Red	40.2	20.0	39.5	12.9	10.1	0.49	114.0	7.3
Acropolis	26.3	11.3	21.3	7.0	5.5	0.24	120.5	2.5
Tropic Night	31.5	13.0	30.5	8.9	5.9	0.31	169.8	3.0
Flame	29.0	12.0	27.0	8.8	5.5	0.34	152.8	2.3
Condor	31.5	16.5	26.8	10.8	6.4	0.40	127.0	3.3
Esmeralda	27.3	16.0	29.8	8.9	5.8	0.31	179.8	3.0
CD at 5%	5.57	3.64	5.10	1.32	0.56	0.03	12.54	1.58
CV (%)	11.94	16.31	11.62	9.21	5.67	6.03	5.78	29.57

Testing of new genotypes of chrysanthemum

Planting material of seven varieties of chrysanthemum were received from NBRI, Lucknow during October 2023. Early flowering was observed in the variety Jubilee (58 days after planting).

Testing of interspecific Ornamental Banana

Twenty germplasm of ornamental banana received from NRCB, Trichy were evaluated for their growth and yield performance for three consecutive years.The pooled data of the study showed that maximum plant height (382.2 cm), number of leaves (25.5) and inflorescence length (60.7 cm) was recorded in Accession no. 20. Early flowering was observed in Accession No. 8 (72.7 days). Male bud size(30.8 cm) and circumference (27.4 cm) was found to be maximum in Accession No. 8.

Testing of tuberose genotypes

The tuberose varieties *viz*. BRH 17, 18, 19, Shayadri Vaman, MPUAT, Phule Rajni, Arka Prajwal, Pratap, Rajni and Arka Keerthi were evaluated under field condition and also in pot culture study. The pooled data analysed for three years revealed that BRH-19 performed better with respect to early flowering (42.67 days after planting), maximum flowering duration (39.3 days), rachis length (58.4 cm), no. of spikes/ clump (5.5) and maximum weight of 100 florets (197.1 g). Maximum no. of florets per spike was observed in BRH-19 and Arka Prajwal (52.1). Maximum spike length was recorded in Arka Prajwal (100.2 cm). Maximum length of floret was recorded in MPUAT accession (6.4 cm). Maximum diameter of floret was recorded in Shayadri Vaman (5.2 cm).

Plate 6. Varieties of tuberose under Andaman Island conditions

Growth and yield evaluation of new speciality flower collection

Thirteen new genotypes of speciality flowers were collected from mainland and planted for evaluation in the field. *Heliconia* variegated Lady Di (84.7 days after planting) showed early flowering, which was followed by *Heliconia* Cv. Iris Bonnachi (99.0 days after planting). Plant height (303.0 cm) and plant spread (159.7 cm) was maximum in *Etlingera elatior* Cv. White.

Table 3. Growth and yield parameters of new speciality flower collection

Genotypes	Plant height (cm)	Plant spread (cm)	No. of leaves	Days to first flowering	No of shoots per clump	No of spikes per clump	Spike length (cm)
H. variegated cv. ***Lady Di***	38.0	32.7	4.7	84.7	2.7	2.7	31.0
Heliconia cv. Kenya Red	124.0	84.0	7.7	115.7	5.0	3.7	45.3
Etlinger elatior cv. White	303.0	159.7	20.3	-	5.0	-	-
Heliconia **cv.** ***Iris Bonnachi***	133.0	95.3	6.3	99.0	5.3	4.7	46.7
Heliconia **cv.** ***Carribean Yellow***	49.7	32.3	4.3	-	2.3	-	-
Stromanthi	116.3	46.7	5.7	163.7	3.0	2.7	32.0
H. wagenaria **cv.** ***Shee (stripes)***	42.7	29.7	3.3	-	1.3	-	-
Alpinia purpurata **cv.** ***Pink***	53.0	49.0	34.3	124.7	5.7	5.7	23.3
Alpinia purpurata **cv.** ***White***	42.0	45.7	27.7	134.0	4.3	4.3	19.0
H. charatacea **cv.** ***Marry***	119.3	34.0	5.3	246.7	2.0	2.3	62.3
Musa coccinea	131.0	51.0	5.7	121.7	4.3	3.0	28.0
Heliconia **cv.** ***Adiriayana***	93.3	47.3	4.3	144.3	4.3	2.3	33.7
Heliconia **cv.** ***Andromeda***	63.3	38.0	4.7	135.0	3.0	2.0	26.0
CD at 5%	16.08	10.90	3.63	12.28	1.05	0.72	5.96
CV (%)	9.48	11.28	21.11	6.92	16.73	16.62	13.24

(a) (b) (c) (e) (f) (g)

(a) *H.chartaceae* cv. *Meyana* (b) *Stromanthi* (c) *Alpinia* cv. *Pink* (e) *Alpinia* cv. *White* (f) *Musa coccinea* (g) *Zingiber spectabilis*

Plate 7. Field view of different speciality flowers

Evaluation of gerbera varieties for growth and yield

Six varieties of gerbera were evaluated for their growth and yield performance. The variety Srividya (Plate 8) showed early flowering (70.25 days after planting) followed by Petali (80.5 days after planting). Maximum number of flowers per plant was observed in variety Srividya (3.75 flowers/week). Number of leaves per plant (12.75) and flower size (10.88 cm) were also maximum in the variety Srividya (Table 4). The stalk length was maximum in the variety Petali (43 cm).

Table 4. Growth and yield evaluation of gerbera varieties

Varieties	No of leaves per plant	Days for first flowering	Stalk length (cm)	Flower size (cm)	No of flowers/ week/ plant
Srividya	12.75	70.25	39.75	10.88	3.75
Haimai	7.25	88.50	39.25	9.98	3.00
Petali	10.50	80.50	43.00	10.23	3.25
Deepti	9.00	107.00	31.75	9.98	2.25
Breakdance	7.75	93.25	41.00	9.85	2.75
Livia	8.75	102.25	35.00	10.20	1.50
CD at 5%	2.37	7.25	7.10	0.55	0.89
CV (%)	16.83	5.33	12.31	3.58	21.34

Plate 8. Flowers of gerbera varieties Srividya and Petali

Evaluation of statice

Flower bud initiation in statice occurred 6 months after planting and the spike length of flower ranged from 55.5 cm to 72.0 cm and flower spread was 56.4 cm to 62.8 cm. Statice can be well integrated as one of the components in floriculture field for its utility as filler.

Multi-location yield evaluation of bacterial leaf blight resistant NILs of CARI Dhan 5

A total of 4 NILs of a popular rice variety, CARI Dhan 5 (17-1-69-375, 46-3-95-647, 131-2190-659 and 131-2-175-1223) were evaluated with recurrent parent CARI Dhan 5 (salt-tolerant) with check variety CSR 36. The experiments were conducted at three locations during *Kharif* 2023. Over the locations, significantly higher average grain yields were recorded for 131-2-175-1223 (5.0 t/ha), followed by 131-2190-659 (4.60 t/ha), with yield advantages of 19.0% and 9.5%, respectively over the recurrent parent (CARI Dhan 5). Early flowering (94 days) and medium plant height were observed for 46-3-95-647 and 131-2190-659, compared to recurrent parents. The selected backcross inbred lines also showed tolerance for salinity (5.0 dS/m^2) and resistance to bacterial leaf blight.

Plate 9. Field view of MAS-derived rice NILs of CARI Dhan 5

Table 5. Performance of NIL of rice variety, CARI Dhan 5 under multiple locations

Lines	PH	DF	PL	TPP	SW	L1	L2	L3	AY	YA	BB	BBG	SaT
17-1-69-375	130	121	30	9	28	4.68	4.09	4.32	4.32	2.9	3	2	3
46-3-95-647	104	94	25	10	28	4.62	3.85	4.20	4.20	-0.1	3	2	1
131-2190-659	110	92	25	9	27	5.06	4.33	4.60	4.60	9.5	3	2	3
131-2-175-1223	127	113	26	9	30	5.30	5.02	5.00	5.00	19.0	1	3	3
CSR 36	115	95	23	10	28	4.78	3.78	4.34	4.34	3.3	3	0	1
CARI Dhan 5	139	110	28	9	27	4.31	4.13	4.20	4.20	0.0	5	0	3
Mean	120.8	104.9	26.1	9.3	28.0	4.79	4.20	4.44	4.44				
CD	6.45	0.80	1.00	N/A	0.54	0.47	0.34	0.21	0.21				
CV	2.90	0.42	2.08	7.76	1.04	5.30	4.43	2.53	2.53				

DF=Days to flowering (50%), **PH**=Plant height (cm), **PL**=Panicle length (cm), **TPP**= Tillers/plant, **SW**=1000 seed weight (g), **AV**= Average grain yield (t/ha), **YA**=Yield advantage over the recurrent parent (%), **L$_1$**=CIARI, Bloomsdale Farm, South Andaman; **L$_2$**=KVK, Nimbudera, Middle Andaman and **L$_3$**=Farmers field, Keralapuram, North Andaman, **BB**=BLB disease score, **BBG**=No of BLB resistant genes present, **SaT**=Salinity tolerance score at (5.0 dS/m^2)

Grain quality analysis of MAS-derived NILs of rice variety, CARI Dhan

A set of 15 MAS-derived NILs of a popular rice variety, CARI Dhan 5 with recurrent parent and a check variety CSR 36 were evaluated for grain quality (Table 6). Based on the analysis, high hulling (81.79%) and milling recovery (69.84%) were recorded in 17-1-69-55, while high head

rice recovery was recorded in17-1-69-72. Most of the lines possessed short bold grains, whereas three lies *viz*. 131-2-190-1196, 131-2-175-1209 and 131-2-175-1223 had medium slender grains and one line 131-2-175-1239 had long bold grains. Out of 15 lines, no chalkiness was observed in 131-2-190-1197 while 10 lines had rare chalkiness in the grains.

Table 6. Grain quality analysis of NILs of a popular rice variety, CARI Dhan 5

Genotype	Gl	Gw	LBr	H	M	HRR	GT	GCh	GC
CARI Dhan 5	8.26	2.77	2.98	80.38	68.43	55.95	SB	Frequent	Soft
17-1-69-55	8.55	2.67	3.20	81.79	69.84	55.62	SB	Frequent	Soft
17-1-69-72	8.45	2.63	3.21	77.79	64.64	64.26	SB	Frequent	Flaky
17-1-69-179	8.46	2.66	3.18	79.24	65.32	55.92	SB	Frequent	Soft
17-1-69-334	8.20	2.71	3.03	77.01	67.78	60.20	SB	Rare	Soft
17-1-69-375	8.58	2.66	3.23	78.08	66.92	60.88	SB	Frequent	Soft
46-3-95-647	8.22	2.50	3.29	78.76	68.69	60.84	SB	Rare	Soft
46-3-95-655	8.54	2.51	3.40	78.35	63.27	44.26	SB	Rare	Soft
131-2-190-659	8.37	2.53	3.31	79.41	67.76	56.69	SB	Rare	Soft
131-2-190-1196	7.77	2.47	3.15	77.85	67.68	49.16	MS	Rare	Flaky
131-2-190-1197	8.50	2.81	3.03	78.05	68.29	63.02	SB	Absent	Soft
131-2-175-1209	8.22	2.31	3.56	77.83	64.97	55.91	MS	Rare	Flaky
131-2-175-1223	7.52	2.42	3.11	77.02	67.99	58.46	MS	Rare	Soft
131-2-175-1224	8.47	2.37	3.57	76.81	64.42	49.85	SB	Rare	Soft
131-2-175-1208	8.39	2.35	3.56	75.80	66.82	61.16	MS	Rare	Flaky
131-2-175-1239	8.54	2.46	3.47	75.15	66.27	51.79	LB	Rare	Soft
CSR36	9.77	2.28	4.28	76.70	64.42	57.79	LS	Rare	Soft

Gl=Grain length (mm), **Gw**=Grain width (mm), **LBr**=L:B ratio, **H**=Hulling (%), **M**=Milling (%), **HRR**=Head rice recovery (%), **GT**=Grain type, **GCh**=Grain chalkiness, **GC**=Gel consistency, **SB**=Short Bold, **MS**= Medium slender, **LB**= Long bold, **LB**= Long slender.

Evaluation of early duration recombinant inbred lines of rice

A total of 15 early-duration recombinant inbred lines derived through multi-parental advanced generation inter-cross (MAGIC) with check variety (ANR 47) were evaluated in the field during *Kharif* 2023. A high range of variability was observed for plant height and panicle length. Total of seven promising rice lines MG8-4-37-E-33, MG8-4-80-E-47, MG8-1-1-E-1, MG8-2-2-E-5, MG8-4-69-E-42, MG4-1-48-M-8 and MG8-4-2-M-12 were selected for further evaluation considering their yield performance.

Table 7. Performance of early duration recombinant inbred lines of rice

Lines	DF	PH	TPP	PL	GY	YA	PAcp
ANR-47 (Check)	87	96	10	23	4.75	0.00	1
MG8-4-11-E-21	87	105	7	22	4.22	-12.64	5
MG8-4-37-E-33	90	108	6	23	5.27	9.82	3
MG8-4-80-E-47	84	112	4	24	5.19	8.48	1
MG4-2-154-E-27	87	90	6	23	3.55	-33.69	3
MG8-4-62-E-39	84	112	7	26	3.76	-26.43	1
MG8-1-1-E-1	88	95	6	23	4.76	0.27	1
MG8-2-2-E-5	88	96	5	28	4.64	-2.37	3
MG4-2-158-E-29	80	114	6	25	3.90	-21.89	3
MG8-3-7-E-17	85	89	10	21	3.97	-19.56	5
MG4-1-133-E-11	87	101	10	24	2.38	-99.83	5
MG8-4-129-M-61	86	143	8	25	2.35	-101.87	3
MG8-4-45-E-35	88	133	10	22	4.36	-9.02	3
MG8-4-69-E-42	87	123	10	29	5.42	12.31	1
MG4-1-48-M-8	83	185	8	26	4.65	-2.22	5
MG8-4-2-M-12	87	116	10	30	4.89	2.80	1
Mean	86.13	113.60	7.71	24.58	4.25		
CD	1.92	2.21	1.32	N/A	0.83		
CV	1.33	1.16	10.23	13.13	11.70		

DF=Days to flowering (50%), **PH**=Plant height (cm), **TPP**= Tillers/plant, **PL**=Panicle length (cm), **GY**=Grain yield (t/ha), **YA**=Yield advantage over the check variety (%) **PAcp**= Physical acceptability

Evaluation of medium duration recombinant inbred lines of rice

A total of 35 medium-duration recombinant inbred lines derived through multi-parental advanced generation inter-cross (MAGIC) with two check variety (CARI Shan 6 and CARI Shan 7) were evaluated in the field during *Kharif* 2023. High range of variability was observed for plant height, tillers per plant and panicle length. Total of eight promising rice lines *viz*. MG8-1-6-E-2, MG8-4-25-E-27, MG4-2-3-E-13, MG8-2-1-E-4, MG8-4-94-M-43, MG8-4-77-E-45, MG4-2-155-E-28 and MG4-2-92-M-33 were selected for further evaluation.

Plate 10. A field view of medium-duration recombinant inbred lines of rice.

Evaluation of late-duration recombinant inbred lines of rice

A total of 12 late-duration recombinant inbred lines derived through Multi-parental Advanced

Generation Inter-Cross (MAGIC) with check variety Gayatri were evaluated in the field during *Kharif* 2023. Five rows of each genotype were planted with a row length of 4.5 m. Observations were recorded on days to 50% flowering, plant height (cm), effective tillers per plant, panicle length (cm), grain yield (t/ha), sheath blight resistance and physical acceptability. Out of 12 lines of five promising rice lines *viz*. MG8-6-6-M-64, MG4-1-121-M-19, MG4-1-39-M-7, MG4-2-139-M-37 and MG4-1-35-M-6 were selected for further evaluation.

Plate 11. Performance of late-duration recombinant inbred lines of rice in field.

Table 8. Performance of late-duration recombinant inbred lines of rice.

Treatment	DF	PH	TPP	PL	GY	YA
MG8-3-6-L-1	112	138	9	28	4.09	-21.55
MG4-1-127-L-1	120	165	11	24	3.88	-25.47
Gayatri	119	141	13	28	5.21	0.06
MG8-4-105-L-4	122	142	13	25	4.85	-6.91
MG8-4-36-M-27	125	136	11	23	4.87	-6.58
MG8-6-6-M-64	111	167	8	22	5.46	4.80
MG4-2-139-M-37	124	171	10	30	5.05	-3.01
MG4-1-121-M-19	113	131	8	22	5.22	0.13
MG4-1-39-M-7	119	155	10	24	5.35	2.63
MG4-1-35-M-6	120	162	12	27	5.40	3.65
MG8-2-138-M-36	120	135	16	26	5.17	-0.83
MG8-4-95-M-44	114	152	12	25	3.85	-26.10
MG4-1-29-M-2	112	171	12	24	3.74	-28.27
Mean	**118**	**151**	**11**	**25**	**4.78**	
CD	2.52	3.71	0.98	0.78	0.46	
CV	1.26	1.45	5.23	1.82	5.72	

DF=Days to flowering (50%), **PH**=Plant height (cm), **TPP**= Tillers/plant, **PL**=Panicle length (cm), **GY**=Grain yield (t/ha),**YA**=Yield advantage over the check variety (CARI Dhan 6) (%).

Evaluation of MAGIC lines rice for anaerobic germination (AG) in controlled conditions

A total of 180 MAGIC lines of rice were evaluated for in anaerobic germination in controlled conditions of micro-plots. Twenty seeds of each rice line were sown and plots were flooded with 2 inch of standing water for 6 days. No germination was recorded in standing water conditions. While after drainage of water, > 85% germination was recorded in seven rice lines *viz*. MG4-1-37-E-3 (85%), MG4-1-46-E-7 (85%), MG8-2-9-E-9 (90%), MG8-3-1-E-12 (90%),

MG8-4-5-E-19 (85%), MG8-4-12-E-22 (90%), and MG8-4-53-E-36 (85%).

Plate 12. A field view of anaerobic germination of rice MAGIC lines in micro-plots

Screening of MAGIC lines of rice for submergence tolerance in the filed

An experiment was conducted to identify submergence-tolerant rice varieties for the vegetative stage of floods that occur in rainfed lowlands. A total of 181 MAGIC lines of rice were evaluated during the rainy season of 2023. The experiment was conducted in an augmented design with two checks *viz*. Swarna *Sub 1* (submergence tolerant) and IR 42 (submergence susceptible). The field was fully submerged for 10 days at the vegetative stage of the crop.

Plate 13. Performance of MAGIC lines of rice in submerged field.

The selection was made for survival rate and productivity. There were 15 lines selected as tolerant submergence stress. These lines are considered promising for breeding improved rice.

Evaluation of pulse varieties for flood-tolerance

An experiment was conducted in controlled conditions (Micro-plots) to identify flood-tolerant varieties of green gram and black gram. Five varieties of green gram *viz*. CIARI Mung 1, CIARI Mung 2, CIARI Mung 3, CIARI Mung 4, CIARI Mung 5 and two varieties of black gram *viz*. CIARI Urd 1 and CARI Urd 2 were sown in micro-plots. After 25 days of sowing, the crop was irrigated up to 2 inches of stagnated water and four levels of flooding (T_1: No flooding, T_2: 3 days flooding, T_3: 4 days flooding, T_4: 5 days flooding) were maintained. It was observed that green gram varieties could tolerate flood up to 3 days only, while black gram varieties could survive up to four days in 2 inches of stagnated water. The grain yield reduction of 35-40% was also recorded in flooded crop than the non-flooded crop and no significant variation was recorded among the varieties of green gram and black gram.

Multiple resistant rice lines developed for coastal-saline soils

131-2-175-1223: It is a MAS-derived NIL of a popular rice variety, CARI Dhan 5 (Plate 14a). It possesses three *Xa* genes governing resistance to bacterial blight *viz*., *xa*5, *xa*13 and *Xa*21 and also has tolerance for salinity, with seed-to-seed maturity of 135–140 days and an average yield of 5.0–5.3 t/ha in normal soils and 3.5–3.7 t/ha in saline soils. It has medium-slender grains and acceptable quality parameters.

131-2190-659: It is a MAS-derived NIL of a popular rice variety, CARI Dhan 5 (Plate 14b). It possesses two *Xa* genes governing resistance to bacterial blight, *viz*. *xa13* and *Xa21* and also has tolerance for salinity, with seed-to-seed maturity of 120–125 days and an average yield of 4.3 to 5.30 t/ha in normal soils and 3.0 to 3.5 t/ha in saline soils (Ec 5.0 dS/m^2). It has medium-slender grains and acceptable quality parameters.

Plate 14. Field view of rice NILs a) 5 131-2-175-1223; b) 131-2190-659

Crop production and postharvest efforts

Evaluation of cinnamon varieties under arecanut plantation

Performance of five improved varieties of true cinnamon along with local check is being evaluated to identify superior genotypes as intercrop in the islands. Analysis of data on plant growth parameters suggested variations for plant height (46.1 cm to 93.2 cm), collar thickness (24.9 mm to 36.3 mm), number of primary branches (7.0 to 14.4) and canopy spread (77.3 cm to 114.4 cm).

Study on variation in leaf drying duration among true cinnamon seedling progenies

A study investigating drying time variations in 24 collections of true cinnamon leaves revealed a range between 5.00 to 7.00 hours, with a grand mean of 6.55 hours. Significant variations (1% level) in weight loss were observed at hourly intervals, with 15.20%, 27.73%, 37.91%, 45.64%, and 51.55% weight loss after 1, 2, 3, 4, and 5 hours of drying, respectively. The findings highlight the influence of genotypes on drying characteristics, emphasizing the importance of efficient drying process.

Table 9. Variations in drying time in terms of weight loss (%) from leaves of cinnamon collections

Parameters	Weight loss (%) over the period of time					Drying time (h)
	1h	2h	3h	4h	5h	
Minimum	4.893	14.373	20.333	27.663	36.356	5.00
Maximum	23.543	38.545	51.146	56.353	59.483	7.00
Grand mean	15.20	27.73	37.91	45.64	51.55	6.55
CD (0.01)	4.425	6.067	5.939	5.612	4.537	0.581
CD (0.05)	3.369	4.614	4.514	4.279	3.450	0.442
F test	**	**	**	**	**	**

Initiatives for Promotion of True Cinnamon in the Islands

In order to promote cultivation of cinnamon in the islands, systematic efforts were initiated through which planting material of cinnamon was provided through CSS-MIDH (NHM) Project on Spices to farmers/ stakeholders from South Andaman Island (Ograbraj, Bird Line, Prothrapur, Caddlegunj, Wimberlygunj, Garacharma, Humfrygunj), North and Middle Andaman Islands (Kalipur and Rangat) and Little Andaman Island (Harminder Bay). Further, planting material was also provided to various stakeholders who participated in different training and awareness programmes conducted during the year. About 4,300 plants were provided to these stakeholders for establishing the gardens.

Macro-propagation technology of banana for rapid multiplication

Polyethylene made rectangular tubs were used for standardization of macro-propagation technology in banana. The experiment was laid in such a way that 50% shade is provided to protect the fragile seedlings. The steps followed in macro-propagation of banana is given in pictorial representation.

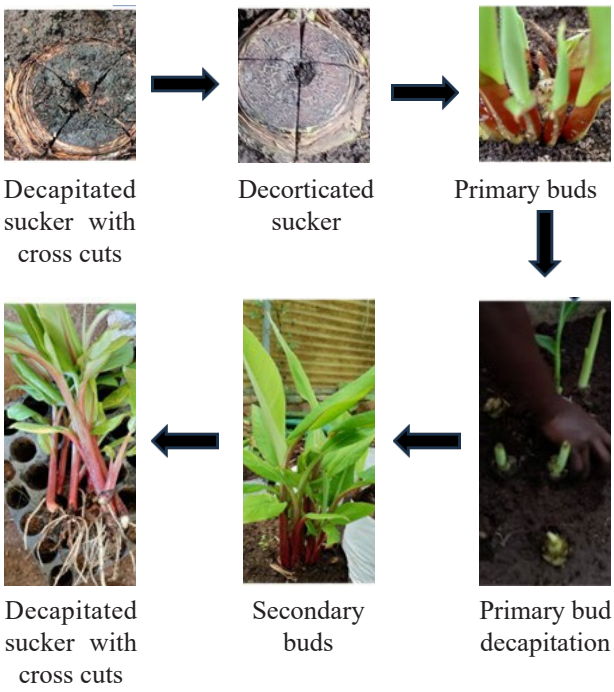


Plate 15. Pictorial presentation of steps involved in the macro-propagation of banana

Nine different treatment combinations were used to study the effect of media on macro-propagation of banana variety Poovan. Variation was observed in number of days taken for sprouting, number of multiple shoot production after primary and secondary capitations among the different treatments and the results are presented in Table 10. The results of the study showed that T_8 (Coircompost: sawdust: FYM: vermicompost (1:1:1:1) + Arka microbial consortia (10 kg) was the best organic media combination under Island ecosystem.

Table 10. Effect of organic substrates on macro-propagation of banana variety 'Poovan'

Treatments	Days taken for bud emergence	No. of primary buds	No. of secondary buds	Plantlet separation (days)	Shoot length (cm)	Shoot girth (cm)	No. of leaves
T_1	18.57	2.73	5.77	62.97	35.40	2.20	4.00
T_2	22.90	3.0	6.53	65.43	28.33	2.03	3.27
T_3	14.43	4.23	9.63	56.70	42.17	2.73	4.23
T_4	27.97	3.37	7.27	75.40	36.33	2.10	3.50
T_5	25.73	2.13	5.23	82.40	29.40	2.40	3.77
T_6	29.47	2.50	5.93	79.77	38.37	2.63	4.00
T_7	16.47	3.10	6.47	70.83	35.80	2.30	4.17
T_8	11.50	5.60	12.07	52.70	46.43	3.03	4.50
T_9	24.83	2.03	4.73	68.50	35.07	2.30	3.97
CD at 5%	1.074	0.385	0.37	1.253	1.136	0.125	0.565
CV (%)	2.909	6.973	3.026	1.06	1.805	2.995	8.303

Multiplication study in dragon fruit

Rapid multiplication of dragon fruit was tried with different combinations and it was found that in the treatment T_6 (Base end cut three sides at 30° angle + IBA @ 500 ppm showed early rooting with maximum number of roots (22.3) and root length (17.8cm). The fresh weight and dry weight of root (3.8 g and 1.6 g respectively) was also maximum in this particular treatment (11).

Table 11. Rooting pattern of dragon fruit as influenced by different cutting methods combined with dipping treatments

Treatments	Treatment details	No. of roots	Root length (cm)	Fresh weight of root system (g)	Dry weight of root system (g)
T_1	No cut (Control)	6.4	5.7	0.3	0.2
T_2	30° angle 3 side cut	11.4	8.5	1.4	0.9
T_3	30° angle 2 side cut	10.4	7.6	1.2	0.8
T_4	30° angle 1 side cut	9.4	7.4	0.9	0.5
T_5	30° angle 3 side cut + Aloe vera gel dip	18.6	13.8	2.8	1.4
T_6	30° angle 3 side cut + IBA @ 500 ppm dip	22.5	17.3	3.8	1.6
T_7	30° angle 3 side cut + cinnamon powder dip	17.6	12.9	2.8	1.3
T_8	30° angle 2 side cut+ Aloe vera gel dip	15.9	12.5	2.5	1.3
T_9	30° angle 2 side cut + IBA @ 500 ppm dip	20.1	16.3	3.2	1.5
T_{10}	30° angle 2 side cut + cinnamon powder dip	16.1	12.3	2.3	1.2
T_{11}	30° angle 1 side cut+ Aloe vera gel dip	13.8	11.5	1.9	1.2
T_{12}	30° angle 1 side cut + IBA @ 500 ppm dip	15.4	13.0	2.4	1.4
T_{13}	30° angle 1 side cut + cinnamon powder dip	4.8	12.0	1.9	1.1

Physicochemical changes in underutilized *Flacourtia montana* during maturity

Characterization of fruits of *Flacourtia montana* was carried out at different maturity stages using morphological and physicochemical parameters. Fruits were harvested at green immature, firm ripe and soft ripe stages and used for analysis. Results revealed that from green immature stage to firm ripe stage, fruit weight as well as pulp percentage increased from 1.1 to 2.1 g and 81.0 to 88.7%, respectively. However, minor variations were noticed between firm ripe and soft ripe stages. Total soluble solids content increased from 12.7 °Brix to 17.0 °Brix and later to 20.0 °Brix during this development. Corresponding decrease in the titratable acidity content was witnessed with the ripening.

Plate 16. Fruits of *Flacourtia montana* of different maturity used for the study

Seed germination studies in Surinam Cherry (*Eugenia uniflora*)

In order to improve the seed germination in Surinam Cherry, seven treatments *viz*. 24 hours soaking of seeds in GA_3 (250 and 500 ppm), thiourea (1 and 2%), potassium nitrate (0.1 and 0.2%) and water soaking were compared with untreated control. Results revealed significant variations amongst the treatments studied and significantly highest germination of 75.5% was obtained with soaking of seeds in GA_3 (500 ppm), as against 42.5% in untreated control (Fig.3). Seedling growth parameters were also significantly influenced by the soaking treatments.

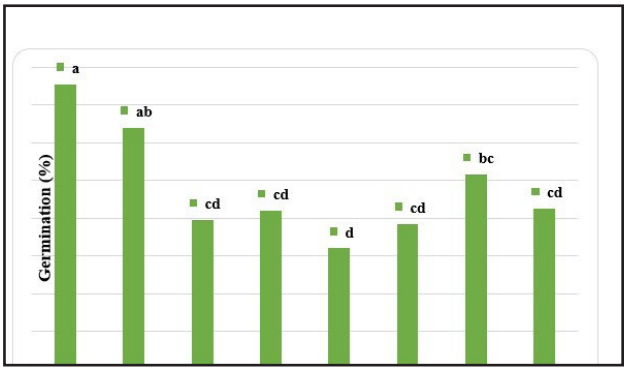


Fig. 3 Effect of seed treatments on germination (%) in Surinam Cherry (*Eugenia uniflora)*

Seed germination in Surinam Cherry as influenced by substrates was studied during second year of trial. In this year as well, highest germination percentage (79.3%) was recorded, when coir pith compost was used as a substrate.

Plate 17. Seedlings of Surinam Cherry obtained from corpith compost substrate

Seedlings obtained from coir pith treatment also showed superior seedling growth parameters such as shoot length (10.9 ± 0.58 cm), root length (11.4 ± 1.49 cm), number of primary roots (30.2 ± 4.20), root thickness (0.7 ± 0.03 mm), collar

thickness (1.0 ± 0.05 mm), number of leaves per seedling (4.9 ± 0.48), leaf length (2.5 ± 0.09) and leaf width (1.6 ± 0.06 cm). Thus, based on the data for two years, coir pith compost could be recommended for nursery raising of Surinam Cherry.

Postharvest technology in native species

To popularize cultivation of Andaman Kokum in the islands, value added products were prepared from it. Sensory evaluation of syrup prepared from rind was carried out with 70 consumer panelists on 9-points hedonic scale. Analysis of results suggested the average scores of 8.03 ± 0.132 (colour), 7.94 ± 0.106 (taste), 7.39 ± 0.162 (aroma) and 8.17 ± 0.095 (overall acceptability) to the product indicating its potential for commercial utilization. Similarly, sensory evaluation of dehydrated woody pepper powder was carried out using 7 points hedonic scale. Analysis of data suggested the mean score of 5.5 ± 0.17 for colour, 6.0 ± 0.22 for taste and 6.1 ± 0.15 for overall acceptability.

Intercropping studies in *Arachnis* orchid

Golden rod (*Solidago* sp.) was intercropped with *Arachnis* orchid, and was also raised as a solo crop to study the performance evaluation. The crop which was raised as a solo crop showed better performance as compared with intercrop trial in *Arachnis* orchid. Plant height (70.95 cm), number of leaves per plant (95.44), leaf area (7.55 dm^2), number of suckers per plant (9.37), days to first floret opening (9.86), number of primary branches (38.23) and number of panicles per plot (40.32) were maximum in solo crop of Solidago.

Horticulture based sustainable roof top production model

The horticulture-based rooftop production models established (Plate 18) under NABARD project were monitored and 10 crop cycles were completed. A training programme on "Horticulture based rooftop production model for self-sufficiency" of five days duration (25-30, October, 2023) at Nehru Yuva Kendra was completed under the project.

Plate 18. Successful horticulture-based rooftop production model at Pathergudda

Cultivation and value addition of cut flowers for entrepreneurship development

The model production unit of speciality flowers were established in the field of new added beneficiaries *viz*. Smt. Shanti, Beodnabad, Smt. Chellammal, Rangachang, Shri. Jagdish Haldar, Namunagar and Shri. Mahadev Majji, Collinpur. Thirty-two species of planting material of speciality flowers were supplied to the new beneficiaries and the fields were established .

Plate 19. Demonstration of speciality flowers at Namunaghar

DIVISION OF
NATURAL RESOURCE MANAGEMENT




Division of Natural Resource Management

Integrated farming system

For enhancing farm production and productivity through farming system approach in hilly uplands of Andaman Islands an Integrated Farming System model is being evaluated in 1 ha area since 2021. The experimental unit is located in hilly land with 8-18% slope having surface runoff of 4 -25% resulting in soil loss of 0.3 to 1.7t on $ha^{-1}yr^{-1}$. The soil is sandy clay loam with 62% sand and 30% clay, acidic (pH 4.6), non saline with EC 0.40-0.60 dSm^{-1}, medium in organic carbon(6-10 g kg^{-1}), available nitrogen (172-380 kg ha^{-1}), low in available phosphorus (2.5-4.5 kg ha^{-1}) and potassium(142-180 kg ha^{-1}). The bulk density in surface soils varies from 1.08 to 1.19 mg m^{-3} with porosity values ranging between 57-61% with rapid infiltration rate (36 $mmhr^{-1}$). The runoff and soil loss were reduced drastically with intercropping of coconut plantations grown on terraces as compared to mono-cropping (coconut alone) in unterraced hilly slopes. The average light intensity in coconut garden on a sunny day ranged from 42300 to 71045 lux in-between trees.The coconut plantation was diversified by intercropping with spices (clove, nutmeg, black pepper), tapioca, sweet potato, pineapple and green fodder in an area of 0.9 ha. Fruit trees *viz.* banana, bread fruit, bread nut, lemon saplings are planted as boundary plantations. The livestock component *viz*. Andaman local goat (20 numbers) with Nicobari poultry birds (40 birds/cycle, 2 cycle in a year) were integrated into the system. Additionally, residue recycling (vermicomposting), rainwater harvesting (lined pond of 230 m^3) and *Azolla* cultivation were included. The crop residues and animal waste generated from the system were recycled through vermicomposting and value added by nutrient enrichment and consortia preparation. During the year, the system recorded a total net return of Rs.1.43 lakh/ha/ year.

Plate 20 . Coconut-goat based integrated farming system model at Garacharma

Novel Biostimulants

A study was undertaken to utilize the rich sea weed resources of the island by extracting and converting them into natural bio-stimulants for enhancing crop production. During the year, a field experiment was conducted to study the effect of seaweed liquid fertilizer (SLF) on growth and yield of green gram (CARI Mung 5) and black gram (CARI Urad 1) in two separate experiments with 5 treatments and three replications. The subplot treatments are T_1-control, T_2-25% SLF, T_4-50% SLF, T_4-75% SLF and T_5-100% SLF. The crop was sown in January 2023 and 2 foliar sprays were carried at the time of flower initiation and 15 days after 1st application as per treatments. The CARI Mung 5 responded well and recorded on par yield for 25, 50% SLE application 975 and 930 kg ha^{-1} respectively.

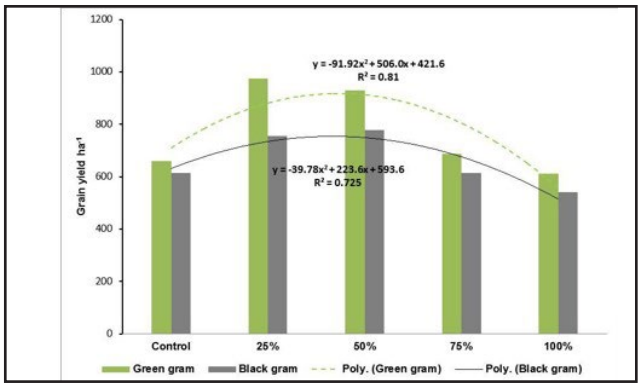


Fig 4. Effect of SLE application on grain yield of green and black gram

Another experiment was conducted to study the effect of SLF on cucumber with 5 treatments (control, 5% SLF, 10% SLF, 15% SLF and 20% SLF) and three replications. The study revealed that application of 15% SLF recorded significantly higher yield of cucumber (620 g/ plant) as compared to other treatments.During the year, patent was granted for dual extraction procedure for getting calcium alginate and seaweed liquid fertilizer (SLF) from brown seaweeds (*Sargassum wightii*).

Humic Acid Formulations

A humic acid formulation (HAF) was prepared by adding humic acid, seaweed extract and nanourea in different proportions and neutralised with citric acid.The effect of this formulation on yield of green gram (CARI Mung 3) was studied and compared with conventional practices under rainfed conditions ofthe island. The experiment was laid out in RBD with 6 treatments *viz.* 0.25, 0.50, 0.75, 1.0% HAF, 2% DAP, 2% Jeevamrit and control with 3 replications. The crop was sown in January 2023 and 3 sprays of respective treatments were taken up at 15 days interval starting from 25 days after sowing. The results indicated a significant improvement in yield parameters and yield of green gram compared to control and other conventional practices like DAP (Table 12).

Table 12. Effect of HAF and other conventional practices on yield of green gram

Treatment	No. of pods/plant	No. of grains /pod	Grain weight/plant	Grain yield (kg)/ha
0.25% HAF	12.67^{b}	83^{c}	3.37^{c}	600^{c}
0.50% HAF	13.33^{b}	12.00^{b}	3.45^{c}	621^{c}
0.75% HAF	13.67^{a}	12.33^{b}	5.39^{b}	865^{b}
1% HAF	14.00^{a}	13.33^{a}	6.10^{a}	978^{a}
2% DAP	9.00^{c}	10.67^{c}	2.88^{d}	512^{d}
2% Jeevamrit	9.67^{c}	10.67^{c}	3.20^{d}	569^{cd}
Control	6.67^{d}	10.33^{d}	2.16^{e}	425^{d}
CD (0.05)	0.29	0.96	0.68	85

Carbon foot print

The carbon foot print (CF) for major crops and cropping systems of Andaman Islands was estimated as total emissions of greenhouse gas (GHGs) resulting from an activity, in this case, “agricultural operations”. The results indicated that carbon foot print was much higher for rice > 10 Mg CO_2 eq/ha, while other arable crops recorded less than 2 Mg CO_2 eq/ha only. For arable crops highest CF was observed for vegetables due to more intensive use of synthetic chemicals compared to low input crops like pulses, fodder *etc*. As the plantation crops being a perennial component involved in net C sequestration by more biomass addition, moreover no external synthetic input is being applied to such crops. Vegetable based cropping systems recorded around 4 to 5 Mg CO_2 eq/ha as against coconut

based cropping systems recording only 162 to 326.7 Kg CO_2eq/ha depending on the intercrops involved. The lowest carbon foot print was due to the perennial nature of the crops and low external input utilization in those crops.The change in C stock from the land use change over the period (2009-2021) indicated that during the last decade, there was a loss of agricultural land up to 56% in Andaman Islands mainly caused by land conversion to other developmental activities and real estate. Accordingly, total SOC stock in major land uses of Andaman Islands declined from 46223.2 Gg (2009) to 45454.7 Gg in 2021 with loss of 768.3 Gg (1.66%) over the years. The loss of forests and agricultural land for other LU contributed more to the loss.

Table 13. Effect of land use change on Soil Organic Carbon stock in different land uses of Andaman Islands

LULC	Andaman Islands (Area, ha)			Total Soil Organic Carbon (Gg)		
	2009	2021	% Change	2009	2021	Loss/Gain in TOC
Forest	514292	509594	-0.91	44589.1	44181.79	-407.31
Water Bodies	61735	73160	18.51	-	-	-
Agriculture	41225	17852	-56.70	669.9	290.09	-379.81
Built up area	1509	11185	641.22	-	-	-
Wetlands/Mangroves	9972	8840	-11.35	811.7	719.57	-92.13
Barren	10950	14801	35.17	135.2	182.78	47.58
Fallow	1160	5411	366.47	17.2	80.13	62.93
Total	640843	640843	-	46223	45454.7	-768.3

Organic Farming

The study on organic farming in coconut based cropping systems for sustaining the productivity was continued during 2023. The recommended dose of nutrients was given through different combinations of organic sources, vermicompost and green manure. The study showed a 9% increase in coconut yield in treatments over control indicating the positive effects of organic treatments. However, black pepper vines showed nutrient deficiency even after manure application, probably due to less nutrient storage and leaching from runoff water. The runoff and nutrient losses were very high due to high slopes (11-26%). Therefore, to arrest the runoff, reduce the soil and nutrient losses and conserve soil moisture, different soil and water conservation measures like contour-based terraces, contour bunds, contour trenches, semicircular trenches around coconut trees with sun hemp and gliricidia, and lined ponds (7 m × 7 m × 1 m) in 0.5 ha were intervened.

Plate 21. Organic farming in coconut based cropping system

Recommended dose of nutrients (500 g N, 320 g P_2O_5 and 1200 g K_2O per palm per year) was given through different combinations of organic sources *viz*. FYM, vermicompost and green manure on N equivalent basis. Green manure (sunhemp and gliricidia) was applied in semi circular trenches made around the coconut trees. The organic wastes were recycled after vermicomposting. After 3 years of experiments, application of recommended dose of nitrogen through FYM + Waste recycling (vermicomposting) + green manure recorded slightly higher yield of coconut (74 nuts/tree/year) as compared to other treatments. Application of FYM and green manuring were done for intercrops like cinnamon, clove, ginger, turmeric and elephant foot yam. The slightly better quality parameters (phenols, flavonoids, DPPH, Carbohydrate and protein) were observed in organic produced crops (cinnamon, clove, ginger, turmeric and elephant foot yam) as compared to the produces from local market.

The study on organic farming in rice-vegetable cropping system was conducted in split plot design. The vegetables *viz.* Okra and Brinjal were grown during Dec-Apr, 2023 with four main plot treatments consist of bulky and concentrated manures (FYM 75% N) + Neem cake 25% N + Biofertilizers (M_1), green manures (Daincha 25% N, Glyricidia 50% N + Azolla 25%) (M_2), Vermicompost 75% N + Bio granules 25% N + P, K through Rock PO4 & Biopotash + BF (M_3) and 100% RDF through inorganic fertilizers (M_4). The subplot treatments consist of foliar spray of Panchagavya (S_1), Jeewamrit (S_2), Sea weed extract (S_3) and control (S_4). The confirmatory trial (July-Nov, 2023) on organic farming in rice (CIARI Dhan-7) revealed that application of 100% N through green manure, green leaf manure & azolla and panchagavya spray recorded higher grain yield of 3.46 t/ha, which is 20 percent lesser than the 100% RDF through inorganic fertilizers (4.15 t/ha). In brinjal, 100 % RDF through inorganic fertilizers recorded higher yield (7.5 t/ha). Among the organic treatments, vermicompost (75% N) + Bio granules (25% N) + P & K through Rock PO_4 & Biopotash +BF and Panchagavya spray recorded higher yield of 5.7 t/ha, which is 31 percent lesser than the 100 % RDF through inorganic fertilizers and foliar spray of Panchagavya. In Okra also, 100 % RDF through inorganic fertilizers recorded higher yield (8.3 t/ha). Among the organic treatments, vermicompost (75% N) +Bio granules (25% N) + P &K through Rock PO_4 & Biopotash + BF and Panchagavya spray recorded higher yield of 6.0 t/ha, which is 38 percent lesser than the 100% RDF through inorganic fertilizers and foliar spray of Panchagavya.

Plate 22. Organic farming in rice-vegetable cropping system

Moisture Stress Management

An experiment was conducted to study the effect of different moisture stress management practices on growth, yield attributes and yield

of tomato, brinjal and cowpea during post monsoon period (November 2022 to May 2023). The experiment was laid out in strip plot design with three horizontal treatments (Drip + plastic mulch, sub-surface drip and surface irrigation) and four vertical treatments (Hydrogel, hydrogel + K spray, hydrogel + Ca spray, hydrogel + K & Ca spray) with three replications. The soils of the experimental field were acidic (pH 5.6), low in available nutrient content (N 166, P 3.2 and K 145 kg/ha). The tomato and brinjal seedlings were transplanted in the main field at 50 × 50 cm spacing. Irrigation was given through drip, subsurface drip and surface irrigation at three days interval. The recommended dose of fertilizer was given through inorganic and organic sources. Foliar spray of potassium nitrate (N-13% & K-45%) and calcium nitrate (N-13.5% & Ca-18.5%) was done at flowering and 15 days after the first spray.

In tomato (Arka Samrat), drip irrigation +mulch and hydrogel + K & Ca foliar spray recorded higher plant height and early flowering. The drip irrigation with plastic mulching recorded higher fruit weight (52.7 cm), no. of fruits (10.1) which resulted in higher yield (533 g plant^{-1} & 8.2 t ha^{-1}) and at par sub-surface drip irrigation. It also recorded higher relative leaf water content (56.2%), membrane stability index (44.1), total chlorophyll content (2.2 mg/g.fw) where as the surface irrigation recorded higher proline content due to water stress. Similarly, application of hydrogel + K & Ca foliar spray recorded higher yield (527 g plant^{-1}& 8.02 t ha^{-1}). However, it did not have any significant influence on physiological parameters. Similarly in brinjal, the plant growth was better in drip irrigation + mulch and hydrogel + K & Ca foliar spray. The drip irrigation with plastic mulching recorded higher fruit weight (67.8), no. of fruits (10.6) which resulted in higher yield (717 g plant^{-1} & 11.2 t ha^{-1}) followed by sub-surface drip irrigation. It recorded higher relative leaf water content (55.7 %), membrane stability index (45.2), total chlorophyll content (2.5 mg/g.fw) where as the surface irrigation recorded higher proline content (5.12 µmol/g.fw) due to water stress. Application of hydrogel + K & Ca foliar spray recorded higher yield (709 g plant^{-1} & 11.1 t ha^{-1}) and at par with hydrogel + K foliar spray. Cow pea was sown in March as a second crop. In cow pea, drip irrigation with plastic mulching recorded higher yield (421 g plant^{-1} & 6.6 t ha^{-1}) followed by subsurface drip irrigation. Application of hydrogel + K & Ca foliar spray recorded higher fruit yield (418 g plant^{-1} & 6.4 t ha^{-1}) and at par with hydrogel + K spray.

The quality parameters, water &nutrient use efficiency and soil moisture content were higher under drip + mulch treatment in tomato, brinjal and cowpea. Though, the cost of cultivation was low in surface irrigation, net return and B:C ratio

Plate 23. Moisture management in tomato and cow pea

were higher in drip irrigation + mulching and sub-surface drip irrigation due to higher yield. Application of hydrogel + K spray recorded higher quality parameters, water & nutrient use efficiency, net return and B:C ratio and at par with hydrogel +K + Ca spray. It can be concluded that drip irrigation + mulching, application of hydrogel and foliar spray of K and Ca is best option to mitigate the moisture stress during dry period and get higher yield and water productivity in vegetables under island condition. However under constraint situation, application of pusa hydrogel (4 kg/ha) and foliar spray of 1% KNO_3 can be recommended to manage moisture stress.

Hydrological Response for Soil and Water Conservation in Island Ecosystem

In this study, potential areas suitable for water conservation practices and soil conservation measures was mapped in Andaman Islands based on various thematic information like land topography (digital elevation model), slope (%), land use land cover, soil texture, runoff, stream order, drainage density, and road proximity. The potential number of water conservation practices (farm ponds and check dams) and suitable area for conservation measures such as terraces, contour or graded bunds and broad bed furrows in hilly, medium, and low land areas, respectively was mapped and determined for Andaman Islands based on prioritized erosion risk areas. The mapping results that about 5.2% of geographical area of Andaman Islands *i.e.,* 26,420 ha area is prone to severe and very severe soil erosion, and it should be prioritized for suitable conservation practices. It is found that about 20% of barren lands are potential for practicing the water (farm ponds and check dams) conservation practices in the Islands. It is inferred that about 20% of area is potentially suitable to develop water conservation practices in the Andaman Islands. The water conservation practices were underdeveloped (37%) in the Islands and there is a scope for 63% more development in terms of farm ponds and check dams. The soil conservation mapping revealed that about 25% of agricultural area is potential for practicing the soil conservation practices like contour/graded bunding, terracing, and broad bed and furrow.

Pesticide Residues

Periodic monitoring of pesticide residues in food commodities *viz*. vegetables and fruits is essential to monitor the pesticide use in Island agriculture. During the reporting period, 241 samples covering vegetables and fruits were collected from farm gate at different villages and venders in major markets of Andaman Islands. Of the total samples, 72% is vegetables (cauliflower, cabbage, cucumber, chilli, okra, tomato and gourds) and 28% is fruits (banana, papaya, orange, apple and Pomegranate). The shoot and fruit borer in brinjal and okra, white fly, mealybug are the major pests in many parts of the Islands. The samples were analysed at Export Inspection Agency (EIA), Kolkata for determination of pesticide residues.

NABARD Project on high value vegetable cultivation under protected cultivation (rainout shelter)

The project on high value vegetable cultivation and vermicompost production under rainout shelter for doubling farmer's income was continued in two progressive farmer's field at Calicut and Beodnabad villages of South Andaman. Under this project, high value vegetables like coriander, palak, onion (leaf), mint, marsha, cucumber, brinjal and chilli were cultivated in rain out shelters at Calicut and Beodnabad. Among

the vegetables, the leafy vegetables like palak, coriander, mint and onion performed better and recorded higher yield and net return. Vegetable cultivation and vermicompost production under rainout shelter recorded an average annual income of Rs. 65,000/- to 72,000/-from one rain shelter. Two awareness programmes and one training on high value vegetable cultivation, natural farming and organic input production were conducted to farmers. Inputs like vegetable seeds, grow bags, rose can, water tank, sprayer etc were distributed. At both the locations, farmers have recycled all the farm wastes through vermicomposting (1.2-1.5 t/year) using vermi bags and used it for vegetable cultivation. The farmers were getting income round the year through sale of vegetables besides meeting the household requirement.

Plate 24. High value cultivation under rainout shelter at Calicut

Gramin Krishi Mousam Sewa (Integrated Agromet Advisory Services)

During the period a total of 105 agromet bulletins were issued in multilingual format covering all aspects of agriculture production based on the weather forecast received from IMD, Pune with the help of multidisciplinary advisory team. It was aimed at minimizing the production losses by supporting informed decision making in farm operations and support marketing of farm produces. Under this programme, 12803 farmers were registered in mKISAN portal and agromet advisories were sent to them regularly in the form of SMS. Further, the services of All India Radio (AIR), Doordarshan, print media, KVK, VRC, social media and other means were effectively utilized to reach the farmers from remote islands. As per the guidance from IMD wastapp group were created block wise village level. A total 27 watsapp grouped is maintain by AMFU, Port Blair and provide inputs like Agro Advisory bulletin, IBF and forecast in pictorial format. On the occurance of extreme events IBF is issued to the Islands farmers and during last year 2023 a total 13 nos. of IBF is issued.

State Specific Action Plan-Water Sector

The state specific action plan (SSAP) on water sector was carried out for Andaman Islands. It essentially consists of supply and demand of water in various sectors, identifications of key issues, their possible solutions and detailed action plan. The water budget analysis in A&N Islands revealed that a total of about 32.78 MCM of water is needed to meet current annual demand by all sectors. It is also estimated that a total of 38.12, 45.2, and 53.06 MCM of water is required to meet the various farm and non-farm sectors demand by 2031, 2041, and 2051, respectively. The draft status report has been accepted by technical committee of National Water Mission with some suggestions for modification. The progress of the project was reviewed during the workshop cum review meeting held on 16 June, 2023 and the report was accepted by steering committee with some suggestions. The interim report was also submitted after incorporation of comments of technical and steering committee.

Third party monitoring report preparation for State CAMPA Projects

As per the rules notified under the state CAMPA there is a provision for the third party monitoring

or works undertaken from state CAMPA fund like plantation, water and soil conservation measures, wildlife management activities etc. In this connection Andaman Nicobar Forest Department various activities carried out CAMPA for their respective divisions. The proposal is to conduct third party monitoring of works undertaken from State CAMPA fund (Plate 35) The period of the CAMPA work will be considered w.e.f. 2010 to till date for the Diglipur, Mayabunder, Middle Andaman, Baratang, South Andaman and Nicobar Forest Divisions. As per the objective of the project all the allotted divisional CAMPA works were examined and report submitted to the funding agency.

Plate 25. Monitoring of CA plantation at South Andaman Forest Division

Sequential cropping under Padauk plantation

Under *Pterocarpus dalbergioides* based sequential cropping system harvested 35 kg of Tapioca tubers from 10 m^2 area. The setts were prepared and planted for study the performance of Tapioca in the forthcoming season. The performance of vegetable cowpea under sequential cropping system was studied. The initial observation shows the better performance of the crop with the yield of 2.2 kg in an area of 10 m^2. Bhendi, brinjal and chilli fruit yield was recorded from the sequential cropping trial from the trial Bhendi performed well under the Padauk based sequential cropping system with the average yield of 0.72 kg/plant. Sweet potato, broad dhaniya, *Pandanus amaryllifolius*, sword bean, sweet corn, baby corn, cauliflower, banana, pine apple crops are in various vegetative stages in the field.

Plate 26. Cultivation of vegetable crops under sequential cropping system

Enriching coconut plantations

The multipurpose trees planted in the coconut garden showed more height (8.21 m) in *Dendrolobium umbellatum,* and highest Diameter at Breast Height level (10.24 cm) in *Callophyllum inophyllum.* Based on the observations the following species were identified to enrich the coconut plantations. The highest mean green biomass of 11.59 kg was recorded in *Dendrolobium umbellatum*, the highest number of pole collected from main stem and branches (6.2) was recorded in *Bahuinia* spp followed by *Dendrolobium umbellatum* (5.4). The pH of the soil in the intercropped field ranged from 4.9 to 5.4, EC from 0.04 µs to 0.10 µs and organic carbon from 0.64% to 1.73%. The dehydrogenase (mgTPF/hour/g soil) ranged from 1.42 to 11.11 and urease (mg urea/hour/g soil) ranged from 3.4 to 5.1.

Total biomass estimation of the Multi-purpose trees under coconut plantation

Destructive sampling was done in the

multipurpose tree species (MPTS) planted as an intercrops in coconut plantation. The mean highest total green biomass of 116 kg was recorded in *Callophyllum inophyllum* followed by *Pterocarpus dalbergioides* (14.65 kg) and least green biomass was recorded in *Sageraea elliptica* (5.2 kg). The dry biomass of the MPTS was recorded after two months. The highest total dry biomass was recorded in *Callophyllum inophyllum* (21.54 kg) followed by *Pterocarpus dalbergioides* (8.65 kg) and least dry biomass was recorded in *Sageraea elliptica* (2.11 kg).

From the study it was concluded that the intercropping of multi purpose trees under coconut plantation would improved the soil nutrient level of 30% compared to pure coconut plantation. Based on the total biomass production of the MPTs it has been recommended that under the Island condition the following species were identified to enrich the coconut plantations such as *Dendrolobium umbellatum* (L.) for green biomass, *Sesbania grandiflora* and *Leucaena leucocephala* for soil nutrient enrichment, *Callophyllum inophyllum* for wind break and *Bahuinia* spp., *Casuarina equisetifolia* for staking

Plate 27. Field view of the MPT's under coconut plantation

The survey and documentation of the existing agroforestry systems present in the Islands were carried out. The results revealed that thespecies diversity of six *tuhets* at Car Nicobar consist of 12 economically important tree species 13 shrub, 15 herb, six climbers and 17 natural forest tree species. The species component in the tribal farming system at Nancowrie, terrasa, Chowra and Katchal Islands recorded the species diversity of 9 *tuhets* consist of 16 economically important multipurpose tree species 12 shrub, 17 herb, 5 climbers and 11 natural forest tree species (major fruit was Nicobar khatta pal, banana and bilimbi; major tuber was Nicobari aloo, colocasia and tapioca).The alley cropping system mainly consist of *Gliricidia sepium* as a hedges and intercrops are Brinjal, Amaranthus, Maize and Black pepper. Besides the species diversity of Andaman Islands home garden revealed that the major species composition such as Papaya, pine apple, banana were the dominant fruit crops, cinnamon, clove, black pepper are the dominant spice crop, colocasia, tapioca, Tania, greater yam were the major tubers, *Terminalia bialata*, *Padauak*, *Diospyros marmorata, Artocarpus chaplasa, Lagerstroemia hypoleuca* were the major existing timber trees, cucurbits, leafy vegetables, moringa, brinjal, chilli were

Plate 28. *Tuhets* at Car Nicobar

the dominant vegetable crops, ocimum, noni, turmeric, ginger, *Cheilocostus speciosus, Tamarindus indica* were the major medicinal

plants and coconut, arecanut, pandanus, wild arecanut were the dominant plantation crops.

Chemical composition of underutilized leafy vegetables

Three underutilized leafy vegetables from Andaman and Nicobar Islands, India, were analyzed for proximate, nutritional, antinutritional, physicochemical, micronutrients and antioxidant profiles. The tender leaves, matured leaves, and twigs of *Champereia manillana, Hibiscus acetosella* and *Ipomoea batatas* were analyzed. The moisture content in the three plant parts analyzed ranged from 47.38% to 63.77%. Maximum ash content and crude lipid was recorded in tender leaves of *C. manillana*, crude protein in matured leaves of *I. batatas*, and total fibre in the twigs of *C. manillana.* Carbohydrate content was maximum in twigs of *C. manillana*, protein content was maximum in matured leaves of *H. acetosella* and vitamin C in matured leaves of *H. acetosella*.

Pandanus seed oil chemical profiling

Seed oil from *Pandanus tectorius*, *P. lerum* and *P. odorifier* analyzed for its fatty acid profile. The results revealed that the highest saturated fatty acid of 40.09% was observed in *P. tectorius* seed oil. The highest polyunsaturated fatty acid of 27.06% and monosaturated fatty acid of 35.98% was recorded in *P. odorifer* seed oil while all the three species seed oil recorded below 1% transfatty acid.

Characterization of Pandanus species

Physiolgical characterization of six accessions of *Pandanus lerum* fruits collected from Nancowrie and Kamorta Islands were done. The average fruit size ranged from 10.20 kg to 15.95 kg with the keys ranged from 82 to 117. TSS of the fruit pulp were also analysed for raw and cooked pulp the mean TSS of raw pulp was 1.6 ºBrix and cooked pulp had 1.4 ºBrix. *P.lerum* collected from different geographical area of Andaman and Nicobar Islands had excellent and diverse phytochemical properties with added benefits where the pulp had high carbohydrates (77.90%), ascorbic acid (0.52%), as well as tannins, saponins, flavonoids, oxalate and TSS (5.66 ºBrix) content added with splendid DPPH (70.81 µg/mL) and hydroxyl RSA (72.31 µg/mL).

Phytochemical properties and antioxidant activities of Pandanus species

P. amaryllifolius were collected from three different locations in Andaman and Nicobar Islands and investigated for its nutritional, anti-nutritional, physicochemical characteristics and antioxidant activity. The study results revealed that the plant not only has antioxidant potential, but breath-taking potential to be well utilized for treating various diseases including cancer. This study revealed that the good concentration of carbohydrates (608.7 mg glucose/g), phenols (46.7 mg GAE/g), flavonoids (20.85 mg QE/g), among plant parts added with notable TSS (4.80 Brix), chlorophyll (7.28 µg/g) and carotenoid (9.67 µg/g) content in the leaves has considerable benefits. The antioxidant activities (79%) in plant parts of *P. amaryllifolius* propounds potent application in nutraceutical industries. Further, a heat map curves has been developed to spread more public awareness. *Pandanus lerum* fruit pulp had good carbohydrates (77.91 ± 0.94%), protein (24.02 ± 0.07%), ascorbic acid (0.53 ± 0.004%), phenols (3.56 ± 0.04%), tannins (14.19 ± 0.15%), saponins (6.65 ± 0.05%), flavonoids (6.60± 0.01%), oxalate (0.19 ± 0.005%) and TSS (5.67 ± 0.04 ºBrix) content added with splendid

DPPH (70.81± 1.62%) activity. In addition, the seed and seed oil also reserved high hydroxyl RSA (75.37 ± 1.05%) and superoxide RSA (74.16 ± 0.32%) respectively as well as notable FRAP activity (1150.01 µM (TE)/g DW)) in seed.

Nutritional and anti nutritional activities of raw and cooked pulp and seeds of *Pandanus lerum* were analysed an the results revealed that thehighest carbohydrate content was observed in the raw pulp (41%) and cooked pulp recorded 31% carbohydrate. While, the highest protein content of 4.38% was recorded in cooked pulp and 2.72% was recorded in raw pulp. The highest anti nutitional activities were recorded in the raw pulp and cooked seeds.

Growth parameters of Pandanus species

The growth observation of the pandanus species were recorded after one year of the planting. The height of the *Pandanus lerum* ranged from 90 to 100 cm, *P. tectorius* was 112 to 200 cm and *P. odorifer* was 100 to 105 cm.

Plate 29. Pandanus germplasm block field view

Distinctness, Uniformity and Stability (DUS) characterization of *Pandanus* species

Distinctness Uniformity and Stability analysis conducted for three Pandanus species (*P. lerum*, *P. tectorius* and *P. odorifer*) and documented for 15 tree and leaf, 1 each of flower, root and 8 fruit and seed characters.

Phytochemical profiles of *Pandanus lerum* fruit pulp

A study was conducted to know the phytochemical profiles of *Pandanus lerum* fruit pulp collected from three Islands of Nicobar District. The present study revealed 66 chemical compounds which were characterized into numerous classes of compounds having differences in qualitative and quantitative aspects as well as some similarities in *P. leram.* The phytochemical profile study demonstrated that presence of different mixture of compounds varying from 33 to 35. The characteristic peaks for the phytoconstituents were categorised based on their functional groups into fatty acids and its ester, heterocyclic compounds, aliphatic hydrocarbons, flavonoids, terpenoids, alcohols, etc. Higher peak percentage area of compound of pulp of the *P. lerum* includes dl-Glyceraldehyde dimer (14.28%), 3-Deoxy-d-mannoic lactone (9.38%), n-Hexadecanoic acid (8.95%), oleic acid (14.22%), n-Hexadecanoic acid (18.17%), 9-Octadecenoic acid, (E)- (41.49%), 1,2-Cyclopentanedione (10.47%), DL-Arabinose (16.90%), n-Hexadecanoic acid (7.60%) and trans-13-Octadecenoic acid (12.10%). Remarkably, there were significant variations in the phytochemical profiles were observed between the three location samples; however phytoconstituents such as Propanoic acid, 3-nitro-, methyl ester, dl-Glyceraldehyde dimer, 1,2-Cyclopentanedione, 4H-Pyran-4-one, 2,3-dihydro-3,5-dihydroxy-6-methyl-, 5-Hydroxymethylfurfural, 3-Deoxy-d-mannoic lactone, 3-Deoxy-d-mannonic acid, Hexadecanoic acid- methyl ester and n-Hexadecanoic acid are present in all the three location samples.

Phytoconstituent Propanoic acid, 3-nitro-, methyl ester is an Organic acid derivative, whereas its biological activity is not yet reported. Collectively the phytoconstituents of *P. leram* found to have various interesting pharmacological activity like antioxidant, antimicrobial, antiviral, anti-inflammatory, anti-cancer, natural sweetener, flavouring agent, anticholinergic, antiproliferative, antielastase, antiandrogenic, hypocholesterolemic, skin hydrating, antiasthmatic, hepatoprotective, anti-diabetic, nutritional benefits, *etc*.

Mangrove community zonation mapping

A field survey was conducted in the Nicobar group of Islands to characterize mangroves using proposed sampling plots with a standard plot size of 0.1 hectare (31.6 m × 31.6 m). During the reporting period, six locations in Nicobar Islands mangrove patches (Table. 14) were chosen for sampling and documented. The documented mangrove species includes *Acanthus ilicifolius*, *Aegiceras corniculatum*, *Avicennia marina*, *A. officinalis*, *Bruguiera cylindrica*, *B. gymnorrhiza*, *B. parviflora*, *B. sexangula*, *Ceriops tagal*, *Excoecaria agallocha*, *Heritiera littoralis*, *Lumnitzer alittorea*, *L. racemose*, *Nypa fruticans*, *Rhizophora apiculata*, *R. mucronata*, *R. stylosa*, *Sonneratia alba*, and *Xylocarpus granatum*.

The species *Heritiera littoralis*, *Rhizophora stylosa*, *Bruguiera parviflora* and *B. sexangula* are classified as very rare and have been documented in the Nicobar Islands. In numerous mangrove areas, degradation has taken place due to Tsunami, and a gradual regeneration process has been observed. Mono patches of *Rhizophora apiculata*, *R. mucronata*, and *R. stylosa* species were recorded, while mixed mangrove patches occurred in various areas within the Great Nicobar Islands, particularly in the Galathea River basin.

Table.14. Phytosociological analysis of mangroves of Nicobar group of Islands

Location	Region	Total	Species Richness (Occurrence)	Relative Density (%)	Relative Frequency (%)	Relative Abundance (%)	Relative Dominance (%)	Important Value Index (IVI)
Munak, Kamorta	Nicobar	97	14	1.82	1.17	1.08	0.48	3.47
Trinkat	Nicobar	62	8	1.07	0.67	1.21	0.43	2.16
Java Nallah	Great Nicobar	91	11	1.71	0.92	1.29	0.40	3.03
Magar Nallah	Great Nicobar	72	11	1.35	0.92	1.02	0.50	2.77
Galathea River area 1	Great Nicobar	97	14	1.82	1.17	1.08	0.48	3.47
Galathea River area 2	Great Nicobar	62	8	1.07	0.67	1.21	0.43	2.16

The mangrove species occurrence, phytosociological data (dominance, abundance, frequency, and the importance value index) and position in the tidal range were recorded. Among the 20 mangrove species examined within the 20 × 20 m quadrant, 97 individuals were documented in Kamorta and Galathea River 1 of the Great Nicobar Islands. The highest value of the Important Value Index (IVI), 3.47, was observed in Kamorta and Galathea River 1

of Great Nicobar Islands. The lowest IVI value, 2.77, was recorded in Magar Nallah, Galathea River 1 of Great Nicobar Islands. Mangrove community zonation mapping, 9 scenes of IRS LISS IV were selected in this context. Imagery processing was done at ArcGIS software .

The mangrove patches were mapped using field survey information and IRS LISS IV imagery in 1:2,50,000 scale, covering an area of 790.06 sq. km from North Diglipur to South of Little Andaman. Notably, *Acanthus ebracteatus* was recorded only in the South Andaman region, while *Heritiera littoralis* was found only in North and Middle Andaman, specifically in Baratang, Dhani nallah and Yerrata Jetty. Further, *Nypa fruticans* was found as a pure patch of palm mangrove population in South and Middle Andaman, while the Rhizophoraceae family was found to be the most important constituent of the vegetative structure in the mangroves of Andaman group of Islands, followed by Acanthaceae, Lythraceae, and Malvaceae. Eventually, the dominant species in Andaman Islands was found to be *Rhizophora apiculata*, followed by *Bruguiera gymnorrhiza*, *Ceriops tagal*, *Rhizophora mucronata*, *Bruguiera cylindrica*, *Excoecaria agallocha*, and *Xylocarpus granatum*.

Plant exploratory survey

During the reporting period two plant exploratory survey were undertaken (Nancowrie and Car Nicobar Islands). Plant exploration survey conducted w.e.f. 04.04.2023 to 18.04.2023 at Nancowrie and Kamorta Islands and collected 6 accessions of *Pandanus lerum*, one coconut accession and conserved in the Institute gene garden. Besides collected five *Pandanus tectorious* accessions and one *Champeria manillana* accession from South Andaman District and seeds sown in the nursery for further study. Observed the vegetative growth of conserved *Dioscorea piscatorum* (New to India) a thorny *Dioscorea* tuber crop collected from Galathea forest in the Garacharma farm. From Car Nicobar Islands four *Dioscorea alata*, three *Colocasia esculenta* and three *Pandanus lerum* accessions were collected and conserved and obtained IC numbers from ICAR- NBPGR, New Delhi.

Yield performance of *Morinda citrifolia* reference varieties

Month-wise fruit yield and fruit characters of 12 year old noni trees were recorded for all the four reference varieties to assess the their yield potential under the influence of weather. In general, the fruit yield was higher than that of previous year. The mean values of fruit yield per tree have the significant difference among the varieties. The highest fruit yield of 35.3 kg/tree was recorded in CIARI Dweep Sampada on par with CIARI Dweep Samridhi (28.5 kg/tree) followed by CIARI Dweep Sanjivini (27.10 kg/tree). Minimum fruit yield of 24.75 kg/tree was recorded in CIARI Dweep Rakshak. In all the four varieties the highest fruit yield per plant was recorded in April like previous year and CIARI Dweep Sampada variety recorded the highest fruit yield of 3.30 kg/tree in September.

Development of Reference Variety block

The vegetatively propagated 25 saplings of reference varieties *viz*. CIARI Dweep Sampada, CIARI Dweep Samridhi, CIARI Dweep Sanjivini and CIARI Dweep Rakshak were planted with 3 × 3m spacing.

The one year old plants height and basal girth shown significant difference among the varieties. The highest height, basal girth of 1.32 m, 3.89 cm respectively was recorded in CIARI Dweep

Sanjivini followed by CIARI Dweep Sampada (1.28 m, 3.56 cm respectively).

Plate 30. CIARI Dweep Sampada reference variety block at ICAR- CIARI, Garacharma farm

Extraction of wood dye from Noni *(Morinda citrifolia L.)*

Optimization of dyeing conditions

To establish the best dyeing parameters for cotton using *Morinda citrifolia* L, optimization studies with different dyeing conditions were carried out for wood dye extract. The UV-Vis spectrophotometer was used to evaluate the absorbance values of the extracted natural dye. The maximum absorption value of 1.972 λ_{max} at 60 °C in 40 g/1000ml of the extracted natural dye was observed at 435 nm. It was observed that mordanted natural dye solutions with 4% of each mordant at 60 °C for a period of 60 minutes has improved absorbance of 1.893 λ_{max} more than the other quantities.

Dye uptake

The percentage of dye uptake in cotton was determined by measuring the difference in dye bath concentration before and after dyeing with a UV-vis spectrophotometer. Various dyed cotton fabrics employ various dyeing procedures such as direct dyeing, pre-mordanting, simultaneous mordanting, and post-mordanting dyeing methods. The dye uptake was calculated using a standard method. It was observed that pre-mordanting and dyeing with ferrous sulphate resulted in 34.43% dye uptake on cotton fibers at 60 °C for 60 minutes. As a result, 60 minutes of dyeing time is an appropriate dyeing period that delivers the largest quantity of dye uptake on cotton fabrics compared to the other dyeing timings (Table 15).

Table 15. Dye uptake of cotton by different mordanting methods

Dye on Cotton Fabrics, (%)				
Methods	**Ferrous sulphate**	**Alum**	**Ferric chloride**	**Stannous Chloride**
Pre-mordant	34.43	22.87	33.92	16.02
Simultaneous Mordant	26.72	22.03	29.25	27.94
Post-Mordant	22.43	20.13	15.46	18.66
Direct dying	26.31			

Color variations

The dye showed light yellowish-brown color from the greyish brown group,199, as per Royal Horticulture Society (RHS) colour chart. Different color variations were observed using pre-mordant, simultaneous mordant, and post-mordant methods. The shade observations were made with reference to the RHS color chart. Significant changes of color were noted in all types of mordant methods respective to different metallic mordants except with alum, which possesses almost the same color in all the mordanting methods.

Germplasm Registration

Andaman Dwarf Arecanut was registered in the ICAR and obtained the registration number (B. Augustine Jerard, V. Damodaran, Jaisankar, I., V. Niral and N. R. Nagaraj (2023). ICAR-NBPGR Plant Germplasm Registration number INGR23064 for Dwarf Arecanut palm *[Areca catechu]*)

One Noni (*Morinda citrifolia*) was registered in the ICAR and obtained the registration number (Jaisankar, I., D.R. Singh, Shrawan Singh and B.A. Jerard (2023). ICAR-NBPGR plant Germplasm Registration number INGR22093.

Farming system studies in tribal areas

The Nicobari tribal communities mainly rely on coconut, tuber crops, pigs and marine fisheries for their livelihood. The tribal farmers clear the forest area cultivate crops in joint family system called Tuhet. They mainly grow only Nicobar Aloo (greater yam) along with Cassava and banana mainly for food in the traditional tuhet garden in addition to their existing coconut plantation. Community based tuber crops based farming system was demonstrated farmer's field at Harminder Bay, Little Andaman during 2022 in 0.3 ha model involving tuber crops, vegetables, fruits and spices integrated with piggery. Farmers were distributed with planting materials of tuber crops (Elephant Foot Yam, Colocasia, Sweet potato), Ginger and Piglets. Regular trainings and field visits were organized to upgrade the farming skills of tribal farmers. Prior to interventions, the net income of the tuhet was Rs 70,000/- with B: C ratio of 1.22. After intervention of tuber crops-based farming system the net income of the tuhet increased to Rs 2,03,770/- with the B: C ratio of 2.29. The employment generation in the tuber crops-based farming system was 457-man days/ha as compared to 240-man days/ha in their traditional system.

Farming system involving tuber crops (0.3 ha model)

Table 16. Prior to intervention (Area/unit) per ha basis

Crop/other components	Area (ha)	Yield (kg)	Gross income (Rs)	Expenditure involved (Rs)	Net income (Rs)	B:C ratio	Employment generation (Man days)
Nicobari aloo	0.2	1650	82,500	38,000	44,500	1.17	47
Cassava	0.1	1125	45,000	19,500	25,500	1.31	25
Total	0.3	2725	1,27,500	57,500	70,000	1.22	72

Employment generation: 240 man days/ha

Table 17. After intervention (Area/unit) per ha basis

Crop/other components	Area(ha)	Yield (kg)	Gross income (Rs)	Expenditure involved (Rs)	Net income (Rs)	B:C ratio	Employment generation (Man days)
1. Crop component							
Nicobari aloo	0.10	1340	67,000	24,600	42,400	1.72	20
Sweet potato	0.02	262	15,720	6,000	9,720	1.62	10
Colocasia	0.04	620	31,000	8,500	22,500	2.64	11
EFY	0.02	315	15,750	5,250	10,500	2.00	10
Cassava	0.05	945	37,800	10,500	27,300	2.60	16
Ginger	0.01	135	27,000	8,000	19,000	2.37	13
Vegetables	0.03	290	17,400	5,250	12,150	2.31	16
Banana	0.02	215	6,450	2,000	4,450	2.22	05
Turmeric	0.01	110	11,000	3,500	7.500	2.14	09
Total	0.30	4232	2,29,120	73,600	1,55,520	2.11	110
II. Animal component							
Pig	3 no	255	63,750	15,500	48,250	3.11	27
Grand Total	0.30	4487	2,92,870	89,100	2,03,770	2.29	137

Employment generation: 457-man days/ha

**Ginger- Rs. 200/kg, EFY- Rs. 50/kg, Colocasia and Nicobari aloo- Rs. 50/kg, Sweet potato- Rs. 60/kg, Cassava- Rs. 40/kg, Vegetable-.60/kg banana- Rs. 30/kg, Turmeric- Rs. 100/kg and Fork- Rs 250/kg*

Table 18. Economics of one ha model

Particulars	Prior to intervention (ha) basis	After intervention (ha) basis
Gross income (Rs/ha)	4,25,000	9,76,233
Net income (Rs/ha)	2,33,330	6,79,233
B:C ratio	1.22	2.29
Employment generation (man days/ha)	240	457

High density planting in elephant foot yam

Table 19. Corm and seed yield

Treatments	Corm yield/plant (kg)			Corm yield(t/ha)			Seed corm yield(t/ha)
	7 M	8 M	9 M	7 M	8 M	9 M	9 M
T_1(120 × 60 cm)	1.24	1.69	1.97	17.27	23.52	27.41	21.62
T_2 (90 × 90 cm)	1.75	2.04	2.37	21.56	25.22	28.81	24.84
T_3 (90 × 75 cm)	1.36	1.54	1.97	20.10	22.82	29.23	21.78
T_4 (90 × 60 cm)	1.59	1.91	2.33	29.44	35.37	43.89	34.54
T_5 (75 × 75 cm)	1.19	1.55	1.96	21.10	27.56	34.84	27.52
T_6 (75 × 60 cm)	1.15	1.46	1.68	25.63	32.44	37.41	30.98
T_7 (60 × 60 cm)	1.00	1.18	1.46	27.78	32.68	40.65	30.13
SEm+	0.097	0.121	0.141	2.173	2.251	2.103	2.107
CD (0.05)	0.299	0.373	0.436	6.694	6.936	6.48	6.492
CV	12.69	12.89	12.47	16.17	13.67	10.53	13.35

The experiment conducted on High density of planting in elephant foot yam revealed that, lower corm yield per plant was recorded in T_7 (60 × 60 cm) at 7, 8 and 9 months (1.46 kg) of planting followed by T_6 (75 × 60 cm) respectively, while individual plant yield was higher in T_2 with plant density of 90 × 90 cm (2.37 kg/plant) and T4-90 × 60 cm (2.33 kg/plant) respectively. However, the highest corm yield (43.89 t/ha) was resulted with plant density of 90 × 60 cm (T_4) followed by T_7 and T_6 which was on par with each other. The higher yield might be due to higher plant population per ha with closer planting adopted.

Table 20. Economics of High density planting in Elephant foot yam

Treatments	Cost of cultivation (Rs.)	Gross return/ha (Rs.)	Net return/ha (Rs.)	B:C ratio
T_1(120 × 60 cm)	396674	1329174	932500	2.35
T_2(90 × 90 cm)	364390	1397042	1032652	2.83
T_3(90 × 75 cm)	416787	1417894	1001107	2.40
T_4(90 × 60 cm)	503349	2128551	1625202	3.23
T_5(75 x 75 cm)	482839	1689976	1207137	2.50
T_6(75 × 60 cm)	584201	1814241	1230040	2.11
T_7(60 × 60 cm)	703395	1971379	1267984	1.80
SEm+	-	102039.33	102039.33	0.240
CD (0.05)	-	314369.9	314369.9	0.741
CV	-	10.53	14.91	16.93

Evaluation of purple flesh Greater Yam under Island

Eight entries of purple fleshed greater yam along with one national check and one local check were evaluated for tuber yield, tuber shape and tuber flesh colour. The result revealed that, the variety Sree Neelima recorded higher yield (22.1 t/ha) followed by the entries TGy 20-2 which are on par. With regard to flesh colour two entries *viz*. TGy 20-4 and TGy 20-5 are recorded white flesh.

Table 21. Performance of purple flesh greater yam (2nd Year)

Entries	Total yield (t ha^{-1})	Tuber shape	Skin colour	Tuber flesh colour
TGy 20-1	17.39	Cylindrical	Purple	White with purple tinge
TGy 20-2	20.61	Cylindrical and branched	Deep purple	Purple
TGy 20-3	14.65	Round	Purple	White with purple tinge
TGy 20-4	19.71	Cylindrical and long	Purple	White
TGy 20-5	9.62	Oval/oblong	Purple	White
TGy 20-6	12.08	Round	Deep purple	Light purple
TGy 20-7	12.00	Round	Deep purple	Purple
TGy 20-8	11.48	Round	Purple	White with purple tinge
Sree Neelima	22.1	Cylindrical	Purple	Light purple
Local	12.57	Cylindrical and branched	Deep purple	Purple
SEm (±)	0.332	-	-	-
CD (0.05)	0.988	-	-	-
CV (%)	3.78	-	-	-

DIVISION OF ANIMAL SCIENCE

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Germplasm collection, conservation and characterization

Mitochondrial Diversity of goats of Andaman and Nicobar Islands

Importance of mitochondrial genotyping demands no introduction since the other name of maternal inheritance is mitochondrial genetic landscape. There are two native domestic goat breeds, *viz*. Andamani goat (ALG) and Teressa goat (TG) in Andaman and Nicobar Islands. The genetic makeup of the indigenous goats was unveiled through analysis of mitochondrial D-loop sequence for sequence polymorphism, phylogeographical signalling and population expansion events. Within 137 sequence information of ALG, a total of 89 polymorphic sites and 77 parsimony informative sites were found. Within 48 sequence information of TG, 53 polymorphic sites were detected and all of them were parsimony informative sites. Nucleotide diversity (pi ± SD) values of ALG and TG were 0.01865 ± 0.00093 and 0.01882 ± 0.00104, respectively. The genetic diversity of the Teressa goat was less compared to the Andamani goat due to its sole presence in Teressa island. Out of 38 well-defined haplotypes of these goats, the majority of haplotypes belonged to haplogroup A followed by haplogroup B and haplogroup D. The result of mismatch distribution and neutrality tests indicated no population expansion event of haplogroup A and B. Finally, based on poor geographical signalling, we hypothesize that goats have been imported to these Islands either through multidirectional diffusion or unidirectional diffusion.

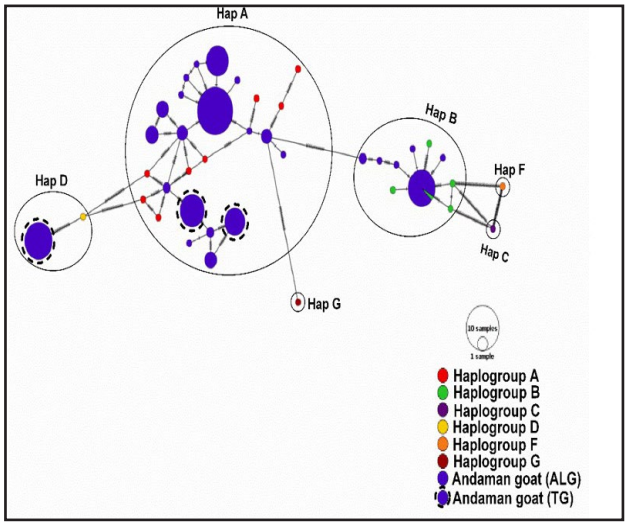


Fig. 5 Haplogroup assignment of different haplotypes of goats of Andaman and Nicobar Islands. The network map was drawn in PopART ver. 1.7. The network map was constructed based on 481 bp hypervariable region (HV1) of goat mt. DNA D-loop.

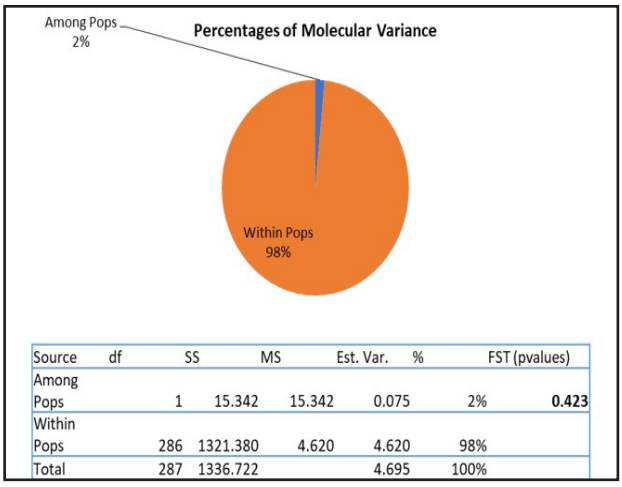
(a)

(b)

Plate 31. (a) Andamani Goat (b) Teressa goat

Genetic structure of goats of Andaman and Nicobar Islands using AMOVA (Analysis of Molecular Variances)

The study aimed to elucidate the genetic similarity among the goat populations of Andaman and Nicobar Islands. Blood samples



Source	df	SS	MS	Est. Var.	%	FST (pvalues)
Among Pops	1	15.342	15.342	0.075	2%	**0.423**
Within Pops	286	1321.380	4.620	4.620	98%	
Total	287	1336.722		4.695	100%	

Fig. 6 Analysis of molecular variance (AMOVA). The p-value of 0.423 indicates a non-significant variation among the populations (ALG and TG) for the studied markers.

were collected from two goat populations *viz.* Andamani goat (ALG) and Teressa goat (TG). Sixteen Restriction Fragment Length Polymorphism (RFLP) markers were used to assess the genetic structure of these goats using AMOVA (Analysis of Molecular Variances). The analysis detected only 2% variation between the two goat populations indicating high similarity betweenthem with reference to fecundity markers.

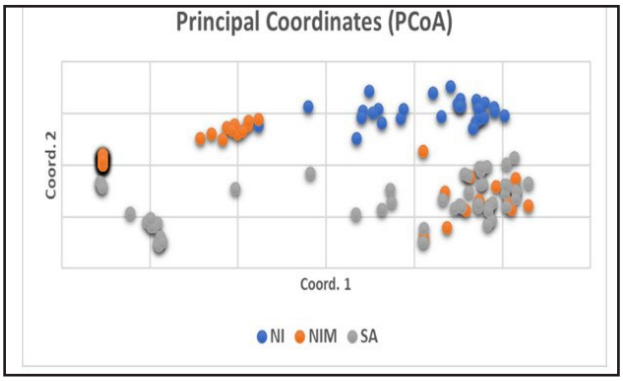


Fig. 7 Principal co-ordinate analysis among the goat populations of Andaman and Nicobar Islands. NI (Nicobar Islands), NIM (North and Middle Andaman) and SA (South Andaman).

Similarly, principal co-ordinate analysis was carried out between the two goat populations of different islands *i.e.* South Andaman, North and Middle Andaman and Car Nicobar. It was found that the Nicobar population was more distinctive than the other two populations. It may be due to negligible exchange of livestock between Nicobar group of islands with Andaman group of islands.

Genotyping of Andaman cattle based on Beta-casein gene (A1 vs A2 allele)

For evaluating the type of beta-casein in the milk, genotyping of the Andaman cattle was done. Blood samples from 387 cattle were collected from different parts of Andaman and Nicobar Islands. Genotyping was done by polymerase chain reaction-restriction fragment length polymorphism (PCR-RFLP) methodology. The detailed genotypes along with the phenotypic characteristics in the examined population are presented in Table 23. The obtained A1 and A2 gene frequency in the samples from field population were 16.48 and 83.52, respectively. The genotypic A2A2 frequency in the cross bred, native and total sample of field animals were 53.81, 92.00 and 67.04 respectively. No animals were found homozygous for A1A1 genotype. The detailed district wise genotype and allele frequency of β-casein in the sample population of Andaman and Nicobar Islands of India is presented in Table 22.

Plate 32. Trinket cattle

Table 22. Genotype and allele frequency of β-casein in the cattle population of Andaman and Nicobar Islands

Area	Type	Genotype			Genotypic Frequency		Gene Frequency	
		A1A1	A1A2	A2A2	A1A2	A2A2	A1	A2
North and Middle Andaman District								
Rangat	Total	0	7	37	15.91	84.09	7.96	92.05
	Native	0	2	33	5.71	94.29	2.86	97.14
	Cross bred	0	5	4	55.56	44.44	27.78	72.22
Mayabunder	Total	0	8	29	21.62	78.38	10.81	89.19
	Native	0	4	26	13.33	86.67	6.67	93.33
	Cross bred	0	4	3	57.14	42.86	28.57	71.43
Diglipur	Total	0	9	34	18.00	82.00	9.00	91.00
	Native	0	1	27	3.57	96.43	1.79	98.21
	Cross bred	0	8	7	53.33	46.67	26.67	73.33
Subtotal		0	24	107	18.32	81.68	9.16	90.84
South Andaman District								
Manglutang	Total	0	39	67	36.79	63.21	18.4	81.61
	Native	0	2	17	10.53	89.47	5.26	94.74
	Cross bred	0	37	50	42.53	57.47	21.26	78.74
Havelock	Total	0	10	9	52.63	47.37	26.32	73.69
	Native	0	0	0	0	0	0	0
	Cross bred	0	10	9	52.63	47.37	26.32	73.68
Subtotal		0	49	76	39.2	60.80	19.60	80.40
Nicobar District								
Car Nicobar	Total	0	9	8	52.94	47.06	26.50	73.53
	Native	0	0	0	0	0	0	0
	Cross bred	0	9	8	52.94	47.06	26.50	73.53
Campbell Bay	Total	0	47	48	49.47	50.53	24.70	75.27
	Native	0	1	12	7.69	92.31	3.80	96.15
	Cross bred	0	36	46	43.90	56.10	22.00	78.05
Subtotal		0	56	65	46.28	53.72	23.10	76.86

Gut microbiota characteristics of Nicobari pig

Gut microbial diversity and composition of Nicobari pig was investigated by using a high throughput Illumina sequencing platform. Microbial composition and diversity of small intestine (jejunum and ileum) and large intestine (cecum and colon) was investigated in three adult Nicobari pigs. At phylum level (Fig 8), gut microbiota was dominated by Firmicutes, Actinobacteria, TM7, Proteobacteria, Bacteroides and Chloroflexi. Other bacterial phyla observed were Euryarchaeota, Planctomycetes, Verrucomicrobia, Tenericutes and Fusobacteria. Firmicutes was the most prevalent bacterial phylum (81.79% in colon, 70.08% in jejunum, 64.20% in ileum and 63.09% in cecum). At order level (Fig 9), Lactobacillales was the most prevalent in jejunum (67.64%), ileum (61.91%) and cecum and in colon the most prevalent order was Clostridiales (44.83%).

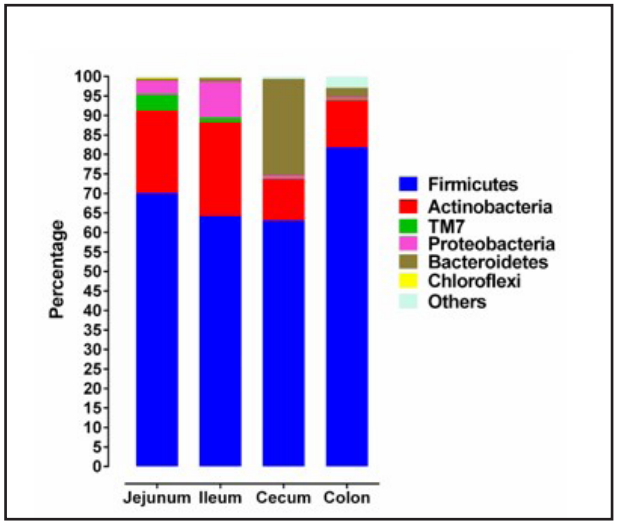


Fig. 8 Gut microbiota composition of Nicobari pig at phylum level

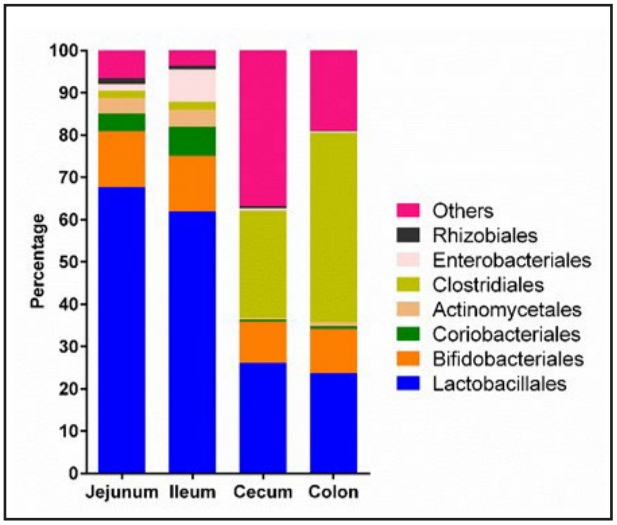


Fig. 9 Gut microbiota composition of Nicobari pig at order level

Nutritional management

Protein balancing in Andamani pigs

The major objective of the study was to optimize the protein level in the ration for Andamani pigs and ascertain the nutritional requirement by the animals. After weaning, the piglets were distributed in three groups, where the control group was fed with a basal diet containing 18.5% CP and 3000 MJ/kg energy, treatment 1 was fed with 17.6% CP and 2850 MJ/kg energy containing feed and treatment 2 received feed containing 16.65% CP and 2850 MJ/kg energy (weaning to 20 kg body weight). In the growing phase, control group was fed with a basal diet containing 14.95% CP and 2570 MJ/kg energy, treatment 1 was fed with 14.2% CP and 2699 MJ/kg energy containing feed and treatment 2 received feed containing13.46% CP and 2699 MJ/kg energy. The trial was conducted for 1 year. At the end of the experimental period, the average body weight of the pigs ranged from 74.72 to 78.34 kg, feed conversion ratio ranged from 3.14 to 3.73, while average daily gain ranged from 0.10 to 0.49 kg; however, no significant difference among the three groups was recorded. The digestibility trial revealed no significant difference among the treatment groups. Percent digestibility co-efficient for dry matter ranged from 77.48 to78.9, CP from 75.34 to76.9, ether

extract from 72.01 to 73.94, crude fibre from 48.48 to 51.73, nitrogen free extract from 76.59 to78.07, total digestible nutrients (intake) from 1162 to 1214 gram and digestible energy (Kcal) from 2535 to 2629. Analysis of carcass quality of the three groups revealed that reducing the total protein by 5-10% could produce better me) at with similar productive efficiency.

Plate 33. Andamani pig

Probiotics supplementation is effective in reducing weaning stress in piglets

The role of a multi-strain probiotic compound containing *Bacillus mesentericus*, *Bacillus coagulans*, *Enterococcus faecalis* and *Clostridium butyricum* on growth performance, diarrhoea incidence, antioxidant profile, lipid panel, stress and immunity in piglets was investigated. Weaned piglets were divided randomly into 3 groups; (i) a negative control group (WC) which was fed only basal diet, (ii) a probiotic group (WB) which was fed basal diet with current probiotic formulation and (iii) a positive control (PC) group which was fed basal diet with 2500 mg/kg ZnO. The experiment was conducted for 28 days. Probiotic supplementation showed positive effect on growth performance and reduced diarrhoea rate (Table 23). The addition of the probiotic formulation in the diet improved lipid panel; the WB group showed significantly higher level of high-density lipoprotein cholesterol and lower levels of total cholesterol and low-density lipoprotein cholesterol as compared to the negative control group. Moreover, probiotic supplementation enhanced antioxidant defence system and gave protection from oxidative damage by increasing the concentration of serum catalase, glutathione-S-transferase and superoxide dismutase and by decreasing the concentration of serum malonyldialdehyde and total nitric oxide. Heat shock proteins and other stress markers, such as serum cortisol, were reduced in the probiotic-fed group. The probiotic group also displayed higher levels of serum IgG and IgM as compared to the negative control group. Altogether, these results indicated that feeding of currently used multi-strain probiotic formulation minimizes the weaning stress, thereby improves the growth performance, antioxidant profile, lipid panel and systemic as well as mucosal immunity. Therefore, the multi-strain probiotic compound may be used to replace ZnO in weaned piglets.

Table 23. Effect of probiotic supplementation on production parameters and diarrhoea incidence of piglets

Parameters	WC	WB	PC	*P*-value
Body Weight/kg				
0 D	8.84 ± 0.03	8.79 ± 0.04	8.75 ± 0.04	0.204
7 D	9.87^{b} ± 0.09	10.11^{a} ± 0.07	10.38^{a} ± 0.05	<0.001
14 D	11.25^{b} ± 0.04	11.79^{a} ± 0.03	11.78^{a} ± 0.04	<0.001
21 D	12.58^{b} ± 0.05	13.63^{a} ± 0.10	13.71^{a} ± 0.11	<0.001
28 D	13.80^{b} ± 0.06	14.88^{a} ± 0.12	14.97^{a} ± 0.13	<0.001
ADG/g				
0-14 D	171.90^{b} ± 3.09	214.17^{a} ± 4.08	216.19^{a} ± 4.61	<0.001
14-28 D	182.26^{b} ± 5.11	220.48^{a} ± 8.22	228.10^{a} ± 9.15	<0.001
0-28 D	177.08^{b} ± 2.08	217.32^{a} ± 4.49	222.14^{a} ± 4.84	<0.001
ADFI/g				
0-14 D	417.73^{b} ± 7.51	454.03^{ab} ± 8.66	459.20^{a} ± 9.83	0.003
14-28 D	466.59 ± 13.08	485.05 ± 18.08	499.20 ± 20.04	0.413
0-28 D	442.16 ± 5.33	469.54 ± 9.81	479.20 ± 10.62	0.116
F:G				
0-14 D	2.43^{a} ± 0.01	2.11^{b} ± 0.01	2.12^{b} ± 0.004	<0.001
14-28 D	2.57^{a} ± 0.01	2.20^{b} ± 0.02	2.18^{b} ± 0.003	<0.001
0-28 D	2.49^{a} ± 0.02	2.16^{b} ± 0.04	2.16^{b} ± 0.003	<0.001
Diarrhea rate (%)				
0-28 D	11.67^{a} ± 0.38	4.67^{b} ± 0.31	4.58^{b} ± 0.26	<0.001

Analyzed data were shown as Mean ± SEM. Values with different superscripts in a same row differ significantly. WC designates weaned negative control group, WB designates weaned probiotic group and PC designates positive control (ZnO) group.

Long term effect of probiotics supplementation in Andamani pig

The long-term effect of a multi-strain probiotic compound containing *Bacillus mesentericus*, *Bacillus coagulans*, *Enterococcus faecalis* and *Clostridium butyricum*was evaluated on Andamani pigs. A total of 18 weaned Andamani piglets were used in the study. The piglets were randomly assigned to 3 different groups. The groups were: 1) C (basal diet), 2) T_1 (basal diet + probiotic 0.05% with feed) and 3) T_2 (basal diet + probiotic 0.2% with feed). At the start of the experiment (0 day), no significant difference in body weight was observed among the groups. At first month, T_2 showed significantly higher body weight as compared to the control group but did not vary significantly with T_1. At 3rd month and 9th month both the supplemented groups (T_1 and T_2) showed significantly higher body weights as compared to the control group (Table 24).

Table 24. Effect of the probiotics supplementation on body weight of pigs

Body weight	C	T_1	T_2
0 D	8.07± 0.19	8.15 ± 0.46	7.9 ± 0.41
1 M	12.97 ± 0.51^{A}	13.47 ± 0.57	13.95 ± 0.62^{B}
3 M	28.22 ± 0.91^{A}	30.19 ± 0.87	30.27 ± 0.9^{B}1
6 M	46.20 ± 1.92	48.40 ± 2.07	49.60 ± 2.30
9 M	60.32 ± 1.93^{A}	63.60 ± 1.79	63.58 ± 1.93^{B}

Data presented as Mean ± SD. ^{A,B}Values with different superscripts in a same row differ significantly. C indicates control group, T_1 and T_2 indicate probiotic supplemented groups.

Regarding average daily weight gain (ADG), no significant difference was observed among the groups for the period of 0-3 month and 6-9 months. For the period 3-6 month and overall (1-9 month), ADGs of T_1 and T_2 were significantly higher than the control group. Similarly overall feed to gain ratio (F:G) was significantly lower in supplemented groups (T_1 and T_2) as compared to the control group (Table 25)

Table 25. Effect of the probiotics on average daily weight gain (ADG) and feed to gain ratio

Parameters	C	T_1	T_2
ADG in gm			
0-3 M	202.89 ± 9.13	210.33 ± 8.75	214.78 ± 9.13
3- 6 M	212.80 ± 8.54^{A}	245.22 ± 6.73^{B}	248.09 ± 6.1^{B}
6-9 M	156.89 ± 8.76	158.88 ± 9.12	155.33 ± 7.56
Overall	193.52 ± 7.76^{A}	205.37 ± 6.89^{B}	206.22 ± 7.11^{B}
F:G			
Overall	3.75 ± 0.06^{A}	3.55 ± 0.05^{B}	3.57 ± 0.05^{B}

Data presented as Mean ± SD. ^{A,B}Values with different superscripts in a same row differ significantly. C indicates control group, T_1 and T_2 indicate probiotic supplemented groups.

Fodder production to improve milk productivity at South Andaman

To improve the milk productivity and provide a self-sufficient village in fodder production, this work was undertaken. Fodder banks were prepared in seven fields (10 acres) at different altitude and Bajra Napier Hybrid (Co-4, Co-5, Co-6 and DHN-6), Guinea grass, Maize, and Cowpea among grasses and Sesbania, Moringa and Leucaena among fodder trees were cultivated. The fields were prepared in bunds for Hybrid Napier (more than 13000 cuttings), Guinea grass and Cowpea (multi-cut), whereas Maize was sown in plain fields (3 fields). During the reporting period, 2.15 ton of silage was prepared and fed to the animals. A total of 13600 fodder stem cuttings were produced and distributed among farmers. Moreover, 59000 kg of fodder was harvested to feed the institute farm animals. Total five capacity building programmers were organized for the farmers.

Herbal management of livestock ailments

Evaluation of traditional knowledge of plants in the management of *Rhipicephalus microplus* in cattle and goat

To know the acaricidal efficacy of aqueous extracts of different herbal plants, two tests *i.e.*, larval packet test (LPT) and larval tarsal test (LTT) were standardized. Initially, the minimum concentration of deltamethrin was standardized which was used as a positive control to judge the efficacy of herbal plants. On the basis of LPT, it was found that, 1.875 ppm of deltamethrin could be used as a positive control since 100 percent mortality of tick larvae was seen after 96 h post treatment. When indigenous plants were tested by LPT, it was found that, individual plant extract was partially effective as larvicidal; on the contrary, polyherbal combination had 100 percent larvicidal activity when the same was used undiluted. By LTT, this was found that, there was 100 per cent ovicidal effect shown not only by the polyherbal combination but also by the individual plants.

Table 26. Titration of deltamethrin concentration to use as positive control for larval packet test (LPT)

Concentration of deltamethrin (ppm)	Percent mortality at different hours			
	24	48	72	96
15	3.66 ± 0.001(3-5)	86.6 ± 0.005^{a} (72-93)	94.2 ± 0.005^{a} (80-100)	100.0 ± 0.000^{a}
7.5	3.33 ± 0.002 (3-7)	11.5 ± 0.001^{c} (12-15)	93.2 ± 0.002^{a} (90-93)	100.0 ± 0^{a}
3.75	4.33 ± 0.001 (4-5)	20.6 ± 0.001^{b} (20-21)	91.2 ± 0.002^{a} (90-94)	100.0 ± 0^{a}
1.875	5.4 ± 0.001 (4-6)	18.5 ± 0.001^{b} (16-18)	77.3 ± 0.003^{b} (78-84)	100.0 ± 0^{a}
0.9375	3.33 ± 0.001 (3-5)	4.66 ± 0.001^{d} (4-6)	5 ± 0.001^{c} (4-6)	21.3 ± 0.002^{b}

Different superscript in a same columndenotes significant difference ($p<0.01$)

Table 27. Percent mortality of larvae in different dilutions of indigenous plants by larval packet test

Name of the plants	Percent Mortality	
	1:1 to 1:8	Undiluted
Turmeric (*Curcuma longa*)	24-48	76.9
Vasambhu (*Acarus calamus*)	34-42	78
Pepper (*Piper nigrum*)	26-38	90
Tulsi (*Ocimum sanctum*)	28-58	54
Acalypha (*Acalypha indica*)	30-58	47.8
Lucas (*Lucas aspera*)	42-58	56
Polyherb	30-42	100

Table 28. Percent mortality of larvae and hatchability of eggs by Larval packet test (LPT) & Larval tarsal test (LTT)

Name of the plants	Percent Mortality	
	1:1 to 1:8	Undiluted
Turmeric	24-48	76.9
Vasambhu	34-42	78.0
Pepper	26-38	90.0
Tulsi	28-58	54.0
Acalypha	30-58	47.8
Leucas	42-58	56.0
Polyherb	30-42	100.0

Stress physiology of native animals

Circadian rhythmic pattern of endocrinological profiles in Andamani pigs

Endocrinological profiles differed significantly ($p<0.05$) among the seasons, different collection times (0800, 1200, 1600, 2000, 2400, and 0400 h) and between day (08:00 to 16:00 h) and night time (20:00 to 04:00 h) collections. Significantly higher level of follicle stimulating hormone (FSH), luteinizing hormone (LH), testosterone and thyroxine (T_4) was recorded in rainy than in dry summer and in night than in day time whereas cortisol and prolactin were higher in dry summer than in rainy seasons and in day than in night time collections in different seasons. In addition, season × time interactions were significantly different ($p<0.05$) for prolactin and cortisol concentrations, while differences were found among the collection times ($p<0.05$), among the seasons ($p<0.05$), and between day and night collections ($p< 0.05$) for FSH, LH, testosterone, T4, cortisol and prolactin in Andamani boar.

Among different hours of blood collection

Highest level at 24:00 h and lowest level at 12:00 h of FSH and LH were observed in rainy and dry summer seasons. Testosterone concentration was highest at 04:00 h and lowest at 12:00 h in rainy and dry summer seasons. Thyroxine concentration was increased from 16:00 h to 24:00 h and decreased from 24:00 h to 12:00 h in different seasons and highest value at 20:00 h and lowest value at 12:00 h were observed in rainy and dry summer seasons. Significantly highest cortisol concentration at 12:00 h and lowest concentration at 04:00 h were observed in rainy and dry summer seasons. Significantly highest and lowest prolactin levels were observed at 12:00 and 24:00 h, respectively in rainy and dry summer seasons.

Between day and night collection

Different times of blood collection were divided into day (08:00 to 20:00 h) and night (20:00 to 04:00 h) times. Hormones such as FSH ($p<0.05$), LH ($p<0.05$), testosterone ($p<0.05$) and thyroxine ($p<0.05$) were higher in night than in day time and cortisol ($p<0.05$) and prolactin ($p<0.05$) were higher in day than in night time in different seasons. Correlation analysis revealed that FSH, LH, testosterone and thyroxine had significant ($p<0.05$) positive correlation with each other whereas these hormones had significant ($p<0.05$) negative correlation with cortisol and prolactin.

Circadian rhythmic pattern of oxidative stress profiles in Andamani pig

Oxidative stress profiles of Andamani pig differed significantly ($p<0.05$) between the seasons, different collection times (0800, 1200, 1600, 2000, 2400, and 0400 h) and between day (08:00 to 16:00 h) and night time (20:00 to 04:00 h) collections. Rainy season has higher antioxidant concentration than dry summer whereas malondialdehyde (MDA) was higher in summer than in rainy season. Concentration of antioxidants was higher in night than in day time; on the contrary, MDA was higher in day than in night time collection in different seasons. Season × time interactions were statistically different ($p<0.05$) for total antioxidant capacity (TAC), catalase (CAT), glutathione (GSH) and superoxide dismutase (SOD) concentrations, while differences were found among the collection times ($p<0.05$) and among the seasons ($p<0.05$) for MDA, TAC, CAT, GSH, and SOD concentrations in blood plasma of Andamani pig.

Among different hours of blood collection

Highest and lowest TAC values were observed respectively at 2400 h and 1200 h in rainy and dry summer seasons. Highest and lowest values of CAT, GSH and SOD were observed respectively at 400 h and 1200 h in rainy and dry summer seasons. Significantly highest and lowest MDA levels were observed at 12:00 and 24:00 h, respectively in rainy and dry summer seasons.

Between day and night collection

Antioxidants were higher and MDA was lower in night than in day time collections in rainy and dry summer seasons. Correlation analysis revealed that antioxidants had significant ($p<0.05$) positive correlation with each other whereas these antioxidants had significant ($p<0.05$) negative correlation with malondialdehyde in rainy and dry summer seasons. Season and time of blood collection showed significant effect on the endocrinological and oxidative stress profiles in pigs of Andaman and Nicobar Islands.

Reproductive management

Melatonin implantation on reproductive profiles in Andamani goat

The present study (melatonin implantation 18 mg/kg body weight) indicated that breeding bucks suffered physiological stress (higher cortisol), oxidative stress (higher malondialdehyde and deficiency of antioxidants), hormonal imbalance (higher prolactin and cortisol and deficiency of gonadotropins, gonadal hormone and thyroid hormones) and infertility due to poor libido and poor semen production and its quality profiles during dry summer season. Thus, dry summer was more stressful season compared to rainy season for the goat bucks. Melatonin supplementation mitigated these stresses and improved the scrotal and testicular biometrics, libido, antioxidants, hormones and semen quality profiles in Andamani goat bucks.

Exploring the transcript variants and expression profile of germ line markers in goats

Primordial germ cells (PGCs) that give rise to the germ cells in the gonads are characterized by expression of germ line molecular markers like Vasa and Dazl. Molecular study of germ line markers like Vasa and Dazl genes in goat helps to understand the molecular mechanisms of specification and differentiation of the germ cells in goat, and also facilitate germ cell manipulation. In an attempt to characterize the vasa transcripts of goat, total RNA was isolated from goat

testis tissue and protocols were standardized for reverse transcription, cDNA synthesis and PCR amplification. PCR amplification was done with Q5 DNA polymerase using the following conditions: initial step of 98 °C for 1 min; 98 °C for 10s, 59 °C for 30s, 72 °C for 1.5 min for 35 cycles, and final extension of 72 °C for 2 min. PCR product of 2.462 kb was separated by electrophoresis using 1.5% agarose gel and visualized by ethidium bromide staining.

Adaptation to climate stress

Sero biochemical and immunological markers of indigenous poultry at various thermal humidity index

Productive physiology and immunological profile under impending climate change scenario in endemic poultry breeds was assessed in Andaman & Nicobar archipelago. Meteorological data were collected from macro and micro environment of intensive and semi-intensive system of management of experimental birds. Data onproductive and immunological traits were collected from Nicobari fowl and Vanaraja birds maintained under two managemental systems following 2 × 2 factorial experimental design. The average temperature humidity index (THI) under intensive and semi-intensive system and macro environment were 83.51, 83.46 and 83.47 respectively which are beyond the THI comfort zone (67-75). The average cloacal temperature of Nicobari fowl and Vanaraja birds under both managemental systems ranged from 40.44 ^{0}C to 41.85 ^{0}C that is within the thermal comfort zone (41 ^{0}C to 42 ^{0}C). The respective adult body weight (g) of Nicobari fowl and Vanaraja birds under intensive and semi intensive system were 1218.2 ± 23.16, 2023.12 ± 14.62 and 910.5 ± 6 .42 and 1522.6 ± 10.67 with feed conversion efficiency of 4.67, 3.4 and 4.72 and 3.54 respectively. Sero-biochemical markers were quantified with respect to THI using ELISA methodology. When age advanced (chick to laying stage), serum protein, creatinine, aspartate transferase and alanine transaminase significantly increased while serum cholesterol and alkaline phosphatase decreased at maximum thermal humidity index irrespective of breeds and system of management. There was significant reduction of these parameters insemi-intensive system as compared to the intensive system irrespective of breeds. Molecular sero-biomarkers such as major histocompatability complex (MHC), interferon gamma (IFG) and heat shock protein (HSP) were quantified using ELISA method. Levels of MHC and IFG in serum were significantly decreased at higher thermal humidity index and heat shock proteins increased at higher THI. The outcomes of these assessment are; 1. Both indigenous birds (Nicobari fowl) and dual purpose bird (Vanaraja) are at border level of thermal comfort zone of ideal cloacal temperature. 2. There is a declining trend in adult body weight gain and feed conversion efficiency when THI increases. 3. Liver function is not normal the birds are under stress condition due to high THI; however, kidney function is not adversely affected. 4. Nicobari fowl is foundto be superior in maintaining homeostatis of immunity as compared to Vanaraja birds during thermal stress and Vanaraja birds are highly prone to cellular damage during stress. 5. Semi intensive system of management isfound to be comparatively less stressful as compared to the intensive system of management.

Table 29. Thermal Humidity Index and respective sero biomarkers

Thermal Humidity Index	Intensive system		Semi intensive system	
	Min	Max	Min	Max
	82.35	84.29	81.87	83.49
Sero-biomarkers of Nicobari Fowl				
Protein (g/dl)	6.56 ± 0.22	8.24 ± 0.12	6.13 ± 0.45	6.88 ± 0.31
creatinine (mg/dl)	0.25 ± 0.09	0.37 ± 0.10	0.2 ± 0.08	0.35 ± 0.11
Cholesterol (mg/dl)	116.26 ± 5.16	130.35 ± 3.69	102.12 ± 1.79	112.28 ± 2.36
Aspartate transferase (U/l)	164.23 ± 6.66	182.01 ± 3.76	160.79 ± 3.64	169.31 ± 4.07
Alanine aminotransferase (U/l)	3.96 ± 0.16	5.18 ± 0.03	3.56 ± 0.34	4.21 ± 0.20
Alkaline phosphatase (U/l)	905.26 ± 25.36	522.52 ± 13.20	905.36 ± 13.12	766.56 ± 17.22
Sero-biomarkers of Vanaraja birds				
Protein (g/dl)	6.83 ± 0.15	8.42 ± 0.11	6.11 ± 0.13	7.81 ± 0.13
creatinine (mg/dl)	0.37 ± 0.04	0.57 ± 0.03	0.30 ± 0.03	0.43 ± 0.13
Cholesterol (mg/dl)	116.14 ± 8.91	126.66 ± 4.29	112.66 ± 3.97	124.33 ± 5.32
Aspartate transferase (U/l)	164.11 ± 7.84	186.6 6 ± 2.54	158.21 ± 2.17	171.33 ± 5.41
Alanine aminotransferase (U/l)	4.74 ± 4.24	5.77 ± 5.22	4.37± 0.33	4.9 ± 0.52
Alkaline phosphatase (U/l)	905 ± 28.24	818.66 ± 16.34	905.33 ± 15.23	761.66 ± 13.12

Monitoring and surveillance of important animal diseases

Monitoring and surveillance of Foot and mouth disease (FMD)

During the reporting period, no clinical case of FMD was reported from Andaman and Nicobar Islands. As a part of the sero-surveillance for the year 2023, a total of 982 cattle blood sera samples were screened for the presence of 3rAB3 antibodies by DIVA-ELISA (differentiating infected from vaccinated) test. Only seven samples were found DIVA positive. The result revealed that the number of positive DIVA cases is less than 1% and has been reduced compared to previous years (Fig 10). For sero-monitoring of NADCP-3nd round vaccinated sera samples, a total of 476 samples were screened for protective antibody titre by solid phase competitive ELISA (SPCE) test. The protective antibody titre was found to be 73% for type 0 followed by 66% for type A and 75% for type A-1 respectively.

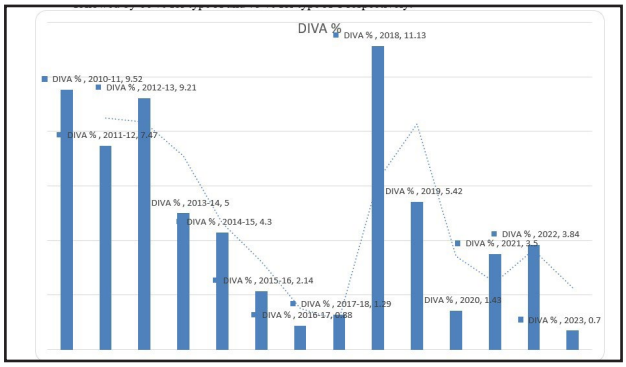


Fig. 10 Trend of DIVA positivity in bovine sera samples

Sero-surveillance and monitoring of important livestock diseases of Andaman and Nicobar Islands

A total of 292 cattle sera samples were screened for the presence of *Brucella abortus* antibodies by Rose Bengal Plate Test. None of the sample was found positive. Out of 182 goat sera samples screened for the presence of *peste des*

petitsruminants virus antibodies (PPRV), none of the sample was found positive. During the reporting period, three outbreaks of contagious ecthyma (Orf) with attack rate of 14.42% were reported from the goats of A & N islands.

Outbreak investigation of caseous lymphadenitis in goats

The caseous lymphadenitis (CL) is an infectious disease of goat and sheep, however the disease has also been reported from cattle, horses, camelsand buffaloes. The causative organism is *Corynebacterium pseudotuberculosis*, which is a Gram-negative bacterium. The disease is mainly manifested by formation of nodular abscesses in lymph nodes, skin, and in internal organs. The wounds are mostly appearing on head, neck and sternum region in goats. Outbreak of caseous lymphadenitis was observed in goats of South Andaman. A total of 22 goats were affected with attack rate of 12.02%. All the affected goats showed typical abscess formation in the neck, submandibular, thigh and abdomen regions. The clinical samples from pus were collected and processed for isolation of *Corynebacterium pseudotuberculosis* by the standard cultural and biochemical characteristics. The confirmation was done by PCR for amplification of 16S rRNA gene and rpoB gene. The details of the primersalong with product size is given below (Table 30). The PCR products were agarose gel electrophoresed containing ethidium bromide, and the gel was visualized and documented in a gel documentation system. The sequencing of PCR products was done and the sequence similarity was detected by the standard nucleotide BLAST algorithm. The nucleotide sequences of the PCR products were compared and found similar with available sequences in the NCBI.

Plate 34. Affected goat showing abscess formation

Table 30. The details of the primers with product size

Target gene	Primer	Product size	Reference
16SrRNA	CCGCACTTTAGTGTGTGTG TCTCTACGCCGATCTTGTAT	815 bp	Umer *et al*., 2017
rpoB	CGTATGAACATCGGCCAGGT TCCATTTCGCCGAAGCGCTG	446 bp	Adderson *et al.*, 2008

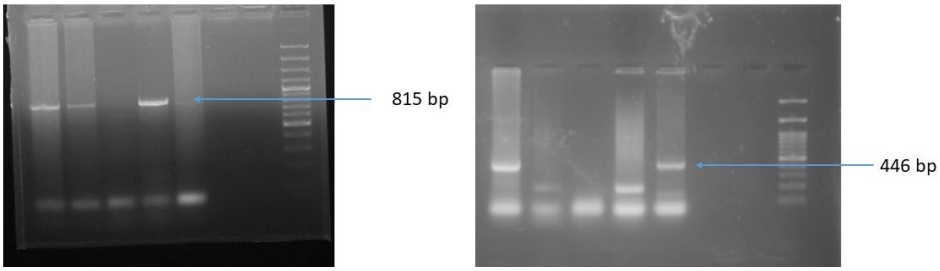


Fig. 11 Amplification of 16SrRNA gene (815 bp) and rpoBgene (446bp)

Antimicrobial resistance bacteria in food chain

The present study was undertaken to investigate scenario of multidrug resistance enterobacteriacae with ESBLs production and pathogenicity and also food borne zoonotic pathogens *viz*. Listeria, campylobacters and staphylococcus from the food chain. A total of ten animal feed samples were collected from animal science farm as well as from farmers field of South Andaman. Isolation and identification of microorganisms was done by the standard procedures, biochemical tests and molecular confirmation. Three *Klebsiella pneumoniae*, four *Staphylococcus*, one each *Salmonella* and *E. coli* was isolated. Only three *Salmonella* strains were isolated from ten manure samples from farm as well as from agricultural field of farmers. Screening of seven vegetables samples (coriander, amaranthas) showed the presence of six Listeria, two *Klebsiella pneumoniae* and one *Salmonella* isolates. Preliminary studies showed the presence of zoonotic pathogens *viz*. *Listeria, Salmonella*, *Staphylococcus* and *Klebsiella* in animal feed, animal manure and leafy vegetables. Detail studies is being undertaken to establish the linkage and association of the bacteria.

Enhancing the productivity of Andamani goat

Under the All India Coordinated Research Project on Goat Improvement, programme on enhancing the productivity of Andaman goats through selective breeding and implementation of advanced scientific management practices has been initiated. During the year, a total of 6032 goats have been registered from the adopted clusters of Port Blair, Baratang and Nimbudera. The overall least square means of body weights (kg) at birth, 3, 6, 9 and 12 months of age were 1.43 ± 0.01, 6.12 ± 0.03, 10.05 ± 0.05, 12.75 ± 0.05 and 16.85 ± 0.18 respectively (Table 31). During the period, the percentage of multiple birth was 51.51%. A total of 1307 kids were born with the tupping percentage of 86% and kidding rate of 1.57. During the year, a total of seven bucks were distributed in the South Andaman cluster. Kids born by bucks distributed under AICRP showed significantly higher body weights. Effect of litter size showed singlets had higher body weights compared to twins and triplets. Body weight at 6,9 and 12 months showed high heritability. During the year, the technologies *viz*. FAMACHA, mineral mixture supplementation, herbal acaricide and fodder production technologies were transferred and validated in the farmer's field. Cases of contagious ecthyma and caseous lymphadenitis were reported. A total of 2650 goats were given the mineral mixture, 1875 for deworming and 460 for dipping for ectoparasite infestation. The overall mortality during the period was 3.85%.

Table 31. Growth performance of field flocks (kg)

Centres	Birth wt	3 Month	6 Month	9 Month	12 Month
Port Blair	1.47± 0.18 (n= 234)	6.62±0.07 (n=78)	10.51± 0.17 (n=110)	13.23± 0.05 (n=122)	17.52±0.30 (n=114)
Baratang	1.46±0.01 (n=51)	5.71±0.04 (n=100)	9.83±0.02 (n=101)	11.87±0.15 (n=41)	16.36±0.57 (n=23)
Nimbudera	1.40±0.01 (n=321)	6.14±0.05 (n=129)	9.88±0.04 (n=173)	12.56±1.02 (n=119)	15.94±1.15 (n=71)
Overall mean	**1.43±0.01 (n=606)**	**6.12±0.03 (n=307)**	**10.05±0.05 (n=384)**	**12.75±0.05 (n=282)**	**16.85±0.18 (n=208)**

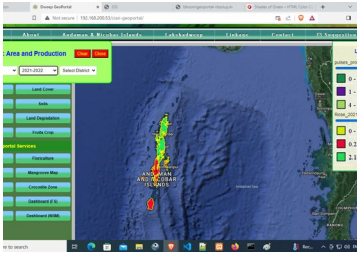
Impact of biotech kisan hub

The outcome of the project has shown that there has been significant improvement in rural poultry and goat production. Activities on mini-incubator for rural poultry production and scientific goaterywere demonstrated in all the districts of the Andaman and Nicobar Islands and the Lakshadweep Islands. A total of 255 trainings and demonstrations were conducted, with 5657 beneficiaries, including 53% women participants. Fifteen mini-incubator demonstration units have been established in the field and at the partnering institutes. By adopting scientific poultry farming, the net income of the farmer has increased from Rs.12,342/- to Rs.37,767/- with a unit size of 50 birds per year. By adopting mini-incubator technology, a net income of Rs.32,560/- per year was obtained. By adopting scientific goat farming technology, net economic gain has increased from Rs. 22,310/- to Rs.31,110/- with a flock size of 5 does and 1 buck. The benefits accrued from various skills in mini-incubators, scientific rural poultry, and goat farming increased by 60.55%. Mortality in goats and rural poultry decreased by 65%. The availability of desi chicks has increased by 4–8 times and alleviated the problems of their non-availability. Twenty-five entrepreneurs have been promoted on mini-incubators and scientific goat farming. A unique WhatsApp group has been created wherein a total of 70 farmers have been in touch with scientists for any queries. Community-based mini-incubator for rural poultry production widened the source of rural chicks and ducklings. The concept strengthened the conservation process of native/desi poultry germplasm among both rural farmers and the tribal farming community of A&N Islands. The multiplier flock concept has established specialized entrepreneurship in the production of elite bucks for breeding.

Poultry seed project

During the period, a total of 1162 Vanaraja and Srinidiparent stocks were received from the Project Directorate on Poultry, Hyderabad. Day old and fourth week body weight (in g) of male birds were 36.4±1.52 and 365.25± 9.02 respectively whereas for female birds the body weights were 35.3±1.15, 205.65±8.05 respectively. During the period from April to December 2023, a total of 2500 numbers of hatchable eggs and poultry birds were supplied to 95 beneficiaries.

DIVISION OF
FISHERIES SCIENCE



Division of Fisheries Science

Augmenting livelihood resilience and knowledge generation through coastal fisheries information hub for Nicobar tribes of Car Nicobar Island

To promote the community-based resource management concept, the citizen science initiatives and their importance in the conservation and sustainable management of coastal bioresources have been sensitized to the tribal fishers in Car Nicobar Island. Our initiatives have led to a better understanding of the sea turtle habitats on the Island. Based on the citizen-sourced data, the landings of the Green turtle (*Chelonia mydas*), Hawksbill turtle (*Eretmochelys imbricata*), and Olive ridley turtle (*Lepidochelys olivacea*) have been recorded based on the fishermen's tip of information. In the case of the Olive ridley turtle, the fishermen from Teetop village were actively involved in the protection of the turtle nests and migration of the baby turtles to the sea which is a significant outcome of the conservation initiatives.

The presence of the freshwater turtle (*Cuora* sp.) was reported from Car Nicobar Island with detailed insights on the perception, awareness, and local ecological knowledge of the local tribes. The turtle species was identified to be *Cuora amboinensis*, the South Asian box turtle based on visual observation and photographs. There is a further need to undertake molecular studies to conform the turtle at the species and sub-species level which we could not do during our sampling considering their accidental discovery at a stream, the limited number of species observed at the time of sampling, and our limited understanding of the status of species, animal ethics, etc.

All India Network Project on Mariculture

Site selection studies for mariculture activities were initiated in North, Middle, South Andaman, and Car Nicobar for open sea cage culture practices. Sites were surveyed to collect the details such as depth at low tide, transparency, salinity, temperature, pH, etc. which were some of the important factors to be considered in site selection for open sea cage culture. Further, for the selected sites in South Andaman infrastructure and bathymetry maps were prepared to provide weightage on site selection based on the multi-criteria analysis. The selected sites in North, Middle and South Andaman were surveyed during the period to assess the suitability for mariculture activities like open sea cage culture, seaweed culture, etc. The sites surveyed in North, Middle, and South Andaman had depth, transparency, and salinity in favourable conditions. The presence of mangroves and creek waters in the sites of North and Middle Andaman was an issue as the waters are known to be the habitat of saltwater crocodiles. Further, the infrastructure and bathymetry maps were also prepared for the sites in South Andaman to give weightage based on multi-criteria analysis.

Seaweed cultivation trails were also undertaken in the South Andaman waters during the reporting period. Seaweeds (*Sargassum* sp. and *Gracilaria edulis*) were collected from Rangachang and Chidiyatapu sites of South Andaman.

Mapping the brackish water areas of South Andaman for aquaculture site suitability using GIS

The shape file boundaries of the study area such as Flat Bay, Dandus Point, Guptapara, Chouldari, Manjeri, Ograbraj, Sippighat and Wandoor were prepared for studying the site-

wise characteristics**.** Using Sentinel-2 images, the Normalized Differentiated Water Index (NDWI) values in hectares were extracted from the study sites individually. Soil and water samples were collected from the study sites during the period. The soil samples were analyzed for pH and organic carbon whereasthe water samples were analyzed for pH, salinity, nitrate and ammonia. The transparency of the water bodies was also measured using a Secchi disc. Based on the protected area locations, sighting of predators such as saltwater crocodiles, access to roads, infrastructure, etc., a first draft of the site selection map was developed for further validation and streamlining. Maps of the inundated sites in Flat Bay, Sippighat, Wandoor and Ograbraj were also shared with the Department of Fisheries, Andaman and Nicobar Administration to demarcate the land type and further leasing process to undertake brackish water aquaculture activities in the inundated areas. A guideline on leasing inundated waterbodies was also prepared and submitted to the Andaman and Nicobar Administration for further implementation.

National Surveillance Programme for Aquatic Animal Diseases (NSPAAD) in Andaman and Nicobar Islands (Second phase)

Under the passive surveillance, a total of 32 numbers of disease cases were reported from the fish and shellfishes due to viral, bacterial, parasitic, fungal infections and water quality issues in Andaman and Nicobar Islands. Characterized the lymphocystis disease virus (LCDV) reported for the first time from Indian glass fish (*Parambassis ranga)* by using microscopic analysis, DNA sequencing and histopathological investigation. Parasitic infestations were caused mainly due to *Dactylogyrus* sp., *Gyrodactylus*s p., *Ichthyophthirius* sp., *Piscinoodinium* sp., *Camallanus* sp., *Paracamallanus* sp., *Argulus* sp., *Lernaea* sp. and *Octolasmis* sp. Likewise, bacterial infections were caused by *Aeromonas hydrophila, Aeromonas veronii, Aeromonas caviae, Pseudomonas alcaligenes, Pseudomonas aeruginosa* and *Acinetobacter* spp. Fungal infection was caused by *Achlya* sp. Besides, baseline data was collected from a total of 108 freshwater fish farms located at South Andaman and North and Middle Andaman. All the collected information were submitted in the National Database on Aquatic Animal Diseases. Validated the geo-reference details of 1277 numbers of freshwater fish farms located at Andaman and Nicobar Islands. To make awareness among the stakeholders on aquatic animal diseases and its health management, a total of 10 numbers of awareness and training programmes were conducted at South Andaman and North and Middle Andaman in which a total of 317 fish farmers and Fisheries Department officials participated In addition, 'Report Fish Disease' mobile app is being popularized among the stakeholders to report the fish diseases through various capacity building programmes.

Plate 35. Indian glass fish *(Parambassis ranga)* infected with lymphocystis disease virus (LCDV) showing whitish clusters of nodules on body parts

Deciphering the *in-vitro* bioactive potential of selected seaweed species of Andaman Islands and evaluation of its immunomodulatory effect on fish

Seaweeds are considered as the source of natural bioactive compounds with potential antioxidant activities. In order to analyse the *in-vitro* bioactive potential, eight seaweed species comprising of red (Rhodophyceae: *Gracilaria edulis, Acanthophora spicifera* and *Gracilaria salicornia*), brown (Phaeophyceae: *Sargassum swightii, Padina tetrastromatica* and *Turbinaria ornata*) and green (Chlorophyceae: *Halimeda opuntia* and *Dictyosphaeria cavernosa*) were collected from the South Andaman coast. The collected seaweed samples were brought to the laboratory and processed for the preparation of seaweed extracts by using the various solvents. Total phenol, flavonoid, antioxidant activity, ABTS (2,2-Azinobiz-3-Ethylbenthiazoline-6-Sulfonic Acid), DPPH (1,1-Diphenyl-2-Picrylhydrazyl), reducing power, metalchelating activity, carotenoid content, proximate composition, *in vitro* antibacterial activity and minimum inhibitory concentration were analysed for the collected seaweed species.

Gracilaria edulis, Padina tetrastromatica and *Halimeda opuntia* exhibited significantly higher *in vitro* bioactive potential (Total phenol, flavonoid, antioxidant activity, ABTS, DPPH, reducing power and metal chelating activity) in red, brown and green seaweed categories, respectively. Carotenoid content was significantly higher in *Padina tetrastromatica S*(83.81 ± 0.28 µg/g) followed by *Halimeda opuntia* (35.28 ± 0.34 µg/g) and *Gracilaria edulis* (24.64 ± 0.18 µg/g). With regard to *in vitro* antibacterial activity against *Aeromonas hydrophila* and *Vibrio parahaemolyticus,* significantly higher antibacterial activity was observed in *Halimeda opuntia, Padina tetrastromatica* and *Gracilaria edulis* in green, brown and red seaweed categories, respectively. Significantly higher minimum inhibitory concentration against *Aeromonas hydrophila*was exhibited by *Padina tetrastromatica* (38.60 ± 1.97%) followed by *Halimeda opuntia* (27.34 ± 0.7%) and *Gracilaria edulis* (24.20 ± 0.08%). Likewise, significantly higher minimum inhibitory concentration against *Vibrio parahaemolyticus* was exhibited by *Gracilaria edulis* (28.90 ± 1.19%) followed by *Halimeda opuntia* (28.73 ± 0.62%) and *Padina tetrastromatica* (27.14 ± 1.44%). The present study showed that significantly higher *in-vitro* bioactive and anti bacterial potential was exhibited by *Gracilaria edulis, Padinatetra stromatica* and *Halimeda opuntia* which reveals their potential for future application as the natural source of immunostimulants. Further, GC-MS analysis was carried out to identify the bioactive compounds present in the selected seaweed species. *In vivo* study is being conducted to evaluate the immunomodulatory effect of selected seaweed species on fishes.

Development of control and treatment measures for the management of parasitic diseases in freshwater fishes

A total 8 medicinal plants and tubers parts which are *Terminalia catappa*, *Cashew ancardium occidentale*, *Psidium guajava*, *Andrographis paniculata*, *Dioscorea* sp. (Achinwhite, Thakinyathakav, NIC-DA-5, Antounth) were screened for phytochemicals, which was further put in usage for testing the efficacy for antiparasitic activity. The highest tannin content was found in *Terminalia catappa* followed by *Cashew ancardium occidentale* and *Psidium guajava*, the highest flavonoid content was found in *A. paniculata* followed by badam leaves, the highest

saponin content was found in *Psidium guajava*, the phenol content was significantly higher in *Cashew ancardium occidentale* followed by *Terminalia catappa* and *Psidium guajava*. The oxalate content was also significantly higher in *Cashew ancardium occidentale* followed by *Psidium guajava*. Based on the availability and applicability of plant products, *Terminalia catappa* and *Psidium guajava* have been taken to study the antiparasitic efficacy against external parasites, and *Andrographis paniculata* against internal parasites.

Table 31. Phytochemical content of the selected plant species

S. no	Plants/parts used	Tannin (µg/ml)	Flavonoids (µg/ml)	Saponin (µg/ml)	Phenol (µg/ml)	Oxalate (g/L)
1	***Terminalia catappa***	182.8±7.4	222.7±2.0	51.2±0.2	118.3±5.3	0.2±0.1
2	***Psidium guajava***	183.2±7.5	112.7±4.9	113.2±0.1	108±1.6	0.3±0.1
3	***Cashew ancardium occidentale***	199.4±4.2	77.3±7.7	59.7±0.2	120.9±1.0	0.4±0.1
4	***Andrographis paniculata***	126.3±1.3	62.8±15.0	36.7±0.1	106.1±0.5	0.3±0.2
5	**Dioscorea sp. (Achinwhite)**	91.4±1.8	76.7±3.5	44.3±0.5	112.7±6.8	0.1±0.1
6	***Dioscorea* sp. (Thakinyathakav)**	81.2±2.2	140.3±4.2	13.4±0.1	104.9±2.4	0.2±0.1
7	***Dioscorea* sp. (NIC-DA-5)**	79.1±0.8	137.7±2.7	26.2±0.2	121±0.9	0.2±0.2
8	***Dioscorea* sp. (Antounth)**	33.4±0.9	522.3±5.5	28.6±0.8	78.5±0.4	0.9±0.3

Prevalence of parasites infecting commercial marine and freshwater fishes of the Andaman Islands

A total of 19 species of parasites have been recorded from 21 freshwater fish hosts. In Andaman Islands, the majority of the parasitic diseases causing serious outbreaks and mortality were due to protozoan and crustacean parasites, followed by monogeneans. There were also sporadic occurrence of ectoparasites and endoparasites belonging to annelids, cestodes and nematodes, however no mortality was recorded. Case studies were done during the parasitic disease outbreaks. A checklist consisting of parasites, hosts, prevalence, mean intensity and its season of occurrence were prepared. Altogether, 27 species of parasites from 27 host fishes were recorded from marine fishes consisting of different families. The family Carangidae was the dominant host affected by the most number of species followed by Clupeidae, Serranidae and Scomberidae. The family Carangidae was affected by three species of nematodes, followed by one species each of Acanthocephala and Isopoda. The family Clupeidae is infected by three species of copepods and one species of isopod. The family Serranidae was dominated by four species of nematodes, and the family Scomberidae was dominated by two species of copepods and one species of isopod. DNA barcodes were also generated for some of the important freshwater fish pathogens (Table 32).

Table 32. DNA barcodes of freshwater fish pathogens reported from Andaman Islands

S.No.	Pathogens	Host	Attachment site	NCBI GenBank accession no.
1	***Argulus* sp. Andaman**	*Labeo rohita*	Body surface	MZ648451
2	***Argulus* sp. Andaman**	*Catla catla*	Body surface	MZ648452
3	***Argulus* sp. Andaman**	*Cirrihinus mrigala*	Body surface	MZ042803
4	***Argulus* sp. Andaman**	*Catla catla*	Body surface	MZ042802
5	***Lernaea cyprinacea***	*Carassius auratus*	Body surface	OP050160
6	***Argulus japonicus***	*Carassius auratus*	Body surface	OP0501238
7	***Aphanomyces helicoides***	*Catla catla*	Caudal peduncle	ON693466
8	***Achlya* sp.**	*Betta splendens*	Body surface	ON693467

Standardization of freshwater aquariculture practices to promote livelihood and employment opportunities in South Andaman

Successful mass production of white half-moon betta fish has been achieved under island condition with 90% survival rate by incorporation of young Moina culture. Giant betta fish has been successfully bred for the first time with 70% survival.

Mexican crayfish (*Procambarus clarkii*) has been introduced for breeding and culture. Angel fish (*Pterophyllums calare*) has been bred. Ornamental aquatic plants like *Limnobium laevigatum* and *Phyllanthus fluitans* have been introduced for propagation. A total of 6 entrepreneurs (4 female and 2 male) have been developed to carry out ornamental fish breeding at Andaman Islands.

Plate 36. Production of white half-moon Betta splendens under Island condition

Development of an Island-based information management system for decision making in agriculture

ICAR-Central Island Agricultural Research Institute has taken the initiative to create the Dweep Geoportal. This platform enables the sharing and dynamic display of data pertaining to political and administrative boundaries, natural resources, demography, agro and socio-economy, and more, through the Web Map Service (WMS). An open-source web GIS application was developed using Geoserver, Open layer, and PostgreSQL. The project aimed to utilize the interactive web GIS application for mapping and visualizing agricultural and allied information, including political and administrative boundaries, natural resources, demography, agro and socio economy.

Generated various GIS vector datasets that consisted of the boundaries of Andaman and Nicobar Island State, District and Tehsil. By utilizing QGIS, created maps that illustrate

the density and distribution of major crops, floriculture, and livestock such as cattle, pigs, goats, sheep, and buffaloes in the districts of Andaman and Nicobar Islands. These maps were developed using data from the livestock census conducted in 2019 and Basic statistics 2021-22 published by the Directorate of Economics and Statistics, ANI.

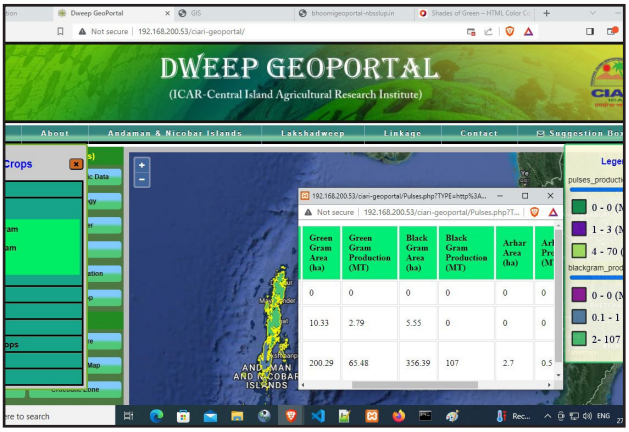


Plate 37. Density distribution map of major crops in Andaman and Nicobar Islands

Exploration of fishery, biology and market potential of tuna resources of Minicoy Islands

Scombrid fish belonging to tribe Thunnini, are known as tunas. Globally the fishes are commercially exploited by means of mechanized fishing fleets from the high seas. The Lakshadweep Islands, a major tuna hub of India, harvested the resources using traditional pole and line method. The comprehensive transitional change in the tuna pole and fishing along with the subsidiary live bait fishing were studied in the Island using a pre-tested interview schedule. The mechanisation and motorization in the fishing sector, especially in craft and gear technology substantially increased the production and processing of tuna in Minicoy Islands. During the survey it was identified that, the backbone of the social and development in the Minicoy, raised from the tuna fishing. The community based fisheries management for the conservation of baitfish resources were surveyed and recorded. An experiment on bait fish alternative was done with the cultivated tilapia fingerlings at tuna pole and line fishing site. A positive sign of acceptance of the alternative bait by tuna was observed in the site. It was estimated that a demand of 7 kgs of tilapia fingerlings were needed for the fishing vessel per day for fishing, once the alternative bait fish scheme is adopted. The regular landing surveys were conducted to record the species and size composition . A total of 332 fishes were dissected for the biological studies during the period. It was found that the crabs of match box size followed by megalopa, squid, acetesshrimps, digested fishes and baits were the major food items observed during the period.

Integrated Farming System (IFS) for enhancing sustainable livelihood of rural tribal community of Minicoy Islands

One acre scientific IFS demonstration plot suitable for Island ecosystem was designed and developed in demonstration farm of ICAR-CIARI Regional Station, Minicoy. The coconut based Goat-Fish-Poultry-Vegetable-Fodder system was introduced with suitable breeds and variety of animals and plants. The shelters, ponds and other facilities were made to accommodate the livestock and fisheries component. Goat (Konkan Kanyal); chicken (Sasso, Gramasree, Thalassery nadan, Kadaknath); duck (Chara-Chemballi) andlayer quail were introduced as animal and poultry components. Based on the performance in growth and disease resistance, the Konkan Kanyal goat was selected as a sustained variety in the Island as compared to other existing breeds. Among the poultry, the Chara-

Chemballi duck was identified as the suitable bird in terms of FCR and economics. The fodder grass CO5, Red Napier and Sorghum were introduced and evaluated in the experimental plots. The *in situ* vermi-composting space was made around the coconut trees and mucuna was introduced as nitrogen fixator. The vegetable crops such as chilly, brinjal, bottle gourd and okra were tested and evaluated in the IFS system. In view of IPM, fruit fly traps, marigold plants and microbial consortia were introduced in the IFS. The existing farming system of Minicoy Islands were evaluated through a survey method using pre-tested questionnaire and identified the importance of IFS to improve the livelihood and food security within the ecosystem. A backyard kitchen garden was designed in the backyard of Smt. Aneesa Hinavage by incorporating the duck, ornamental fish and vegetables along with the existing cattle stock. Ducks, vegetable seedling and fishes were provided as inputs to the farmer along with the advisories on farming practices.

Opportunities and Challenges of Sustaining Agriculture in Andaman & Nicobar District and Minicoy: A Behavioural Perspective

An exploratory study in 2022-2023, was undertaken to understand the farmers and youth's behavioural perspective and to evolve strategies to retain/attract them in agriculture from 3 districts, 9 tehsils and 253 revenue villages, through Stratified Random Sampling method. Altogether, 35 villages from South Andaman, 18 from North and Middle Andaman and 10 from Nicobar along with 86 farmers and 99 youths were selected representing three districts of Andaman & Nicobar Islands (ANI).

Farmer's suggestion to adopt farming as a profession

Abstract of behavioural perspective of youth is presented in Table 34. Suggestions revealed by rural youth in reducing the migration emphasized that farming must be satisfying and economically rewarding for young people to take agriculture. These suggestions will act as a positive catalyst in reducing the migration of the rural youth from homeland.

Table 33. Abstract of Behavioural perspective of Farmer. Figures in parenthesis signifies percentage.

Profile	Category
Age	Old (84.88)
Education	Middle (33.72)
Occupation	Full time farming (65.12)
Farm experience (in yrs)	0-30 (74.42)
Family	Nuclear (51.16)
Farm size(in acre)	Marginal (up to 2.5) (43.02)
Annual Income (Rs)	50,001-1.5 lacs (48.84)
Social participation	Low (93.11)
Extension contact	Low (44.19)
Information seeking behaviour	Low (46.51)
Economic motivation	High (69.96)
Risk orientation	High (55.62)
Scientific orientation	High (75.39)
Farmer attitude towards farming	Strongly agree (51.80)
Reasons for fading interest in agriculture	Lack of labour (74.42)
Farmers suggestion	Promote agro eco-tourism (100.0)

Table 34. Abstract of Behavioural perspective of Youth. Figures in parenthesis signifies percentage.

Profile	Category
Age (years)	25-40 (54.55)
Education	Secondary (65.66)
Present status	Unemployed & live with parents(34.34)
Family type	Joint (60.61)
Marital status	Unmarried (72.73)
Father's occupation	Agriculture(farming) (44.44)
Father's annual income (Rs)	50,001-1.5lacs (41.41)
Farm land holding (acre)	Small (2.5-5.0) (53.5)
Youth participation in farm activities(days/year)	Other than farm activities (29.04)
Professional course aspiration	Medicine and allied(32.32)
Occupational aspiration	Government employee(44.44)
Factors influencing aspiration	Parental influences(93.94)
Overall perception level towards agriculture	Highly favorable(68.69)
Attitude towards agriculture	Strongly agree+ Agree(44.40)

Profile	Category
Reasons for migration	Demographic factor (90.91)
	Socio cultural factors (65.66)
	Economic factors (74.75)
Suggestion revealed by rural youth in reducing the migration	Availability avenues of entrepreneurial packages/ models in the village itself including skill development (97.98)

National Extension Programme

Assessment of on-farm demonstrations and farmers' feedback to technologies of IARI disseminated through National Extension Programme

Under the National Extension Programme of IARI, 27 demonstrations in 5 cluster villages were conducted during Kharif season on vegetables viz. Palak *var* Pusa All Green, Palak *var* Pusa Bharati and Bhendi *var.* A-5, covering 0.52 ha.

The performance of Palak var Pusa All Green, Palak var Pusa Bharati and Bhendi var. A-5 with economics, feedback and impact is given below:

Table 35. Performance of crop demonstration

Sl. No.	Crop	Variety	No. of Demo	Area (ha)	Yield obtained in demo (t/ha)			Local Check (t/ha)	Increase in yield (%)
					Highest	Lowest	Average		
1	**Palak**	Pusa All Green	14	0.20	7.2	3.2	4.7	2.2	53.19
2	**Palak**	Pusa Bharati	12	0.30	4.1	2.6	3.4	2.2	35.29
3	**Bhendi**	A5	1	0.02	15.0	-	15.0	7.0	53.33

Table 36. Economic Impact of Palak

Variety	Average cost of cultivation (Rs/ ha)		Average gross return @ Rs.80 per kg (Rs/ha)		Average net return (Rs/ha)		Benefit cost ratio	
	Demo. plot	Local	Demo. plot	Local	Demo. plot	Local	Demo. plot	Local
Palak Pusa All Green	1,16,600	85000	3,76,000	1,76000	2,59,400	91,000	3.22	2.07
Palak Pusa Bharati	1,16,600	85600	2,72,000	1,76000	67,400	90,400	2.33	2.05

Table 37. Economic Impact of Bhendi

Variety	Average cost of cultivation (Rs/ ha)		Average gross return @ Rs.70 per kg (Rs/ha)		Average net return (Rs/ha)		Benefit cost ratio	
	Demo. plot	Local	Demo. plot	Local	Demo. plot	Local	Demo. plot	Local
Bhendi A5	1,52,000	95,000	10,50,000	4,90,000	8,98,000	3,95,000	6.90	5.15

Farmers' feedback

Palak var. Pusa All Green

Palak var. Pusa All Green is preferred over the local varieties for its small and thin leaves, it withstands pest and disease infestation, has more shelf life. Moreover, farmers are purchasing the seed of Pusa All green from a private seed seller & cultivating for getting better price in the market.

Bhendi *var.* A5

It has better plant height, fruits are straight, thicker and attractive dark green.

4.5 ICAR-CIARI Regional Station, Minicoy, Lakshadweep

Demonstration of pearl millet as intercrop in coconut

Demonstration of pearl millet as intercrop in coconut was conducted seeds performed a germination rate of 96% and seedlings were transplanted to the coconut farm when it reaches 6 cm height. The organic manure (poultry manure: neem seed cake; 1:1) added in to trenches and the seedling planted 20 cm apart. The flowering started after 5 weeks of transplantation and the grains matured in 10 to 12th weeks.

Plate 38. Demonstration plot of pearl millet under coconut plantation

Marigold under coconut plantation as an IPM and flower

Three varieties of marigold plants were introduced in Minicoy Island to manage the agricultural pest in demonstration farm of ICAR-CIARI RS Minicoy. The three variety named a (Bear skin type), b (Local-Orange), c (Hybrid-red). A total area of 650 Sq. m selected for the trial cultivation and the seedling were planted in trenches of depth of 20 cm were made and manured with Poultry manure.

Plate 39. Cosmos plants introduced for biocontrol of Parthenium weed

Cosmos a new ornamental introduction to the home garden of Minicoy Islands

As a new candidate, ICAR- CIARI regional station Minicoy introduced cosmos, as ornamental to home gardens in Lakshadweep Island. The plantation of the flowers in the garden of ICAR-CIARI grown over the parthenium weed infestation to control the weed and it attracted by public the seeds and seedlings of the plant collected by many people of Minicoy as well as other Islands.

Demonstration of scientific goat farming

ICAR-CIARI regional station Minicoy Introduced the Konkan kanyal breed of goat from ICAR-CCARI goa. The pure breeds to the animals (3 females and 2 males) procured and rearing in protected environment of regional station as a parent stock for future multiplication.

Plate 40. Demonstration training programme on Scientific goat farming

Demonstration of Scientific poultry farming

The layer chicken breed sasso and grama shree, Layer quail, Duck- Chara chempalli introduced and demonstrated scientific cultivation practices in ICAR-CIARI regional station Minicoy.

4.6 Krishi Vigyan Kendras

ICAR-CIARI-KVK, South Andaman

(i) Training

Discipline	No. of training	Male	Female	Total
Agronomy	09	259	157	424
Horticulture	-	-	-	-
Agril. Engg.	01	07	18	25
Fisheries	-	-	--	-
Animal Science	-	-	-	-
Home Science	05	0	122	122
Total	15	266	297	571

(ii) Front Line Demonstration (FLD)

Discipline	No. of FLD	Title
Agronomy	02	1. FLD on Rice-ANR 47 2. FLD on green dal 3. FLD on black gram
Home Science	02	1. Value addition in moringa 2. Promotion of vermicomposting for income generation
Agrl. Engg.	01	1. Manual low head pump
Total	05	

(iii) On Farm Trials (OFT)

Discipline	No. of OFT	Title
Agronomy	01	1. Medium duration rice cultivar
Home Science	02	1. Process optimization for instant millet laddu mix. 2.Value addition in Jackfruit for Nutritional security and income generation among women SHG.
Total	03	

ICAR-CIARI-KVK, North and Middle Andaman

(i) Training

Discipline	No. of training	Male	Female	Total
Agronomy	1	21	04	25
Horticulture	1	39	06	45
Agril. Engg.	5	123	41	164
Fisheries	1	13	03	16
Animal Science	2	40	29	69
Total	10	236	83	319

(ii) Front Line Demonstration (FLD)

Discipline	No. of FLD	Title
Agril. Engg.	2	1. Power weeder application in paddy 2. Use of tiller in Banana cultivation for intercultural operations and weeding
Total	2	

(iii) On Farm Trials (OFT)

Discipline	No. of OFT	Title
Agril. Engg.	2	1. Performance and evaluation of hermetic bag for storage of paddy grains in Andaman region 2. Assessment and performance evaluation of manual harvesting implements and shrub cuter for harvesting of rice
Total	2	

ICAR-CIARI-KVK, Nicobar

(i) Training

Discipline	No. of training	Male	Female	Total
Agronomy	-	-	-	
Horticulture	03	70	94	164
Agril. Engg.	-	-	-	
Fisheries	03	45	58	270
Animal Science	03	36	59	95
Total	12	235	313	548

(ii) Front Line Demonstration (FLD)

Discipline	No. of FLD	Title
Horticulture	3	Demonstration of Dweep Vertigrow Technology
Horticulture	5	Popularization of kitchen gardening
Plant Protection	2	Demonstration of ecofriendly cue lure pheromone traps and yellow sticky trap for the management of cucurbit fruit flies.)
Total	10	

(iii) On Farm Trials (OFT)

Discipline	No. of OFT	Title
-	-	-
Total	-	

5. Scheduled Tribe Component

A. Scheduled Tribe Component

(i). Capacity building programmes

Sl. No.	Title	Venue	Date	Number of participants			Coordinators
				M	F	T	
1	**Sensitization on Integrated Pest Management (IPM)**	RS, Minicoy	09th to 13th January, 2023	34	47	81	S.M. Ajina Y. Gladston S.K. Zamir Ahmed
2	**Training on Climate resilient scientific livestock farming**	Car Nicobar	23rd to 27th January, 2023	40	70	110	P.A.Bala A.K. De Y. Ramakrishna
3	**Potential of organic farming under Island based cropping system**	Pilpillow, Hitui, Chota Inaka, and Kakana villages in Nancowrie Islands	7th to 11th February 2023	110	116	226	I. Jaisankar B. A. Jerard Y. Ramakrishna R. Jayakumara Varadan
4	**Twin training on Agricultural technologies for enhancing the income & nutritional security of tribal farmers and Income generating activity for tribal youth**	Upper Katchal, E-Wall, Meenakshi Ram Nagar and Japan Tikri of Katchal Island	06th to 07th April 2023	95	36	131	D.Karunakaran I. Jaisankar
5	**Awareness programme on responsible fishing practices and input distribution programme**	Big Lapathy, Car Nicobar	13th April, 2023	34	-	34	K. Saravanan J. Praveenraj R. K. Sankar S.K. Zamir Ahmed M. Sarief
6	**Scientific Cultivation of paddy in rainfed lowland**	Harminder Bay, Little Andaman	4th May, 2023	18	22	40	P. K. Singh K. Shyam Sunder Rao
7	**Awareness programme on Fruit Cultivation in Home Garden**	Harminder Bay, Little Andaman	8th May, 2023	100	-	100	Pooja Bohra

Sl. No.	Title	Venue	Date	Number of participants			Coordinators
				M	F	T	
8	**Training programme on Natural Farming, Scientific goat and poultry farming and Input Distribution**	RS, Minicoy	20th to 23rd May, 2023	13	7	25	Y. Gladston, Abdul Gafoor S.M. Ajina Shareefuddeen Hassan M.I. Arif S.K. Zamir Ahmed
9	**Awareness on Organic Farming, IPM & Input distribution**	Kalpeni Island, Lakshadweep	30th May, 2023	6	11	17	Y. Gladston S.M. Ajina Shareefuddeen Hassan M.I. Arif S.K. Zamir Ahmed
10	**Awareness of Quail farming and its benefits. (Anganwadi workers/ Mahila)**	KVK Car Nicobar	4th August, 2023	0	20	20	R.R. Alyethodi P. A. Bala
11	**Livestock and Poultry production in Nicobar**	Car Nicobar	5th to 8th August, 2023	85	101	185	P. A. Bala, R. R. Alyethodi Jai Sunder Y. Ramakrishna D.Bhattacharya T. Sujatha K. Muniswamy P. Perumal A. K. De
12	**Awareness on Livelihood Augmentation through sustainable fisheries for Tribal Fishers and input distribution and demonstration of cast net fishing**	Minicoy	24th August, 2023	12	10	22	Y. Gladston S.M. Ajina Shareefuddeen Hassan M.I. Arif S.K. Zamir Ahmed
13	**Awareness program on Sustainable model for food security for thetribal communities of Lakshadweep**	RS, Minicoy	22nd September, 2023	0	18	18	Y. Gladston S.M. Ajina S.K. Zamir Ahmed

Sl. No.	Title	Venue	Date	Number of participants			Coordinators
				M	F	T	
14	**Skill development for tribal farmers through scientific poultry farming**	Minicoy	06th to 10th November, 2023	22	80	102	S.K. Zamir Ahmed Y. Gladston S.M. Ajina T. Sujatha S. Hassan M.I. Arif
15	**Training Programme cum Exposure Visit on Agriculture and Allied Sectors for the Tribal Captains of Nicobar Islands**	ICAR-CIARI, Port Blair	22nd September, to 2nd October, 2023	14	-	14	Y. Ramakrishna Jai Sunder S.K. Zamir Ahmed P.K. Singh T. Subramani I. Jaisankar K. Saravanan
16	**Training on functioning of hatchery and vaccination in poultry,**	Livestock farm complex, ICAR-CIARI	25th to 27th September, 2023	0	14	14	T.Sujatha A.K. De R.R.Alyethodi K.Munisamy
17	**Climate resilient Agricultural Practices for Island based Cropping System**	Perka, Chukchucha and Tapoiming village of Car Nicobar Islands	1st to 3rd November, 2023	147	47	191	I. Jaisankar Santosh Kumar T. Subramani
18	**Skill development program - scientific poultry farming**	RS, Minicoy	06th to 10th November, 2023	22	80	102	S.M.Ajina Y. Gladston S. Hassan S.K. Zamir Ahmed
19	**Training and demonstration on climate resilient scientific pig farming**	Harminder Bay	04th to 08th December, 2023	35	65	100	A. K. De P. Perumal P. A. Bala
20	**Training programme cum front line demonstration on infertility management in cattle, goat and pig**	Harminder Bay	04th to 08th December, 2023	35	65	100	P. Perumal A.K. De P. A. Bala

Sl. No.	Title	Venue	Date	Number of participants			Coordinators
				M	F	T	
21	**Stakeholder Meeting on Integrated Pest Management**	Minicoy	23rd December, 2023	18	57	75	Y. Gladston S.M. Ajina T. Sujatha S. Hassan M.I. Arif S.K. Zamir Ahmed

M- Male, F- Female, T-Total

(ii) Distribution of planting materials/ seeds

S. No.	Particulars	Quantity	Venue	Number of beneficiaries		
				M	F	T
1	**Distribution of vegetable seed kits**	80	Dugong creek	55	25	80
2	**Coconut seedlings (Chowghat orange dwarf, Green Dwarf and Gangabondam)**	192	ICAR-CIARI, Regional Station, Minicoy	15	1	16
3	**Hybrid Napier (CO 5) Fodder grass**	100	ICAR-CIARI, Regional Station, Minicoy	0	2	2
4	**Vegetable seedlings (Chilly, Brinjal, Tomato, Pumpkin, Cowpea, Cucumber, Cabbage, Ash gourd, Bottle Gourd)**	2935	ICAR-CIARI, Regional Station, Minicoy	62	118	180
5	**Ornamental plants (Marigold, cosmos, Bougainvillea, Chinese balsam, Coleus, Portulaca)**	792	ICAR-CIARI, Regional Station, Minicoy	12	38	50
6	**Medicinal plants (Tulsi, Aloe vera)**	8	ICAR-CIARI, Regional Station, Minicoy	1	1	2
7	**Paddy seeds (CIARI Varieties)**	5.0	Harminder Bay, Little Andaman	16	20	36
8	**Paddy seeds (CIARI Varieties)**	5.0	Campbell Bay, Great Nicobar	32	08	45

M- Male, F- Female, T-Total

(iii) Distribution of other inputs

S. No.	Particulars	Quantity	Venue	Number of beneficiaries			Coordinators
				M	F	T	
1	**Ponocur 1.5 g bolus (10's)**	200 stripes	Tapoiming and Chukchucha Villages Nicobar District	32	13	45	P. Perumal A. K. De P. A. Bala I. Jaisankar Santhosh Kumar
2	**Feritos Bolus (5's)**	200 stripes					
3	**Groviplex syrup (5 litre)**	25 bottles					
4	**Phytocol liquid (1 litre)**	100 bottles					
5	**Phytocol liquid (5 litre)**	10 bottles					
6	**Himax ointment (50 g)**	300 tubes					
7	**Naturamine Gold powder (1.1 kg)**	150 pockets					
8	**Timpol Powder (100 gm)**	200 pockets					
9	**Tyrel Liquid (100 ml)**	200 bottles					
10	**Topicure++ spray (100 ml)**	100 bottles					
11	**Rumipro bolus (6's)**	200 stripes					
12	**Doramectin (20 ml)**	30 vials	Harminder Bay, Little Andaman	35	65	100	P. Perumal A. K. De P. A. Bala
13	**Tonophosphan (100 ml)**	50 vials					

S. No.	Particulars	Quantity	Venue	Number of beneficiaries			Coordinators
				M	F	T	
14	**Phytocol liquid (20 litre)**	6 bottles	ICAR-CIARI, Port Blair	14	0	14	D. Bhattacharya Jai Sunder T. Sujatha P. A. Bala A. K. De P. Perumal R. R. Alyethodi K. Muniswamy
15	**Phytocol liquid (5 litre)**	50 bottles					
16	**Himax ointment (50 g)**	300 tubes					
17	**Himax ointment (1 kg|)**	10 tubes					
18	**Naturamine Gold powder (1.1 kg)**	100 pockets					
19	**Naturamine Gold powder (11 kg)**	10 pockets					
20	**Pig feed**	5 tonnes	Harminder Bay, Little Andaman	35	65	100	A.K. De P.A. Bala P. Perumal
21	**Fishing rod with accessories**	34	Big Lapathy, Car Nicobar	34	-	34	J. Praveenraj K. Saravanan R. Kiruba Sankar Mohamed Sarief
22	**Snorkel with mask**	65	Big Lapathy, Car Nicobar	65	-	65	R. Kiruba Sankar J. Praveenraj, K. Saravanan Mohamed Sarief
23	**Fishing net**	34	Big Lapathy, Car Nicobar	34	-	34	K. Saravanan J. Praveenraj R. Kiruba Sankar S.K Zamir Ahmed Mohamed Sarief
24	**Solar lantern**	32	Dugong creek	55	25	80	S.K Zamir Ahmed
25	**Distribution of slashing knife**	100	Dugong creek	55	25	80	S.K Zamir Ahmed
26	**Distribution of secateurs**	32	Dugong creek	55	25	80	S.K Zamir Ahmed

S. No.	Particulars	Quantity	Venue	Number of beneficiaries			Coordinators
				M	F	T	
27	**Distribution of Climbing Devices**	50	Upper Katchal, E-Wall, Meenakshi Ram Nagar and Japan Tikri of Katchal islands	95	36	131	D. Karunakaran I. Jaisankar S. K. Zamir Ahmed
28	**Fruit fly traps**	850 nos.	Minicoy and Kalpeni Islands	195	201	396	Y. Gladston S.M.Ajina Shareefuddeen Hassan M.I. Arif S.K. Zamir Ahmed
29	**Cast net**	10 nos.	Minicoy and Kalpeni Islands of Lakshadweep	10	0	10	Y. Gladston S.M. Ajina Shareefuddeen Hassan M.I. Arif S.K. Zamir Ahmed
30	**Biopesticide**	Verticillium - 250Kg Beauveria - 250kg Psuedomanas - 250kg Trichoderma - 150kg	Minicoy Islands and Kalpeni Islands	22	25	47	Y. Gladston S.M. Ajina Shareefuddeen Hassan M.I. Arif S.K. Zamir Ahmed
31	**Fertilizers**	Neem cake - 1500 kg Liquid bio potash -75 kg Phospobacteria - 69 kg Azospirillum - 100 kg VAM - 75 kg	Minicoy Islands and Kalpeni Islands	38	40	78	Y. Gladston S.M. Ajina Shareefuddeen Hassan M.I. Arif S.K. Zamir Ahmed

S. No.	Particulars	Quantity	Venue	Number of beneficiaries			Coordinators
				M	F	T	
32	**Micronutrients**	Micro nutrients mix-200 kg	Minicoy Islands and Kalpeni Islands	15	45	60	Y. Gladston S.M. Ajina Shareefuddeen Hassan M.I. Arif S.K. Zamir Ahmed
33	**Small agricultural implements**	Vegetable seed kits (212 nos.), pruning knives (20 nos.), sickles (50 small, 50 big), shovels (50 nos.), grow bags (40 nos.), secateurs (130 nos.), grass cutter (6 nos.), PVC coated chain link (2,100 m), hand saw (130 nos.), tapioca setts (200 nos.), axe (130 nos.), yellow sticky traps (20 packs), cue lure pheromone kit (30 nos.)	Kakana village: Pilpillow village, Hitui village: Chota Enaka village of Nancowrie Islands	148	78	226	I. Jaisankar B. A. Jerard Y. Ramakrishna R. Jayakumara Varadan
34	**Small agricultural implements**	Crow bar (50 nos), Pick Axe (50 nos), Spade (50 nos), Axe (50 nos) and PVC coated wired mesh (1500 running meter around 4 tonnes).	Perka village	43	17	60	I. Jaisankar Santosh Kumar T. Subramani
35	**Pick axe**	100	Harminder Bay, Little Andaman	100	-	100	Pooja Bohra
36	**Spade**	100		100	-	100	
37	**Sickle**	100		100	-	100	
38	**Machete**	100		100	-	100	
39	**Trowel**	100		100	-	100	

S. No.	Particulars	Quantity	Venue	Number of beneficiaries			Coordinators
				M	F	T	
39	**Veterinary medicines**	Panacure 200 strips, Fertios 200 strips, Groviplex 5 lit 50 vials, Phytocol 100 nos, Phytocol 5lit 10 bottles, Himax 300 tubes, Naturamine 150 pockets, Timpol 200 pockets, Tyreliquid 200 bottle, Topicure 100 bottle and Rumipro 100 strips.	Tapoiming and Chukchucha village	32	13	45	I. Jaisankar Santosh Kumar T.Subramani
40	**Coconut climbing devices**	100	Harminder Bay, Little Andaman	100		100	Ajit Arun Waman
41	**Spare ropes for coconut climbing devices**	80 nos. or 40 pairs		80		80	
42	**Dweep HanGreens - Large**	25		0	25	25	

(iv) Demonstration of technology

S. No.	Technology	Venue	Date	Number of participants			Coordinators
				M	F	T	
1	**Demonstration on Iron supplementations to piglets**	Car Nicobar	25th January, 2023	30	45	75	P.A.Bala A.K.De Y. Ramakrishna
2	**Demonstration on Coconut Climbers**	Upper Katchal, E-Wall, Meenakshi Ram Nagar and Japan Tikri of Katchal islands	6th to 7th April, 2023	50	0	50	D.Karunakaran I. Jaisankar S.K. Zamir Ahmed
3	**Demonstration of scientific poultry farming**	ICAR-CIARI, RS, Minicoy	6th to 10th November 2023	22	80	102	S.M. Ajina Y. Gladston Shareefuddeen Hassan M.I Arif S.K. Zamir Ahmed

S. No.	Technology	Venue	Date	Number of participants			Coordinators
				M	F	T	
4	**Demonstration on pheromone traps**	ICAR-CIARI, RS, Minicoy, Farmers fields, Kalpeni	9th to 13th January, 2023, 5th to 17th April 2023,30th May, 2023, 18th July, 2023, 9th November, 2023, 23rdDdecember, 2023	195	201	396	Shareefuddeen Hassan M.I Arif S.K. Zamir Ahmed
5	**Demonstration of cast net fishing**	ICAR-CIARI, RS, Minicoy	24th August 2023	22	0	22	Shareefuddeen Hassan M.I Arif S.K. Zamir Ahmed
6	**Demonstration of Scientific goat farming**	ICAR-CIARI, RS, Minicoy	22nd May2023	13	7	20	Shareefuddeen Hassan M.I Arif S.K. Zamir Ahmed
7	**Fish amino acid preparation**	ICAR-CIARI, RS, Minicoy	23rd December, 2023	35	13	48	Shareefuddeen Hassan M.I Arif S.K. Zamir Ahmed
8	**Biopesticidepreparation using NSKE**	ICAR-CIARI, RS, Minicoy	23rd December, 2023	35	13	48	Shareefuddeen Hassan M.I Arif S.K. Zamir Ahmed
9	**Demonstration on coconut climbing devices**	Harminder Bay, Little Andaman	9th May, 2023	180	0	180	Ajit Arun Waman
10	**Demonstration on Dweep HanGreens**	Harminder Bay, Little Andaman	9th May, 2023	0	25	25	Ajit Arun Waman
11	**Demonstration on Probiotics supplementation in piglets for control of weaning stress**	Harminder Bay	08th December, 2023	35	65	100	A.K. De P.A. Bala P. Perumal
12	**Heat detection and Artificial insemination in pig**	Harminder Bay	04th to 08th December, 2023	35	65	100	P. Perumal, A.K. De P.A. Bala

S. No.	Technology	Venue	Date	Number of participants			Coordinators
				M	F	T	
13	**Demonstration on Control of Iron deficiency anaemia in piglets**	Harminder Bay	07th December, 2023	35	65	100	A.K. De P.A. Bala P. Perumal

M- Male, F- Female, T-Total

(v) Kitchen garden/ demonstration block/ nursery development

S. No.	Particulars	Venue
1	**Kitchen garden**	G H S S, Minicoy
2	**IFS demonstration cum kitchen garden**	Farmers field (Smt. Aneesa Hinavage), Minicoy
3	**Kitchen garden**	JNV, Minicoy
4	**Kitchen garden**	Backyard of Shri. Shahid Kunnuge, Minicoy
5	**Kitchen garden**	Backyard of Smt. AyshommaBeegum, Minicoy
6	**Nursery development in G H SS Minicoy**	G H S S, Minicoy
7	**Nursery development in Demonstration Farm of ICAR-CIARI (3 Nos.)**	ICAR-CIARI, RS Minicoy
8	**Demonstration block (Total 8; Millets, Cold season Vegetables, Tomato, Poultry, Goat, Marigold, Cosmos, Chilly, Fodder grass)**	ICAR-CIARI, RS Minicoy

(vi) Exposure visits for tribal farmers

S. No.	Exposure visit with target group	Venue	Number of participants		
			Male	Female	Total
1	**Visits of tribal village Fallisseri to Poultry farm demonstration Unit of ICAR- CIARI**	ICAR-CIARI, Regional Station, Minicoy	22	80	102
2	**Visits of tribal farmers of Minicoy Islands demonstration Unit (goat) of ICAR-CIARI**	ICAR-CIARI, Regional Station, Minicoy	13	7	20

Training Programme cum Exposure Visit on Agriculture and Allied Sectors for the Tribal Captains of Nicobar Islands

Capacity building programmes on livestock and poultry production

Distribution of fishing nets

Plate 41. Glimpses of training

6. Women Participation (SC/ST)

Sl no	Sector	Number of women farmers beneficiaries (ST)
1	**Animal Science**	155
2	**Horticulture**	376
3	**NRM**	163
4	**Fisheries**	53

7. Technologies Developed and Commerciaized

7.1 Technology Developed

Name of the Technology: Modified stem-cut air layering method for propagation of Andaman padauk

Scientists Involved: I. Jaisankar, B.A. Jerard and A. Velmurugan

To assess the appropriate vegetative propagation techniques to obtain true-to-type planting material and to standardize the suitable media composition, aunique modified stem-cut air layering method for propagation of Andaman padauk was developed. For this purpose, around 2 cm of bark in juvenile branches of 1 to 2 cm diameter was removed. As per the experimental design, 5 ml of IBA 2,000 ppm concentration was sprayed in the exchange region and wrapped with approximately 100 g of decomposed coir dust + top soil. In addition to this routine air-layering method, a modified stem-cut method was adopted, wherein, after removing the bark, the branch was split upwards for a length of 7.5 to 10 cm and the whole cut split was dipped in a test tube containing IBA 2,000 ppm. The treated split portion along with test tube was wrapped tightly in a black polythene sheet for callus development. After five days, the test tube was removed carefully without damaging the callus and again the layer was bound with top soil + decomposed coir dust. The top soil used in the air-layering experiment was collected from the natural forest floor. Similarly, coir dust is a leftover dusty material after fiber extraction from coconut husk. These substrates were moistened with deionized water during implantation for easy handling. When roots were visible through the transparent polythene sheet, the air layers were detached from the mother plant just below the girdle and the number of roots was counted. Then the rooted air layers were transplanted in polythene bags filled with growth medium containing sand, soil, and farmyard manure in equal proportions and kept under shade for one week and watered regularly until the root system became well established. The modified stem cut air layers sprayed with IBA 2,000 ppm and bound with top soil and decomposed coir dust required the significantly shortest time to root (11 days), showed the highest rooting percentage (89.2%), largest number of primary roots (8.6), longest root (17.5 cm), largest proportion with secondary roots (82.8%), and largest number of bud sprouts (5.7) and branches (4.9). From the modified stem cut air layering method the rooting time will be reduced, increasing the rooting percentage and survival percent of the plants. More lateral roots will be used to hold the larger area top soil while planting these air layered plants in the field. Production time of the nursery potting mixture requirement also reduced by 30%.The modified stem cut air layering method is efficient to produce more number of air layers in a short span of time with true to type padauk planting material.a- branch split upwards for 3-5 inches; b- whole cut split dipped into a test tube containing water and IBA, and tightly wrapped with polythene sheets; c- callus formed splits; d- rooting media applied and wrapped tightly with

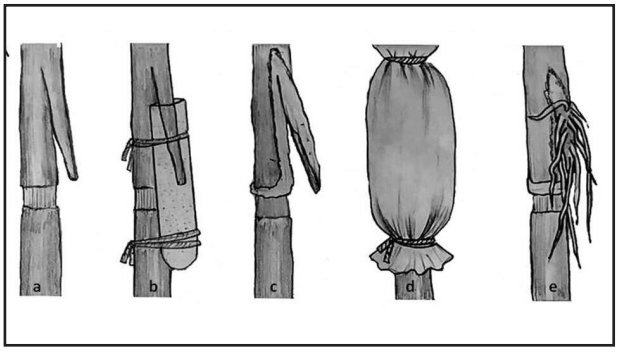


Plate 42. Modified stem cut method of air layering

transparent polythene sheet; e- rooting observed in the split branches

7.2 Technologies certified by ICAR

7.2.1 Dweep tickure : Herbal acaricide for control of tick infestation in livestock. Developed by Dr. Jai Sunder, Dr. T. Sujatha, Dr. A.K. De and Dr. D. Bhattacharya and Dr. E.B.Chakurkar.

7.2.2 Nursery protocol for endemic wild banana: Developed by Dr. Pooja Bohra and Dr. Ajit Arun Waman

7.2.3 Concept of Mini incubator for rural poultry Tecnology: Developed by Dr. T. Sujatha, Dr. Jai Sunder, Dr. Shardul Vikram Lal and Dr. E.B. Chakurkar.

7.2.4 DweepGau Maa Rakshak for Humpsore: Developed by Dr. P. Perumal & Dr. A.K. De

7.3 Technologies commercialized

Dweep Larval Rearing Technology for Fancy Guppy Fish

ICAR-Central Island Agricultural Research Institute (ICAR-CIARI), Port Blair, Andaman & Nicobar Islands signed the Memorandum of Agreement (MoA) with Miss. Megha Ram, School Line, Port Blair, South Andaman on 7th July 2023 for the commercialization of Dweep Larval Rearing Technology for Fancy Guppy Fish.The technology was developed by ICAR-CIARI under Island conditions for the commercial production of fancy guppy fish through interventions in feeding protocols, culture water preparation, disease management, etc. The technology was developed under the overall guidance of Dr. Eaknath B. Chakurkar, Director, ICAR-CIARI, Port Blair and the scientific team comprising Dr. J. Praveenraj,

Plate 43. Commercialization of dweep larval rearing technology for fancy guppy fish

Dr. K. Saravanan, and Dr. R. Kiruba Sankar, Scientists of ICAR-CIARI, Port Blair.

7.4 Patents granted

7.4.1 First Patent granted to ICAR-CIARI, Port Blair for developing NOVEL ACARICIDE

ICAR - Central Island Agricultural Research Institute, Port Blair receives patent for an invention entitled "Novel acaricide compositions for veterinary topical applications and the method of preparation there of" under Patents Act, 1970 (Patent No: 455756) on 29th September, 2023. The invention is a process for developing oil based herbal topical formulation as an acaricide to treat tick infestation in livestock. A team consists of Dr. Jai Sunder, Dr. T. Sujatha, Dr. A. Kundu, Dr. M.S. Kundu and Dr. S.D. Roy.

7.4.2 Patent granted for dual Procedure for Preparation of Liquid Fertilizer and Calcium Alginate (Phyco-Colloid) from Brown Seaweed

A procedure has been developed for extraction of calcium alginate and liquid fertlizers from brown seaweed. A team consisting of Dr. T.P. Swarnam, Dr. A. Velmurugan and Dr. T. Subramani developed the technology

7.4.3 Design patent granted for developing parasitic egg concentrator

Design patent has been granted in veterinary parasitological appliance named Parasite Egg Concentrator. The invention is unique as this egg concentrator reduces the use of plastic ware by 71.42 percent and chance of exposure of laboratory personnel. It is also useful for Sheather's sucrose flotation, saturated salt solution, zinc sulphate floatation and formol ether concentration technique and showed 100% sensitivity and specificity. This appliance is useful for field level application. The developer team consisted of Dr. Debasis Bhattacharya, Dr. Zachariah George, Dr. Arun Kumar De, Dr. P. Perumal, Dr. T. Sujatha, Dr. Jai Sunder and Dr. E.B. Chakurkar.

7.4.4 Design patent granted for developing coconut leaf separator

This patent is granted for a tool which helps to separate coconut leaf mid rib on 30th October, 2023. This tool is very handy, efficient, and labor-saving, for removing the midrib from coconut leaflets. Using this tool, one can separate at least 500 midribs per hour. Moreover, the midribs obtained through this tool are comparatively cleaner than the traditional method. A team consists of Dr. I. Jaisankar, Dr. B. Augustine Jerard, Dr. E.B. Chakurkar and Dr. T. Subramani developed the tool.

7.4.5 Registration of three animal breeds

Andamani goat, Andamani pig, and Andamani duck have been recognised as new breeds in India by the Indian Council of Agricultural Research-National Bureau of Animal Genetic Resources, Karnal, Haryana on 05th December, 2023.

Plate 44. Registration of three animal breeds

7.5 Seeds & Planting Material

Crops	Variety	Category	Quantity (Nos. / Kg)
Rice (*Oryza sativa* L.)	CARI Dhan 1	Breeder seed	2.5 kg
Rice (*Oryza sativa* L.)	CARI Dhan 2	Breeder seed	9.0 kg
Rice (*Oryza sativa* L.)	CARI Dhan 3	Breeder seed	11.0 kg
Rice (*Oryza sativa* L.)	CARI Dhan 4	Breeder seed	43.0 kg
Rice (*Oryza sativa* L.)	CARI Dhan 5	Breeder seed	97.0 kg
Rice (*Oryza sativa* L.)	CARI Dhan 6	Breeder seed	99.0 kg
Rice (*Oryza sativa* L.)	CARI Dhan 7	Breeder seed	91.0 kg
Rice (*Oryza sativa* L.)	CARI Dhan 8	Breeder seed	15.0 kg
Rice (*Oryza sativa* L.)	CARI Dhan 9	Breeder seed	05.0 kg
Rice (*Oryza sativa* L.)	ANR 40 (CARI Dhan 10)	Breeder seed	65.0 kg
Rice (*Oryza sativa* L.)	ANR 47 (CARI Dhan 11)	Breeder seed	84.0 kg
Mung (*Vigna radiata* L.)	CARI Mung 1	Breeder seed	16.0 kg
Mung (*Vigna radiata* L.)	CARI Mung 2	Breeder seed	12.5 kg
Mung (*Vigna radiata* L.)	CARI Mung 3	Breeder seed	52.0 kg
Mung (*Vigna radiata* L.)	CARI Mung 4	Breeder seed	20.0 kg
Mung (*Vigna radiata* L.)	CARI Mung 5	Breeder seed	9.0 kg
Urd (*Vigna mungo* L.)	CARI Urd 1	Breeder seed	31.0 kg
Urd (*Vigna mungo* L.)	CARI Urd 2	Breeder seed	8.5 kg
Brinjal (*Solanum melongena* L.)	CARI Brinjal 1	TFL seed	0.25 kg
Brinjal (*Solanum melongena* L.)	CARI Brinjal 2	TFL seed	0.50 kg
Rice (*Oryza sativa* L.)	CARI Dhan 5	TFL seed	538.0 kg
Rice (*Oryza sativa* L.)	CARI Dhan 6	TFL seed	529.0 kg
Rice (*Oryza sativa* L.)	CARI Dhan 7	TFL seed	1057.0 kg
Rice (*Oryza sativa* L.)	ANR 40 (CARI Dhan 10)	TFL seed	474.0 kg
Rice (*Oryza sativa* L.)	ANR 47 (CARI Dhan 11)	TFL seed	395.0 kg
Rice (*Oryza sativa* L.)	Gayatri	TFL seed	1007.0 kg
Mung (*Vigna radiata* L.)	CARI Mung 1	TFL seed	30.0 kg
Mung (*Vigna radiata* L.)	CARI Mung 2	TFL seed	52.0 kg
Mung (*Vigna radiata* L.)	CARI Mung 3	TFL seed	60.0 kg
Urd (*Vigna mungo* L.)	CARI Urd 1	TFL seed	100.0 kg
Urd (*Vigna mungo* L.)	CARI Urd 2	TFL seed	48.0 kg
Kewri (*Pandanus tectorius*)	Local collection	-	35 nos.
Kewda (*Pandanus lerum*)	Local collection	-	32 nos.
Sword Bean (*Canavalia Gladiata*)	Local collection	-	30 nos.
Ludai (*Sapium Buccatum*)	Local collection	-	120 nos.
Beedi leaf (*Bauhinia* sp.)	Local collection	-	100 nos.
Noni (*Morinda Citrifolia*)	CIARI Dweep Sampada	-	90 nos.
Arecanut (*Areca catechu*)	Samrudhi, Mangala	Seedling	4475 nos.

Crops	Variety	Category	Quantity (Nos. / Kg)
Coconut *(Cocos nucifera)*	CIARI Annapurna, AOT, AGD, AOD	Seedling	730 nos.
Acerola (*Malpighia glabra)*	IC-371804	Rooted cutting	1300 nos.
Passion fruit (*Passiflora edulis)*		Seedling	378 nos.
Andaman Kokum (*Garcinia dhanikhariensis)*	Identified collections	Seedling	1613 nos.
Malabar Tamarind (*Garcinia gummi-gutta)*	GG-01 and GG-05	Grafts	95 nos.
Malabar Tamarind (*Garcinia gummi-gutta)*	Identified collections (seedlings)	Seedling	1738 nos.
Kydia mangosteen (*Garcinia kydia)*	Identified collections	Seedling	169 nos.
Mysore gamboge (*Garcinia xanthochymus)*	Identified collections	Seedling	75 nos.
Surinam cherry (*Eugenia uniflora)*	-	Rooted cutting	214 nos.
Khatta phal (*Baccaurea ramiflora)*	Local	Seedling	1373 nos.
Malayan apple (*Syzygium malaccense)*	Local	Seedling	390 nos.
Watery rose apple (*Syzygium aqueum)*	WRA/ND-1	Air layers	35 nos.
Bael (*Aegle marmelos)*	-	Seedling	311 nos.
Turmeric *(Curcuma longa)*	-	Rhizome	335 kg
Ginger (*Zingiber officinale)*	Jorhat	Rhizome	192 kg
Mango ginger (*Curcuma mangga)*	IC-0628643	Rhizome	85 kg
Clove *(Syzygium aromaticum)*	Identified superior types	Seedling	300 nos.
Cinnamon *(Cinnamomum verum)*	Konkan Tej, YCD-1, local selections	Air layers & Seedling	7064 nos.
Tejpat *(Cinnamomum tamala)*	Ct/CKT	Rooted cutting	250 nos.
Black pepper (*Piper nigrum)*	Panniyur-2	Rooted cutting	8366 nos.
Long pepper *(Piper longum)*	Viswam	Rooted cutting	536 nos.
Pipali (*Piper sarmentosum)*	PS/CIARI	Rooted cutting	502 nos.
Woody pepper *(Piper pendulispicum)*	WP/LM	Rooted cutting	186 nos.
Lemongrass *(Cymbopogon flexuosus)*	OD-19	Slips	1099 nos.
Medicinal plants (Coleus, Pattharchoor, Aloe, Kalmegh etc.)	Coleus, Pattharchoor, Aloe, Kalmegh etc.	Rooted cutting	529 nos.
Breadnut *(Artocarpus camansi)*	-	-	214 nos.
Jackfruit *(Artocarpus heterophyllus)*	-	-	267 nos.

Crops	Variety	Category	Quantity (Nos. / Kg)
Mountain sweet thorn *(Flacourtia montana)*	-	-	110 nos.
Brinjal *(Solanum melongena)*	CARI-B1	Seedlings	2500 nos.
	CARI-B2		1500 nos.
	Arka Anand		3000 nos.
Chilli *(Capsicum anuum)*	Arka Meghna	Seedlings	650 nos.
	Arka Khayati		900 nos.
	Arka Tejasvi		550 nos.
	Local Varieties		850 nos.
Tomato *(Solanum lycoperiscum)*	Arka Rakshak	Seedlings	1100 nos.
	Arka Samrat		500 nos.
	Arka Abhed		400 nos.
Arecanut Seedling	Mangala & Samrudhi	Seedlings	3370 nos.
Coconut Seedling	Dwarf Yellow, Orange & Green	Seedlings	250 nos.
Fish Feeds	Dweep-Carp Grower Feed and Dweep- Carp Starter Feed	-	1450 kg
Crabs	Mud crabs	-	35 kg
Fishes	*Betta splendens* (Betta fish) - White half-moon, Giant betta, HMPK betta	-	900 nos.

8. Success Stories

Success Story 1

Economic improvement of farmer by adopting the Tri-model Therapeutic Methodology (*Gau Maa Humpsore Rakshak*) to treat humpsore in dairy cow

Mrs. Champa Rani Das,Village: New Wandoor, South Andaman, Mobile: 9476028510

Situation analysis - Mrs. Champa Rani Das, aged 37 years, is a progressive, innovative and scientific dairy farmer since last 5 years. She initiated her dairy farm with 2 cows and presently she has 14 dairy cattle of different crossbred of HF, Jersey and Gir. She is selling 10-15 L of milk per day with revenue generation of Rs.15000-20000 per months. She follows scientific managemental practices for dairy farm. However, she suffered production and reproduction losses due to humpsore in dairy cattle. Almost 40% of cattle suffered from humpsore with multiple locations of the body and the size of the sore varied from few cm to more than 12 cm. Age of affected animals were 2-9 years and the humpsore persisted for more than 8 years. Symptoms like pruritus, loss of hair, exudation, ulceration and incrustation in the sore were noticed in the humposore affected animals. She attempted to treat the humpsore with various treatment protocols from locally and traditionally prepared medicines to commercial ointments; but failed. Finally, she approached Scientists, ICAR-CIARI, to treat humpsore.

Impact of technology adoption - With technical support and therapeutic management of humpsore with the tri-model therapy, the health, production and reproduction performances of dairy cattle were improved. The success rate of the treatment was 95%. Milk yield was increased in 85% of treated animals. Induction to heat was observed in 80% animals which conceived in the first attempt. The ugly looking skin on animals disappeared and value of the animals was increased.

Technology Interventions -Dweep Gau Ma hump sore treatment protocol technology was demonstrated. She was given training and provided al the technical support from the ICAR-CIARI.

Income generation - She has gained higher revenue and profit from dairy farm. The revenue has been increased from Rs.20,000/- to 25,000/- per month.

Contributors: P. Perumal, A. K. De, Jai Sunder, and D. Bhattacharya

Success story - 2

Transition of Rural poultry rearing into venture of rural poultry integration

Smti. Sheela Mazumdar, Nimbudera, North and Middle Andaman

Situation analysis - The concept of rural poultry integration was beyond imagination until the introduction of mini-incubators in rural poultry farming. Smti. Sheela Mazumdar has shown the possibility for rural poultry integration in the remotely located village of Nimbudera, N&M Andaman.

Technology Interventions - SScientists of the ICAR-CIARI adopted Smti. Sheela Mazumdar under DBT-BIOTECH KISAN HUB in 2022. A mini-incubator field unit (240 egg capacity) was established. All the technical knowledge on the operation of the mini-incubator was given to her. She collected desi eggs from other farmers, hatched them, and distributed chicks to other farmers through backward and forward linkage. Experiencing a huge demand for chicks of rural

poultry, innovative extension work "Farming of rural poultry integration" was implemented. Under this strategy, rural chicks, after hatching, were supplied to farmers at no cost for rearing. Thirty-five percent sharing of marketable desi birds (body weight: 1.5 kg) was done between her and the farmer who reared them till market age. This strategy was formulated to intensify scientific rural poultry farming and to provide a stable marketing window for desi birds to farmers and to consumers as well.

Impact of technology adoption - WWith the technical support of the ICAR-CIARI, she started using a mini-incubator for hatching rural chicks, and gradually she became well versed in the technical aspects of the mini-incubator. She is getting desi chicks with hatchability percentage above 70%. She implemented the strategy "RURAL POULTRY INTEGRATION" by providing the desi chicks (30 chicks) at no cost to farmers along with one kg of poultry feed sufficient for the brooding period, with the agreement that the farmer has to give back 10 numbers of adult marketable desi poultry, i.e., around 1.5 kg body weight of each bird. Now she has extended the strategy to 25 farmers.

Income generation - She is earning net monthly income of Rs 10500.

Contributors - T. Sujatha, Jai Sunder, Y. Ramakrishna

Success story - 3

Self-sustaining Quail Entrepreneurship Model

Mrs. Meenakshi, Village: Indiranagar, Phone: 9474209785, Family size: Total land area/ number of livestock/ crop area/ etc.. 1-1.5 acre.

Situation analysis - Mrs. Meenakshi, showed interest in quail farming when the NABARD-funded project on quail farming was initiated in 2021. After the three-day training on quail farming and with the input support of hatchable quail eggs, she initiated quail farming. Motivated by the better profit output, she constructed cages for rearing quails. Started with a one-cage system, now changed to multi-tier cages with the capacity to accommodate 300 adults and 500 chicks. Technical support and guidance were obtained from the scientists of ICAR-CIARI. Now, she regularly sells the chicks and eggs in Sunday Market, Chouldari, South Andaman, and also to other customers. She is maintaining a flock size of 150-200 adult birds.

Technology Interventions - Scientists of ICAR-CIARI provided training and technical guidance viz. scientific methods of brooding, breeding, feeding, management, cage making, etc. Inputs such as fertile eggs were given in the early phase of her venture. The marketing support via the WhatsApp groups was given. Also, the mini-incubator provided under the DBT-Kisan Biotech program of ICAR-CIARI gave a real boost since artificial quail egg incubation is essential.

Impact of technology adoption - She learned the rearing of quail with less than <5-10% mortality in the chickhood stage is very important. She gave inverter connectivity for this purpose in the brooder stage. Using the scientific methods of quail rearing, she got 65-70% efficiency in egg production and 190-220 g body weight in the marketable age of 6 weeks. Through the multi-tire cage system, three times more quails are reared in the same floor space. Further, the use of a Mini-incubator makes her entrepreneurship self-sustaining by hatching quail eggs. She got many customers through WhatsApp groups and is capable of selling regularly in the Sunday market and making a good profit.

Income generation - Through the regular sale of

chicks @ Rs.70/ bird and eggs @ Rs.4 in Sunday Market, Chouldari, and to other customers, she is earning a net profit of Rs 10000-12000/- per month.

Contributors - R.R Alyethodi, T. Sujatha, Jai Sunder and P.A Bala

Success story - 4

Roof Top Gardening in Minicoy Islands, Lakshadweep

Shri. Mohammed Manikfan Furakkad, Minicoy Island, Lakshadweep

He loves planting and other agricultural activities since childhood. He was very dedicated towards his work and very often visit ICAR-CIARI, RS, Minicoy for purchasing vegetable seedlings. When ICAR-CIARI scientific team visited him and conducted a detailed study and encouraged him to go for Terrace Cultivation with minimal number of crops with his taste. He started roof top gardening in an area of 90 sqm. He started growing vegetables and fruits viz. chilli, brinjal, okra, tomato, sponge gourd, ivy gourd, pumpkin, water melon, passion fruit and mint. He maintained 80 bags of chilli along with other vegetables. Weekly he used to harvest nearly 5-6 kg of chilli and distribute/sale to his neighbors and fellow beings. Scientists of the ICAR-CIARI provided all the technical guidance regarding scientific cultivation and management practices including pest and disease management, bio fertilizers preparation and so on. With the technical support of the ICAR-CIARI, knowledge regarding the preparation of bio-fertilizers like bio-slurry and fish amino acid boosted his cultivation and fetched additional income for his family and his is looking forward to enhance the area in an advanced manner. A revenue of nearly Rs.15000/- was generated.

Contributors - Y. Gladston, S.M. Ajina and S.K. Zamir Ahmed

9. Information on other Section

9.1 Priority Setting, Monitoring and Evaluation (PME) Cell

PME Cell is involved in compilation and submission of various reports viz. Institute Annual Report, DARE/ICAR Report, 12 points report, cabinet monthly report, newsletter, ARMS, replies to parliamentary questions, SFC of the institute, annual plan of the institute etc. Besides, the cell is also conducting Institute Research Council (IRC) meeting, PMEC meeting, Institute Germplasm Identification Committee meeting, Award screening committee meeting, Publication Review Committee meeting etc. The PME cell also maintains repository of RPFs/RPPs of the Institute funded projects along with the annual reports.

The XVI Institute Research Council of ICAR-Central Island Agricultural Research Institute, Port Blair, was held from May 31 to June 2, 2023, under the chairmanship of Dr. E. B. Chakurkar, Director, ICAR-CIARI, Port Blair. All the scientists of the institute attended the meeting and presented the progress of ongoing projects. A total of 31 ongoing projects and 5 new institute-funded projects were discussed and reviewed during the meeting. The monitoring of externally funded projects was also conducted on June 2, 2023. The Field Institute Research Council meeting was held from 5th to 7th September, 2023, and on 26th October, 2023. All the scientists of the institute visited experimental plots, laboratories and explained the progress of the ongoing projects.

Study circle has been started under the Chairmanship of Director, ICAR-CIARI, Port Blair with a main objective to discuss various scientific issues such as discussion and refinement of research articles, presentation of research papers in the conference/seminar, presentation of latest scientific research and development by the scientists. Important documents of the Institute *viz*., annual report, Cabinet, 12 points, reply to parliament queries, along with publishing of research articles, technical bulletins, folders, books, farmer's data base were completed in time frame. The cell also maintains repository of RPFs of the Institute funded projects along with the annual report, bulletins, folders, books and other related publications for ready reference.

9.2 ICAR- CIARI Library

The library of ICAR-CIARI has strengthened the reference books with a total collection of 7137 books and other miscellaneous publications in addition to various journals, databases, technical books and others reference materials. ICAR-CIARI library has started work on KOHA library management system platform with its module facilities. During the period, 1600 books have been updated on the database. Online public access catalogue (OPAC) module has been activated which provides a simple and clear interface for search books in library. The facility at N.T.Singh conference hall of Library is conducive for organizing regular meetings, seminars, workshops and conducting examinations. Library is a member of Consortium for e-Resources in Agriculture (CeRA) which provides research articles of various journals and document delivery request (DDR) is available in CeRA.

9.3 Official Language Cell

The Hindi Cell had conducted Hindi Pakhwada-2023 from 14th September to 28th September, 2023, wherein various programmes

like Essay Competition, Letter writing, noting and drafting, word meaning, quiz competition etc. were organized for the scientists and staff members of ICAR-CIARI to create awareness about the importance of Hindi and maximum usage of Rajbhasha in research and official activities. On this occasion, Dr. Manju Nair, Associate Professor, Dept. of Geography, JNRM College was presentas a Chief Guest. One-day seminar was conducted during the valedictory function of Hindi Pakhwada and Dr. Vyas Mani Tripathi delivered a lecture on the topic "The role and importance of Rajbhasha in the development of farmers and science". On this occasion, the director and the chief guest honoured the winners and participants of various competitions organized during Hindi Pakhwada with cash prizes and certificates.

Plate 45. Celebration of Hindi Pakhwada-2023

Apart from this, Hindi cell submits Quarterly report in the prescribed proforma to council and uploads to Rajbhasha Vibhag website of Ministry of Home Affairs. The Quarterly meeting of Official Language Implementation Commiteee was conducted under the chairmanship of the Director, ICAR-CIARI for effective and maximum usage of Hindi in our Institute. Hindi cell was also involved in translation and typing related works of our institute as and when required. Hindi Cell also monitors proper functioning of *Aajka Shabd* in Library, ATIC Building and office Building.

9.4 Institute Technology Management Unit

During the year 2023, the technology "Dweep larval rearing technology of fancy guppy" was commercialized. Technology certification was done to four technologies *viz*. Nursery protocol for endemic wild banana – *Musa sabuana* (syn. *M. indandamanensis*), Concept of mini incubator to alleviate broodiness in rural poultry production, Dweep tickure andTri-model Therapy Dweep Gau Maa Humpsore Rakshak. An awareness programme on Intellectual property: Women & IP Accelerating Innovation & creativity was organized to tap out the innovative potential of women group for the widest possible range of talents needed to solve the pressing problems facing humanity. Institute Technology Management committee meeting with AGRINNOVATE INDIA LIMITED (AgIn) including interaction with entrepreneurs, price fixation of tick formulation technology, technology valuation of "Parasitic egg concentrator", technology transfer public private interaction meet and techno commercial assessment expert committee meeting (virtual mode) was conducted. Patent was granted to four technologies Novel Acaricide Compositions for Veterinary Topical Applications and the Method of Preparation thereof (Patent No.: 455756), Dual Procedure for Preparation of Liquid Fertilizer And Calcium Alginate (Phyco-Colloid) from Brown Seaweed (Patent No.: 488886), Parasitic Egg Concentrator and coconut mid leaf separator (Industrial Design).

9.5 AKMU

The Agriculture Knowledge Management Unit (AKMU) is dedicated inpromoting the use of ICT-driven technology and disseminating information to all stakeholders in the agriculture and allied sectors. The unit's main focus is on enhancing IT infrastructure at the institute level. Currently, the unit maintains a Local Area Network (LAN) that connects 120 nodes with 120 computers, which are distributed across different divisions and sections using optical fiber and CAT 6 cable. To ensure reliable internet connectivity for staff members to carry out their day-to-day tasks such as e-office work, ERP, and accessing online portals, a dedicated 40 Mbps leased line link has been established. AKMU effectively delivers and showcases various technologies, policies, and activities through its institute website (https://ciari.icar.gov.in) as well as on popular social media platforms such as Facebook (https://www.facebook.com/ICARCIARI/), Twitter (https://twitter.com/CIARIPortblair), and YouTube (https://www.youtube.com/@icar-ciari949). The major activities undertaken by the Agriculture Knowledge Management Unit (AKMU) during this period are as follows:

- Updating of Institute website regularly, which is hosted at ICAR data centre (https://ciari.icar.gov.in).
- Maintaining Desktop and other peripherals and upkeeping Local Area network of entire campus.
- Procure, integrate and install various IT component and Software.
- Manage Audio/ Video presentations at Conference Hall, Auditorium and Director's Committee Room during workshop/ seminar/ lecture.
- Assistance provided to staff to work e-office, ERP, eHRMS,GeM, PFMS, Smart Performance Appraisal Report Recording Online Window (SPARROW).
- Updated research publication to Krishi Portal.
- Maintained Aadhaar Enabled Bio-metric Attendance System (AE-BAS).
- During this period one International conference, one National conference and one workshop were organized in hybrid mode
- Organizing Agricultural Education Day 2022 with the support of the Social Science Section.

9.6 Sports Activities

ICAR-Central Island Agricultural Research Institute (ICAR-CIARI), Port Blair participated in the ICAR Zonal Sports Tournament (Eastern Zone)-2022 held at ICAR-IVRI, Izatnagar during 24th to 27th April, 2023. The zonal sports tournament was attended by the participants from 21 ICAR Research Institutes of Eastern zone. The team ICAR-CIARI was represented in the tournament with the coordination of Mrs. G.V. Kantham as Chief-De-Mission and Mrs. Champa Rani Das as Team Manager.

The sports contingent of ICAR-CIARI secured winner position in table tennis (doubles) and runner-up position in badminton (doubles) by Mrs. G.V. Kantham and Mrs. Champa Rani Das. In addition, Mrs. Champa Rani Das secured runner-up position in carroms and second position in Javelin throw events. Dr. Eaknath B. Chakurkar, Director, ICAR-CIARI along with Dr. Jai Sunder, Chairman, Sports Committee and Dr. K. Saravanan, Member Secretary, Sports Committee of ICAR-CIARI congratulated and felicitated the participants at ICAR-CIARI campus for their excellent performance and sportsmanship spirit shown in the ICAR zonal sports tournament.

Besides, the sports contingent of ICAR-CIARI namely, Mrs. G.V. Kantham and Mrs. Champa

Rani Das participated in the ICAR Inter-Zonal Sports Tournament-2022 held at ICAR-NDRI, Karnal during 9th to 12th September, 2023. In addition, the sports contingent of ICAR-CIARI comprising of five members participated in the ICAR Zonal Sports Tournament (Eastern Zone) - 2023 held at ICAR-NRRI, Cuttack during 13th to 16th December, 2023 with Mr. A. Babuswamy as Chief-De-Mission and Mr. Deep Kumar Mukherjee as Team Manager. The sports contingent of ICAR-CIARI secured winner and runner-up positions in carrom (singles) by Mrs. Champa Rani Das and Mrs. G.V. Kantham, respectively (Fig. 2). The sports committee of ICAR-CIARI under the leadership of Dr. Eaknath B. Chakurkar, Director, ICAR-CIARI along with Dr. Jai Sunder, Chairman, Sports Committee and Dr. K. Saravanan, Member Secretary, Sports Committee of ICAR-CIARI congratulated and felicitated the sports contingent of ICAR-CIARI for their performance in ICAR Zonal Sports Tournament.

Plate 46. Participation of sports contingent of ICAR-CIARI in ICAR Zonal Sports Tournament (Eastern Zone) - 2022 held at ICAR-IVRI, Izatnagar

9.7 Swacch Bharat Abhiyan

Swachhata Hi Sewa (SHS) special campaign 3.0

All the staff of ICAR-CIARI, Port Blair, KVKs staff took the Swachhata pledge. The clean-up activities were initiated at the interior and exterior parts of the central lab premises of ICAR-CIARI, Garacharma campus, residential colony drainage and water harvesting structures. The staff of ICAR-CIARI took up cleaning activities including the removal of trash, and old materials w.e.f., 15.09.2023 to 02.10.2023.

Plate 47. Swachhata campaign

Swachhta Pakhwada during 16th – 31st December, 2023

The swachhta packwada programme was started with the swachhta pledge and all the staff of ICAR-CIARI actively participated the programme w.e.f 16.12.2023. The programme includes the cleaning drive at various parts of the campus as well as the nearby villages and market area. Awareness programmes were conducted at five villages and emphasis was given on the clean and green India concept. Anonline lecture on Wealth from Agro waste was delivered by Dr. Tapan Biswas, Professor, BCKV, Kalyai, West Bengal on 22.12.2023. On 23.12. 2023, ICAR-CIARI, KVKs organised the Kisan Diwas in which around 150 farmers participated and learned the smart agriculture practices, organic waste management, natural farming and scientific cattle management.

Swachhta Awareness at local level was conducted at KVK, Nimbudera at Swadesh Gram Village area and tree seedlings wereplantedand

awareness onswachhta activity was provided. Cleanness drive was done in the public places of Guptapara village and Bathubasti of South Andaman District with the involvement of the residents of the areas.

9.8 PG Cell

Post Graduate Cell has coordinated programmes for 13 students to complete the dissertation work /internship as a part of their degree courses such as B.Sc., M.Sc., B.Tech., M.Tech and Ph.D. Students worked in various fields such as Herbal formulation for livestock, Climate Resilient Agriculture Practices, bio-pesticide, Microbial Resistance study in Animal, processing of spices and under-utilized fruits, plant tissue culture, Micro-propagation, Sea weed, Alternative to antibiotic growth promoters, Genetic diversity of horticultural crops and Disease resistance gene in rice. In addition to this, students were guided for Molecular Laboratory Techniques and Exposure to Agro Enterprises in South and North Andaman. The duration of training/internship varied from 2 to 6 months.

9.9 Central Instrumentation Facility

The centralized laboratory facility of CIARI is equipped with highly sophisticated equipments suitable for conventional and contemporary research work in agriculture and allied sciences. It has sophisticated equipments such as GCMS, fluorescent microscopy, -80 ºC Deep freezer, -20 ºC Deep freezer, Rotary evaporator, Cooling centrifuges, Spectrophotometer, Gel documentation system, Mini protein apparatus, Lyophilizer etc. This year, new equipments such as ELISA Reader and Agarose gel electrophoresis were installed.

9.10 Round up of Institute Activities

ICAR-CIARI Celebrates Republic Day

The 74th Republic Day was celebrated at ICAR-CIARI, Port Blair on January 26, 2023. Dr. E.B. Chakurkar, the Director, proudly raised the national flag in the presence of staff and their families. In his address, he praised the Institute's achievements in the past year, particularly mentioning Dr. A. Velmurugan's appointment as Assistant Director General at ICAR Headquarters. He also commended the Social Science Section for organizing Agriculture Education Day and acknowledged the Regional Station, Minicoy, for their efforts in popularizing CIARI technologies. Dr. Chakurkar highlighted notable breakthroughs like new coconut varieties and animal breeds, as well as technologies successfully commercialized by the Institute.

Plate 48. Republic day celebration

Kisan Mela on Natural Farming at CIARI

A two-day Kisan Mela on "Promoting Natural Farming" was inaugurated on March 16, 2023, at ICAR-CIARI, Port Blair, by Shri. Keshav Chandra, IAS, Chief Secretary of A & N Islands. More than 400 farmers from South, Middle, and North Andaman participated in the mela. The Chief Secretary flagged off a tableau on natural farming and inaugurated the Modern Goat Unit. The Chief Guest praised ICAR-CIARI's technological advancements,

urging dissemination for broader adoption. He emphasised scientific collaboration across the agriculture and animal husbandry sectors and encouraged branding for marketability. Three farmers were honoured for their natural farming achievements. The programme also featured a farmer's quiz and scientist-farmer interactions.

Plate 49. Kisan mela at ICAR-CIARI

Awareness programme on Intellectual Property conducted at ICAR-CIARI, Port Blair

On World Intellectual Property Day, the Institute Technology Management Unit, ICAR-CIARI, Port Blair, held an awareness programme on 26th April, celebrating creativity and innovation, particularly focusing on women's contributions. The event featured insights from five experts showcasing women inventors' "can-do" attitude, covering areas like biofuels from flower waste, rapid fish adulteration detection, intellectual property development, ELISA-based brucellosis control, and horticulture value addition. Dr. T. Sujatha, I/c ITMU, organised the programme with 63 participants, including scientists and officers.

ICAR-CIARI, Port Blair celebrates World Veterinary Day 2023

ICAR-CIARI, Port Blair, organised a one-day workshop on "Scientist-Farmers Interaction to Promote Entrepreneurship in Animal Husbandry Activities" on the eve of "World Veterinary Day 2023" on April 28.2023. Dr. S.D. Kannan, IFS, was the chief guest, along with Dr. K.A. Naveen, Director, DAHVS, A & N Administration, and Smti. Archana Singh, GM, NABARD, Port Blair. Dr. V. Ranganathan, Professor and Head, TANUVAS, delivered a lead lecture. A total of 93 participants, including senior veterinary officers, paravet farmers, progressive farmers, and scientists, have attended the programme.

Plate 50. Celebration of World Veterinary Day 2023

World Environment Day 2023

On June 5, 2023, ICAR-CIARI, Port Blair, observed World Environment Day with the theme "Beat Plastic Pollution" at its Garacharma campus. The director stressed the significance of the day in preserving ecology and advocated for using natural, biodegradable materials over plastic. CIARI has already replaced plastic nursery pots with eco-friendly pandanus or

Plate 52. Celebration of World Environment Day 2023

coconut pots. Additionally, 155 high-yielding coconut varieties were planted during a mass plantation event. ICAR-CIARI's Regional Station in Minicoy, along with the Department of Environment and Forest, organised a plantation drive focusing on "Solutions to Plastic Pollution," including planting moringa and mangrove species. The event aimed to raise awareness and promote environmental conservation.

ICAR-CIARI celebrated its 46th Foundation Day

ICAR-Central Island Agricultural Research Institute, Port Blair, celebrated its 46th Foundation Day on June 23, 2022. Ms. Nandini Paliwal, IAS, Commissioner-cum-Secretary, A&N Administration, was the Chief Guest. Dr. C. Sivaperuman, Officer Incharge, ZSI, Port Blair, and Smti. Archana Singh, GM, NABARD, Port Blair, were guests of honor. Dr. T.V.R.S. Sharma delivered a lecture on "My Experience at CIARI and Its Development for the Andaman and Nicobar Farming Community." Ms. Paliwal highlighted the need for synergy in knowledge, policy, and marketing for sustainable agriculture, advocating for an international symposium. Smti. Archana Singh expressed interest in collaborative programs. Dr. E.B. Chakurkar, Director, ICAR-CIARI, briefed on the Institute's achievements and challenges, emphasising technological advancements and women's contributions. The chief guest and other delegates honoured the awardees in the categories of scientist, administration, technical, skilled supporting, and contractual workers during the occasion.

Plate 52. Celebration of institute foundation day

ICAR-CIARI celebrates 77th Independence Day

ICAR-Central Island Agricultural Research Institute celebrated Independence Day at its main campus with fervour and gaiety. The flag hoisting ceremony was attended by approximately 150 Institute staff and family members. Dr. E.B. Chakurkar, Director, ICAR-CIARI, appreciated the staff's efforts and highlighted the Institute's achievements, including certified technologies like Dweep Tickure and initiatives such as the nursery protocol for endemic wild banana. The Regional Station in Minicoy also participated in Independence Day celebrations and the Har Gar Tiranga campaign under Azadi Ka Amrit Mahotsav.

Plate 53. Celebration of independence day

Kisan Gosthi on “Enhancing Farmers Income Through Advance Agriculture”

Prasar Bharathi Akashvani, Port Blair, and ICAR-CIARI celebrated India’s G-20 Presidency with a Kisan Gosthi on "Enhancing Farmers' Income Through Advanced Agriculture" on August 30, 2023. The event featured expert discussions from

CIARI's team on topics like agro-ecotourism, livestock's role in income enhancement, healthcare's importance in the livestock economy, integrated farming for sustainability, agriculture technologies and start-ups, technology transfer by KVK, freshwater fish farming, and spice value addition. Progressive farmers, entrepreneurs, scientists, and KVK SMS were participated

Plate 54. Celebration of kisan gosthi

Second International Conference ICFPLS-2023 conducted by PISRF & ASA at Port Blair

The Second International Conference on "Prospects and Challenges of Environment and Biological Sciences in Food Production System for Livelihood Security of Farmers (ICFPL-2023)" was jointly organised by Pragati International Scientific Research Foundation (PISRF), Meerut, UP, India, Andaman Science Association (ASA), Port Blair, Andaman & Nicobar Islands, India, in collaboration with ICAR-Central Island Agricultural Research Institute, Port Blair, from September 18th to 20th, 2023. The conference was attended by over 200 delegates from 24 states and 2 UTs. During the inaugural session, Shri. Swatantra Dev Singh, Cabinet Minister of Water Resources, Uttar Pradesh Government, emphasised the importance of such seminars for the farming community's betterment, sharing successful water management experiences from Bundelkhand. Dr. P.L. Patil, Vice Chancellor of the University of Agricultural Sciences (UAS), Dharwad, Karnataka, highlighted farming system approaches, and Shri. Rajeev Choudhary, Director of Agricultural Engineering, Government of Madhya Pradesh, discussed farm mechanization technologies. Dr. E.B. Chakurkar, Director of ICAR-CIARI, emphasised comprehensive deliberations on all agricultural components to boost farmers' income. Dr. Gaya Prasad, Chairman of ICFPLS 2023, praised technology's impact on production and farmer income. The session concluded with awards and the release of the e-copy of the conference's souvenir.

Plate 55. Second International Conference ICFPLS-2023

National Conference on Spices, Aromatic and Medicinal Plants for Economic Prosperity and Ecological Sustainability (SAMPEPES)-2023

The National Conference on Spices, Aromatic, and Medicinal Plants for Economic Prosperity and Ecological Sustainability-2023, jointly organized by ASA, Port Blair, and DASD, Kerala from October 5th to 6th, 2023. Ms. Nandini Paliwal, IAS, was the Chief Guest. In her address, she lauded ICAR-CIARI for showcasing agricultural technology and speakers at the conference. She emphasized the importance of converting research into policies benefiting farmers and promoting economically viable agri-tourism ventures, especially in Andaman. Dr. E.B. Chakurkar, Director, ICAR-CIARI highlighted

spices national significance and anticipated the conference's recommendations to uplift spice farmers and contribute to national revenue. Keynote addresses by Dr. Homey Cheriyan and Dr. M. Madhava Naidu enriched discussions on spice potential and technological interventions. The event gathered notable directors, scholars, and around 150 participants.

Plate 56. National Conference on SAMPEPES

Visit of Special Secretary, LPWD to Regional Station, Minicoy

Shri. Sandeep Kumar Mishra, Special Secretary of LPWD & Guardian Officer in Minicoy, visited ICAR-CIARI Regional Station, Minicoy farm on October 31st, 2023, accompanied by Dr. Rahul Rathod, Deputy Collector of Minicoy. They praised the farm's technological advancements, including the Integrated Farming System model, intercropping, and poultry breeds, ensuring nutritional and economic security for farmers.

Celebration of World Soil Day by ICAR-CIARI, Port Blair

ICAR-CIARI, Port Blair, KVK Sippighat, and Dept. of Agriculture organized a World Soil Day event at Shoal Bay, South Andaman. A total of 219 participants, including farmers, officials, and PRI Members, discussed soil health, organic farming practices, soil conservation, and biofertilizers, emphasizing better crop production. Organic inputs and informational materials were distributed to farmers.

Exposure Visits

Exposure Visit for DIET students to ICAR-CIARI

An educational trip for 120 students and six faculty members from Dr. S. Radhakrishnan DIET, Garacharma, South Andaman, was organized at ICAR-CIARI on February 15, 2023. They were briefed on Integrated Farming Systems, horticulture, animal science, and endemic plant species. Dr. S.K. Zamir Ahmed Principal Scientist & Head I/c, Fisheries Science Division, welcomed them, emphasizing the institute's agricultural role in the Islands and promoting scientific awareness. Students interacted with scientists, expressing gratitude for the knowledge gained and showing interest in future visits.

Plate 57. Exposure Visit for DIET students to ICAR-CIARI

TGCE students visits ICAR-CIARI

An educational trip for 108 B.Ed. first-year students from TGCE, South Andaman, along with six faculty members, took place at ICAR-CIARI on February 23, 2023. They gained practical exposure to integrated farming, animal

science, and horticulture. Dr. S.K. Zamir Ahmed Principal Scientist & Head I/c, Fisheries Science Division, highlighted the institute's role and encouraged scientific awareness among the students. The students were enthusiastic and expressed gratitude for the experience and interaction with scientists.

Plate 58. Exposure Visit for TGCE students to ICAR-CIARI

Exposure visit of college students to Horticulture Plants Propagation Unit of ICAR-CIARI

Fifty B.Sc. students and four faculty members from TGCE, South Andaman visited ICAR-CIARI's Horticulture Plants Propagation Unit on February 24, 2023, for National Science Day. Dr. E.B. Chakurkar, Director, ICAR-CIARI encouraged scientific curiosity and interaction with scientists. Dr. Ajit Arun Waman & Dr. Pooja Bohra showcased practical aspects of endemic fruits, spices, medicinal plants, and tissue culture. The students were engaged and appreciated the experience, coordinated by Dr. S.K. Zamir Ahmed.

Plate 59. Exposure Visit for TGCE students to ICAR-CIARI

10. Awards and Recognition

Name of Person	Award	Awarding Agency
Ajina S.M	Appreciation Certificate	Best Integrated Farming System (IFS) activities in Minicoy Islands from ICAR-CIARI, Port Blair.
	Best Oral Presentation Award	Second International Conference on prospects and challenges of environment and biological sciences in the food production system for livelihood security of farmers (ICFPLS-2023) held at ICAR-CIARI, Port Blair during 18 to 20 September, 2023.
Ajit Arun Waman	Best Oral Presentation Award (First)	International Seminar on Exotic and Underutilized Horticultural Crops: Priorities and Emerging Trends (ISEUHC-2023) held at ICAR-IIHR, Bengaluru.
	Subject Editor	Vegetos, Springer Nature.
	Editor	Current Agriculture Research Journal, Enviro Research Publishers.
	Subject Editor	Journal of the Andaman Science Association.
	Organizing Secretary	National Conference on Spices, Aromatic and Medicinal Plants for Economic Prosperity and Ecological Sustainability (SAMPEPES-2023).
Ajit Arun Waman and Pooja Bohra	Best Experimental Field Award for *Garcinia* Germplasm Block for the year 2022-23	ICAR-CIARI, Port Blair.
Ajit Arun Waman and Pooja Bohra	Best Working Laboratory Award for Plant Tissue Culture Laboratory for the year 2022-23	ICAR-CIARI, Port Blair.
A.K. De	Second Prize in Extempore Competition (in Hindi) during HindiFortnight - 2023	ICAR-CIARI, Port Blair.
	Invited Lead Lecture	Institutional Development Plan (National Agricultural Higher Education Project) held during 14 to 15 July, 2023 at Guru Anand Dev Veterinary and Animal Sciences University, Ludhiana, Punjab.

Name of Person	Award	Awarding Agency
A.K. De	Invited Lead Lecture	XXIV National Training Programme on "Application of diagnostic tools for Parasitic Diseases of Veterinary and Public Health Importance" held on 15 January, 2023 at Centre of Advanced Faculty Training in Veterinary Parasitology, Karnataka Veterinary, Animal and Fisheries Science University, Bidar.
	Peer Reviewer	Animal Biotechnology, Animals, Veterinary Sciences, Antibiotics, Marine Drugs, Small Ruminant Research, Indian Journal of Animal Sciences.
A.K. De **P. Perumal**	Fellow Award	Pragati International Scientific Research Foundation (PISRF), Meerut, Uttar Pradesh.
A.K. De **P. Perumal** **Jai Sunder**	Best Poster Presentation Award	Second International Conference on prospects and challenges of environment and biological sciences in the food production system for livelihood security of farmers (ICFPLS-2023) held at ICAR-CIARI, Port Blair during 18 to 20 September, 2023.
A.K. De **P. Perumal** **Jai Sunder**	Best Oral Presentation Award	
A.K. De **S. Sawhney** **R. Muthiyan** **D. Bhattacharya** **P. Perumal** **D. Malakar,** **Jai Sunder** **T. Sujatha** **A. Kumar** **S. Mondal** **A.K. Bera** **P.A. Bala** **E.B. Chakurkar**	Best Research Publication Award for the year 2022-23	ICAR-CIARI, Port Blair.
Gladston Y.	Appreciation Certificate	Improvement and facelift of Regional Centre, Minicoy from ICAR-CIARI, Port Blair.
Jai Sunder **R.R. Alyethodi** **P. Perumal**	Appreciation certificate for Best Experimental Unit-Modern Goat Shed	ICAR-CIARI, Port Blair.

Name of Person	Award	Awarding Agency
Jai Sunder	Fellow	Indian Association for Advancement of Veterinary Research.
	Honorary Fellow	Pragati International Scientific Research Foundation, Meerut, Uttar Pradesh.
	Best Cell: PME Cell for the year 2023	ICAR-CIARI, Port Blair.
K. Saravanan	Dr. C.V. Kulkarni Best Young Scientist Award for the year 2022-23	ICAR-CIFE, Mumbai.
	Best Oral Presentation Award	Second International Conference on prospects and challenges of environment and biological sciences in the food production system for livelihood security of farmers (ICFPLS-2023) held at ICAR-CIARI, Port Blair during 18 to 20 September, 2023.
P. Perumal	Best Researcher Award	Sixth International Conference on Veterinary and Livestock organized by Conference Mind during 28 to 29 July, 2023.
	Best Scientist Award	Indian Academy Researchers Association, Tamil Nadu.
P. Perumal **A.K. De**	Commercialization Award for Dweep-Gau Maa Humpsore Rakshak Technology	ICAR-CIARI, Port Blair.
P. Perumal **A.K. De**	Certificate of Technology for *Dweep-Gau Maa Humpsore Rakshak*	Indian Council of Agricultural Research, New Delhi.
P. Perumal **A. K. De** **Jai Sunder** **D. Bhattacharya** **E. B. Chakurkar**	Best Poster Presentation Award	Second International Conference on prospects and challenges of environment and biological sciences in the food production system for livelihood security of farmers (ICFPLS-2023) held at ICAR-CIARI, Port Blair during 18 to 20 September, 2023.
Pooja Bohra **Ajit Arun Waman**	Technology Certificate for Nursery protocol for endemic wild banana *Musa sabuana* (syn. *M.indandamanensis*)	Indian Council of Agricultural Research,, New Delhi.

Name of Person	Award	Awarding Agency
Pooja Bohra	Young Scientist Award (Fruit Science)	Pragati International Scientific Research Foundation, Meerut, Uttar Pradesh.
	Co-organizing Secretary	National Conference on Spices, Aromatic and Medicinal Plants for Economic Prosperity and Ecological Sustainability (SAMPEPES-2023).
	Local Co-organizing Secretary	Second International Conference on prospects and challenges of environment and biological sciences in the food production system for livelihood security of farmers (ICFPLS-2023) held at ICAR-CIARI, Port Blair during 18 to 20 September, 2023.
	Best Oral Presentation Award (Third)	
	Invited Lecture	World Intellectual Property Day- 2023 celebration held at ICAR-CIARI, Port Blairon 26 April, 2023.
	Review Editor	Frontiers in Horticulture.
	Peer Reviewer	Plant Methods, Springer Nature.
R. Jayakumara Varadan	Best Oral Presentation Award	Second International Conference on prospects and challenges of environment and biological sciences in the food production system for livelihood security of farmers (ICFPLS-2023) held at ICAR-CIARI, Port Blair during 18 to 20 September, 2023.
R. Kiruba Sankar	Honourable Lieutenant Governor's Commendation Certificate and Medal	Andaman and Nicobar Administration.
	Appreciation Certificate	Honourable Member of Parliament (Lok Sabha), Andaman and Nicobar Islands.
	Best Research Paper Award 2022	ICAR-CIARI, Port Blair.
R. Kiruba Sankar	Best Oral Presentation Award	Second International Conference on prospects and challenges of environment and biological sciences in the food production system for livelihood security of farmers (ICFPLS-2023) held at ICAR-CIARI, Port Blair during 18 to 20 September, 2023.
	Lead Expert	Aquaculture policy preparation and roadmap development by the Andaman and Nicobar Administration.
R.R. Alyethodi	NABL Accessor (Accessor ID 3286)	NABL (National Accreditation Board for Testing and Calibration Laboratories).

Name of Person	Award	Awarding Agency
R.R. Alyethodi (Team Award)	Patent No. 474562 An in-house built lamp assay for rapid detection of cow components adulterated in buffalo milk/ meat	The Patent Office, Government of India.
	Patent No. 411559 Development of a rapid, user friendly single tube tetra prime PCR based diagnostic assay for detection of bovine leukocyte adhesion deficiency (BLAD) carriers in cattle	The Patent Office, Government of India.
R.R. Alyethodi	Appreciation Award	Tribal Council, Car Nicobar.
	Certificate of Appreciation	Vigilance Awareness Week - 2023 programme held at ICAR-CIARI, Port Blair.
S.K. Zamir Ahmed	Fellow Award	Society of Extension Education, (Agra) awarded at RARI (SKNAU, Jobner), Jaipur during 18-20 December, 2023.
	Best Oral Presentation Award	First International Extension Education Congress on Rural Transformation and Sustainable Agri-food System through Community Based Organisation (CBO) Oriented Extension Strategy held at RARI, Durgapur (SKNAU, Jobner), Jaipur during 18-20 December, 2023.
	Certificate of Appreciation	For serving as the judge in essay competition on the topic "Promising Anti-Corruption Measures for Developed Nation" during Vigilance awareness week - 2023 events held at ICAR-CIARI.
		For serving as the Chairman of technical session during First International Extension Education Congress on Rural Transformation and Sustainable Agri-food System through Community Based Organisation (CBO) Oriented Extension Strategy held at RARI, Durgapur (SKNAU, Jobner), Jaipur during 18-20 December, 2023.

Name of Person	Award	Awarding Agency
S. Sawhney **D. Bhattacharya** **P. Perumal** **J. Sunder** **T. Sujatha** **S. Mondal** **E.B.Chakurkar** **A.K. De** **I. Jaisankar**	Best Oral Presentation Award	Second International Conference on prospects and challenges of environment and biological sciences in the food production system for livelihood security of farmers (ICFPLS-2023) held at ICAR-CIARI, Port Blair during 18 to 20 September, 2023.
T. Sujatha	Women Scientist Award	Pragati International Scientific Research Foundation, Meerut, Uttar Pradesh.
I. Jaisankar	Appreciation letter received from Chairperson.	Tribal council Kamorta, Nicobar District.
	Acted as a reviewer	Journal of Biobased materials and bioenergy
	Received International excellence Award-2023 in the Category of Agroforestry on September 14 -15, 2023	Finura Agro Tech LLP, Coastal Peace & Development (CPD) & Rohini College of Engineering and Technology, Tamilnadu
	Nominated as a Union territory of Andaman and Nicobar Islands Expert Appraisal Committee member for Environment Impact Assessment Authority w.e.f. 22.12.2023	Ministry of Environment, Forest and Climate Change, The Gazette of India, CG-DL-E-23122023-250852

11. Ongoing Research Projects

11.1 External funded

Sl. No.	Title	PI/ CO-PIs	Budget (lakh)	Funding Agency
1	**National Surveillance Programme for Aquatic Animal Diseases (NSPAAD) in Andaman and Nicobar Islands (Second phase) (2022-2025)**	**K. Saravanan** J. Praveenraj R. Kiruba Sankar	53.70	Department of Fisheries, Government of India
2	**Augmenting livelihood, resilience and knowledge generation through coastal fisheries information hub for Nicobari tribes of Car Nicobar Island (2021-2025)**	**R. Kiruba Sankar** D. Karunakaran Sirisha Adamala K. Saravanan, J. Praveenraj	158.0	DST, New Delhi
3	**Establishment of Biotech Kisan Hub (2019-2023)**	**Dr. Jai Sunder** T. Sujatha, D. Bhattacharya A.K. De S.K. Zamir Ahmed R. Jaya Kumara varadan L.B. Singh, Z. George S.V. Lal A.K.O. Rateesh	134.23	DBT, New Delhi
4	**Standardization of freshwater aquariculture practices to promote livelihood and employment opportunities in South Andaman (2022-2024)**	**J. Praveenraj** K. Saravanan, R. Kiruba Sankar	10.0	NABARD, Port Blair
5	**CSS (MIDH) NHM Project on Spices (2022-Continuing)**	**Ajit Arun Waman**	8.85	Directorate of Arecanut and Spices Development, Kozhikode, Kerala
6	**Standardization of agro-techniques and nursery protocol for *Centratherum anthelminticum* (L.) Kuntze ex Gamble. (2023-2025)**	**Ajit Arun Waman** Jishin Prakash T.S.	9.10	Central Council for Research in Ayurvedic Sciences, Ministry of Ayush, GoI, New Delhi

Sl. No.	Title	PI/ CO-PIs	Budget (lakh)	Funding Agency
7	**Integrated Agromet Advisory Services for A&N Islands (2008-2024)**	**T. Subramani** T.P. Swarnam S.K. Zamir Ahmed Jai Sunder P.K. Singh	75.0	IMD, Pune
8	**Monitoring of pesticide residues at national level (2017-2024)**	**T.P. Swarnam** (Jul 2023) **T.Subramani** (Jul-Dec 2023)	15.0	DAC, New Delhi
9	**High value vegetable cultivation and vermicompost production in rainout shelters for doubling farmer's income (2020-2023)**	**T. Subramani** Sirisha Adamala	11.3	NABARD
10	**Development and Standardization of DUS Characteristics Procedures for Noni (*Morinda citrifolia* L.) (2013-2024)**	**I. Jaisankar**	39.50	PPV& FRA, Govt. of India, New Delhi
11	**Mangrove Community Zonation and Biophysical Characterization for Coast of Andaman and Nicobar Islands (2019-2023)**	**I. Jaisankar** Bimal K. Bhattacharya Nikhil Lele	17.75	SAC, ISRO, Govt. of India, Ahmadabad
12	**Bio-prospecting of *Pandanus* sp. (Kewda) of Andaman and Nicobar Islands for its medicinal properties (2021-2024)**	**I. Jaisankar** B.A. Jerard, A.Velmurugan M. Rajkumar R. Jaya Kumaravaradan	32.52	NMPB, Ministry of Ayush, Govt. of India, New Delhi
13	**Third party monitoring report preparation for State CAMPA Projects (2023- Mar- 2023)**	**I. Jaisankar** T. Subramani R. Jaya Kumara Varadan, V. Baskaran	3.75	Department of Environment and Forests, A&N Administration, Port Blair
14	**Consultancy Project on 'Preparation of State Specific Action Plan (SSAP) for Water Sector, Andaman and Nicobar Islands (2019-2024)**	**T. Subramani** Sirisha Adamala B.K. Nanda P.A. Bala I. Jaisankar Y. Gladston	20.01	Andaman & Nicobar State Water & Sanitation Mission (ANSWSM)

Sl. No.	Title	PI/ CO-PIs	Budget (lakh)	Funding Agency
15	**Study on the status of minerals profile in cattle sera, its correlation with infertility and production and development of area specific mineral mixture to augment productivity (2020-2023)**	**Jai Sunder** T. Sujatha P. A. Bala	23.00	RKVY, Andaman and Nicobar Islands
16	**Control of in refugia and in house invasive flies of livestock in organised and unorganized herds of South Andaman District (2022-2024)**	**D. Bhattacharya** Jai Sunder, A. K. De P. Perumal T.Sujatha	11.02	NABARD
17	**Standardization of protocol for genetic improvement of dairy cattle in Andaman and Nicobar Islands, and its linkage to the farmer's income (2022-2024)**	**A. K. De** Ashish Kumar	11.03	NABARD
18	**Promotion of indigenous Kadaknath chicken as backyard poultry farming in South Andaman (2022-2024)**	**K. Muniswamy** T. Sujatha P. Perumal A. K. De Z. George D. Bhattacharya	10.99	NABARD
19	**Augmentation of fertility through controlled breeding programme and artificial insemination in Goat of South Andaman (2022-2024)**	**P. Perumal** A. K. De R. R. Alyethodi Jai Sunder P. A. Bala	11.03	NABARD
20	**Economic Empowerment and nutritional security of women farmers in Andaman & Nicobar Islands through organic mushroom cultivation (2021-2024)**	**N. Bommayasamy** Nitu Sindhu	29.04	DST
21	**Effective rainwater harvesting and utilization through lined tank technology (2021-2024)**	**B.K. Nanda** Y. Ramakrishna N. Bommayasamy Pooja kapoor	10.38	NABARD

11.2 ICAR funded

Sl. No.	Title	PI /Co-PIs	Budget (Lakh)
1	**All India Network Project on Mariculture (2018-2025)**	**R. Kiruba Sankar** J. Praveenraj K. Saravanan Chittaranjan Raul	60
2	**AICRP on Seeds (Crop) (2006 - contd.)**	**P.K. Singh**	75.50
3	**AICRP on Vegetables (2005 - contd.)**	**P.K. Singh**	8.24
4	**AICRP on Palms (2015 - contd.)**	**Ajit Arun Waman**	4.20
5	**AICRP on Fruits (2016 - contd.)**	**K. Abirami**	-
6	**AICRP on Floriculture (2016 - contd.)**	**V. Baskaran**	2.00
7	**AICRP on Tuber crops (2010 - contd.)**	**I. Jaisankar**	7.5
8	**AICRP on Goat Improvement (2014 - contd.)**	**Jai Sunder**	22.00
9	**AICRP on Integrated farming system (2015 - contd.)**	**T.P.Swarnam** (Jul 2023) **T.Subramani** (Jul-Dec 2023)	7.6
10	**AICRP on Pig (2014 - contd.)**	**A. K. De** D. Bhattacharya P. Perumal Jai Sunder P.A. Bala	32.00
11	**National Animal Disease Control Programme onFoot and Mouth Disease (2022 - 2025)**	**Jai Sunder**	8.00
12	**National Animal Disease Epidemiology Network (2022 - 2025)**	**Jai Sunder**	2.00
13	**National Extension Programme (2017 - contd.)**	**S.K. Zamir Ahmed** P.K. Singh Y. Ramakrishna	-
14	**Poultry Seed Project (2014 - contd.)**	**T. Sujatha**	10.0

11.3 Institute funded

Sl. No.	Title	PI	Budget (Lakh)
	Fisheries Science Division		
1	**Prevalence of parasites infecting commercial marine and freshwater fishes of the Andaman Islands (2019-2023)**	**J. Praveenraj** R. Kiruba-Sankar K. Saravanan Y. Gladston	44.3
2	**Mapping the brackish water resources of South Andaman foraquaculture site suitability using GIS approach (2022-2025)**	**R. Kiruba-Sankar** K. Saravanan Sirisha Adamala J. Praveenraj	20.0
3	**Deciphering the in-vitro bioactive potential of selected seaweed species of Andaman Islands and evaluation of its immunomodulatory effect on fish (2022-2025)**	**K. Saravanan** J. Praveenraj R. Kiruba-Sankar	39.0
4	**Development of control & treatment measures for the management of parasitic diseases in freshwater fishes (2023-2026)**	**J. Praveenraj** Chittaranjan Raul Ajit Arun Waman	38.0
5	**Development of Island-based information management system for decision making in agriculture (2022-2026)**	**D. Karunakaran** R. Kirubasankar S.K. Zamir Ahmed	39.0
6	**Opportunities and challenges of sustaining agriculture in south Andaman district of Andaman and Nicobar Islands : perspective (2021-2024)**	**S.K. Zamir Ahmed** Y. Rama Krishna Y. Gladston D. Karunakaran	32.0
7	**Exploration of fishery, biology and market potential of tuna resources of Minicoy Islands (2022-2025)**	**Y. Gladston** S.K. Zamir Ahmed Ajina S.M R., V.M Abdul Gafoor, Chittaranjan Raul	84.50
8	**Integrated Farming System (IFS) for enhancing sustainable Livelihood of rural tribal community of Minicoy Islands (2022-2025)**	**Ajina S.M** S.K. Zamir Ahmed Y. Gladston V.M Abdul Gafoor E. B. Chakurkar	85.50

Sl. No.	Title	PI	Budget (Lakh)
Horticulture Crop Improvement and Protection			
9	**Harnessing variability of multi-parent advance generation intercross(MAGIC) population of rice for genetic improvement (2022-2026)**	**P.K. Singh**	24.00
10	**Collection, conservation, evaluation and agro technique standardization of native and commercial ornamental crops (2021-2023)**	**V. Baskaran** K. Abirami T. Subramani S.K..Zamir Ahmed	61.38
11	**Collection, conservation and evaluation of commercial fruit crops of Andaman and Nicobar Islands (2018-2023)**	**K. Abirami** V. Baskaran	40.00
12	**Identification and characterization of superior germplasm of cinnamon, tejpat and long pepper under Bay Islands condition (2021-2026)**	**Ajit Arun Waman** Pooja Bohra	49.25
13	**Conservation, bioprospection and utilization of selected underutilized fruit species of Bay Islands (2021-2026)**	**Pooja Bohra** Ajit Arun Waman	58.24
Natural Resource Management			
14	**Enriching coconut plantations of Andaman and Nicobar Islands through augmentation of indigenous multipurpose tree resources (2018-2023)**	**I. Jaisankar** B.A. Jerard T. P. Swarnam V. Damodaran	28.94
15	**Evaluation of Andaman Padauk (*Pterocarpus dalbergioides*) based sequential cropping system (2022-2025)**	**I. Jaisankar** B. Augustine Jerard T. P. Swarnam R Jayakumara Varadan T. Subramani	31.50
16	**Study of hydrological response for soil and water conservation in Island ecosystem (2019-2023)**	**Sirisha Adamala**	46.00
17	**Organic farming studies for sustaining productivity of Island cropping systems (2018-2024)**	**T. Subramani**	64.00
18	**Study of hydrological response for soil and water conservation in Island ecosystem (2019-2023)**	**Sirisha Adamala**	46
19	**Management of moisture stress in vegetable cropping system (2021-2023)**	**T. Subramani**	34.3
20	**Valorization of organic wastes for abiotic stress management (2021-2023)**	**T.P. Swarnam**	42.0

Sl. No.	Title	PI	Budget (Lakh)
21	**Development of novel biostimulants for enhancing crop production in island agroecosystem (2021-2023)**	**T.P. Swarnam**	44.5
	Animal Science Division		
22	**Identification of Genome-Wide Molecular Signatures Responsible for Higher Fecundity in Andaman Local Goats (2018-2023)**	**R. R. Alyethodi** Jai Sunder A.K. De P. Perumal P.A. Bala D. Karunakaran	27.00
23	**Evaluation of Hormonal and Biochemical profiles of indigenous boar under abiotic stressors and melatonin intervention for its mitigation (2020-2023)**	**P. Perumal**	34.77
24	**Goat Improvement through assisted reproductive techniques in Andaman and Nicobar Islands (2020-2023)**	**P. Perumal** R. R. Alyethodi A. K. De Jai Sunder D. Bhattacharya	34.14
25	**Probiotics supplementation in pig health and immunity (2020-2023)**	**A.K. De** D. Bhattacharya P. Perumal P.A. Bala	24
26	**Evaluation of traditional knowledge of plants in the management of *Rhipicephalus microplus* in cattle and goat (2022-2025)**	**D. Bhattacharya** T. Sujatha Jai Sunder A. K. De P. Perumal A. A. Waman	25.00
27	**Sorting of X and Y bearing spermatozoa in Rabbit Model (2023-2025)**	**R.R.Alyethodi** P. Perumal	10.00
28	**Evaluation of Serum levels of ERBB2, FGFR1, MAP3K19, GDF9, and IGF1R as goat fecundity biomarkers (2023-2023)**	**R.R.Alyethodi** K Muniswamy	10.00
29	**Studies on the prevalence of antimicrobial resistance in bacteria of zoonotic importance in food chain and environment (2022-2025)**	**Jai Sunder** A. K. De T. Sujatha D. Bhattacharya	7.50
30	**Exploring the transcript variants and expression profile of germ line markers Vasa and Dazl genes in Goat. (2023-2023)**	**K. Muniswamy** R.R. Alyethodi P. Perumal	21.00

Sl. No.	Title	PI	Budget (Lakh)
31	**Mitigation of heat stress of endemic poultry breeds of Andaman and Nicobar Islands under seasonal and climate change scenario (2022-2025)**	**T. Sujatha**	15.50

12. Publications

Research Articles

Adamala, S., Velmurugan, A., Subramani, T., Kumaravaradan, Jaya, R. and Biswas, T.K. (2023). Prediction of annual one day maximum rainfall for Andaman & Nicobar Islands. *Journal of Andaman Science Association*, **27**(1): 8-12. (NAAS Rating: 4.15)

Adamala, S., Velmurugan, A., Kumari, N., Subramani, T., Swarnam, T.P., Damodaran, V. and Srivastava, A. (2023). Application of RMMF based GIS Model for Soil Erosion Assessment in Andaman Ecosystem. *Land*, **12**: 1083. https://doi.org/10.3390/land12051083. (NAAS Rating: 9.92)

Alyethodi, R.R., Sunder, J., Karthik, S., Perumal, P., Muniswamy, K., Sujatha, T. and Bhattacharya, D. (2023). Effect of different parameters on the serum levels of MDA, NBT, and NO in Andaman local goat breeds. *The Indian Journal of Animal Sciences*, **93**(11): 1098-1102.https://doi.org/10.56093/ijans.v93i11.121191. (NAAS Rating: 6.29)

Anandhi, S., Balamurugan, T.C., Prakash Krupakaran, R., Senthamil Pandian, C. and Perumal, P. (2023). Matrix metallo proteinases modulates the semen quality profiles of Kangeyam bull. *Journal of Andaman Science Association,* **28**(2): 210-217. (NAAS Rating: 4.15)

Augustine Jerard, B., Damodaran, V. and Jaisankar, I. (2022). Promising unique accession of arecanut (*Areca catechu*). *Journal of Andaman Science Association*, **27**(2): 224-229. (NAAS Rating: 4.15)

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Bhowmick, S., Pal, S., Sunder, J., Sujatha, T., De, A.K., Mondal, T., Singh, A.D., Joardar, S.N., Batabyal, K., Dutta, T.K., Bandyopadhyay, S., Tiwari, A. and Samanta, I. (2023). Exploring broilers and native fowls of Andaman and Nicobar Islands as a source of β-lactamase-producing *Enterobacteriaceae* even with limited anthropogenic activities and docking-based identification of catalytic domains in novel β-lactamase variants. *Frontiers in Veterinary Science*, **9**: 1075133. https//10.3389/fvets.2022.1075133. (NAAS rating: 9.47)

Bohra, Pooja., Waman, A.A. and Devi, R.K. (2023). Morphological and biochemical attributes of potted acerola as affected by shade conditions. *Erwerbs-Obstbau*, **65**: 1811-1817. https://doi.org/10.1007/s10341-023-00916-6.(NAAS rating: 7.3)

Chamuah, J.K., Awomi, L.T., Talimoa Mollier, R., Singh, M., Aier, M. and Perumal, P. (2023). Haemoparasites of domestic bovines and their diagnostic pattern: A Review. *Biotica Research Today*, **5**(8): 600-605. https// 10.54083/BioResToday/5.8.2023/600-605.

De, A.K., Chakraborty, D., Perumal, P., Sawhney, S., Banik, S., Chakurkar, E.B. and Bhattacharya, D. (2023). Supplementing turmeric rhizome powder in growing Andaman local pigs: a conflated approach for therapy evaluation. *Tropical Animal*

Health and Production, **55**: 45. https://doi.org/10.1007/s11250-023-03459-w. (NAAS Rating: 7.89)

De, A.K., Gupta, S., Perumal, P. and Bhattacharya, D. (2023). Unusual stories of transmission of diseases from plants to animal kingdom: Tale of phytonoses scripted. *Indian Journal of Animal Health,* **62**(2): 1-14. DOI: 10.36062/ijah.2023.spl.00723.

De, A.K., Sawhney, S., Perumal, P., Ramachandran, M., Muniswamy, K., Ravi, S.K., Malakar, M., Alyethodi, R.R., Mondal, S., Jai Sunder, Banik, S., Kundu, A. and Bhattacharya, D. (2023). Maternal lineage of Nicobari pig (*Sus scrofa nicobaricus*) correlated with migration of Nicobarese, a native tribal population of Andaman and Nicobar Islands, India. *Animal Biotechnology*, **34**(2): 156-165. DOI: 10.1080/10495398.2021.1950742. (NAAS Rating: 8.14)

De, A.K., Sawhney, S., Sunder, J., Muthiyan, R., Perumal, P., Sujatha, T., Malakar, D., Mondal, S., Bera, A.K., Kumar, A., Chakurkar, E.B. and Bhattacharya, D. (2023). Peeping into mitochondrial diversity of Andaman goats: unveils possibility of maritime transport with diversified geographic signaling. *Genes,* **14**(4): 784. https://doi.org/10.3390/genes14040784. (NAAS Rating: 10.14)

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Gautam, R.K., Singh, P.K., Venkatesan, K., Rakesh, B., Sakthivel, K., Swain, S., Srikumar, M., Zamir, Ahmed S.K., Devakumar, K., Rao, S.S., Vijayan, J., Ali, S. and Langyan, S. (2023). Harnessing intraparietal variation for agro-morphological and nutritional traits in a popular rice landrace for sustainable food security in tropical islands. *Frontiers in Nutrition*, **10**: 1088208.doi:10.3389/fnut.2023.108820. (NAAS Rating:12.5)

Gautam, R.K., Singh, P.K., Sakthivel, K., Venkatesan, K., Rao, S.S., Srikumar, M., Vijayan, J., Rakesh, B., Ray S., Akhtar, J., Meena, B.R., Langyan, S., Ali, S. and Krishnamurthy, S.L. (2023). Marker assisted enhancement of bacterial blight (*Xanthomona soryzae* pv. *oryzae*) resistance in a salt-tolerant rice variety for sustaining rice production of tropical islands. *Frontiers in Plant Sciences,* **14**: 1221537. doi: 10.3389/fpls.2023.1221537.(NAAS Rating: 12.63)

Giordano, R., Weber, E.P., Mitacek, R., Flores, A., Ledesma, A., De, A.K., Herman, T.K., Soto-Adames, F.N., Hill, C.B. and

Hartman, G.L. (2023). Patterns of asexual reproduction of the soybean aphid, *Aphis glycines* (Matsumura), with and without the secondary symbionts Wolbachia and Arsenophonus, on susceptible and resistant soybean genotypes. *Frontiers in Microbiology*, **14**: 1209595. doi: 10.3389/fmicb.2023.1209595. (NAAS Rating: 12.06)

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Jaisankar, I., Jerard, B.A., Moses, M.E and Simhachalam, P. (2023). Genetic diversity of *Pterocarpus dalbergioides* (Andaman Padauk) accessions of Andaman and Nicobar Islands. *Journal of Andaman Science Association*, **28**(1): 31-39. (NAAS Rating: 4.15)

Jaisankar, I., Varadan, R.J, Adamala, S., Blesy, G.M., Prabu, L.S., Umamaheswari, A. and Ramanan, S.S. (2023). Phytochemical properties and antioxidant activities of *Pandanus amaryllifolius*. *Indian Journal of Agroforestry,* **25**(2): 112-120. (NAAS Rating: 5.19)

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Junghare, V., Alex, R., Baidya, A., Paul, M., Alyethodi, R.R., Sengar, G.S., Kumar, S., Singh, U., Deb, R. and Hazra, S. (2022). In silico modeling revealed new insights into the mechanism of action of enzyme 2'-5'-oligoadenylate synthetase in cattle. *Journal of Biomolecular Structure and Dynamics*, **40**(24): 14013-14026. (NAAS Rating: 11.24)

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Kiruba-Sankar, R., Adamala, S., Barman, J, Saravanan, K., Praveenraj, J., Yuvaraj, E., Kumar, G. and Ahmed, S.K.Z. (2023). Aboriginal tribes' knowledge of the endangered freshwater turtle *Cuoraamboinensis* from Car Nicobar, a remote oceanic island in the Bay of Bengal. *Fishes,* **8**(10): 517. https://doi.org/10.3390/fishes8100517.(NAAS Rating: 9.1)

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Books, Book Chapters, Folders, Bulletins, Training Manuals, Proceedings, Monograph, Policy document

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Technical bulletin

Jaisankar, I., Jerard, B.A., Damodaran, V., Chakurkar, E.B., Byju, G., Subramani, T., Harinivas, A. and Karunakaran, D. (2023). Prospects of Nicobari Aloo (*Dioscorea alata* l.) cultivation in Andaman and Nicobar Islands, Technical Bulletin No. CIARI/05/2023. ICAR-CIARI, Port Blair, India. p. 27.

Folders

Alyethodi, R.R., Sujatha, T., Bala, P.A., Muniswamy, K., Perumal, P., De, A.K.,Kandangal, A.M., Bhattacharya, D. and Jai Sunder. (2023). Quail brooder set up & management. Published by Director, ICAR-CIARI, Port Blair.

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GenBank Accession Number/ registration number etc

Parasite	Host	Attachment site	NCBI GenBank Accession Number	Contributors' name
***Argulus* sp. Andaman**	*Labeo rohita*	Body surface	MZ648451	J. Praveenraj K. Saravanan
***Argulus* sp. Andaman**	*Catla catla*	Body surface	MZ648452	J. Praveenraj K. Saravanan
***Argulus* sp. Andaman**	*Cirrihinus mrigala*	Body surface	MZ042803	J. Praveenraj K. Saravanan
***Argulus* sp. Andaman**	*Catla catla*	Body surface	MZ042802	J. Praveenraj K. Saravanan
Lernaea cyprinacea	*Carassius auratus*	Body surface	OP050160	J. Praveenraj K. Saravanan
Argulus japonicus	*Carassius auratus*	Body surface	OP0501238	J. Praveenraj K. Saravanan
Aphanomyces helicoides	*Catla catla*	Caudal peduncle	ON693466	J. Praveenraj K. Saravanan
***Achlya* sp.**	*Betta splendens*	Body surface	ON693467	J. Praveenraj K. Saravanan

IC number	Scientific name	Common name	Contributors' name
IC - 0647377	*Garcinia dhanikhariensis*	Andaman Kokum	Pooja Bohra Ajit Arun Waman
IC - 0647378	*Garcinia dhanikhariensis*	Andaman Kokum	Pooja Bohra Ajit Arun Waman
IC- 0647379	*Garcinia dhanikhariensis*	Andaman Kokum	Pooja Bohra Ajit Arun Waman
IC- 0647380	*Garcinia dhanikhariensis*	Andaman Kokum	Pooja Bohra Ajit Arun Waman
IC- 0647381	*Garcinia dhanikhariensis*	Andaman Kokum	Pooja Bohra and Ajit Arun Waman
IC- 0647382	*Garcinia dhanikhariensis*	Andaman Kokum	Pooja Bohra and Ajit Arun Waman
IC- 0647383	*Garcinia andamanica*	Burma Phal	Pooja Bohra and Ajit Arun Waman

- B. Augustine Jerard, I. Jaisankar, V. Damodaran, L.B. Singh and S.K. Zamir Ahmed (2023). IC number 0647385 for Roselle (*Hibiscus sabdariffa*) obtained from ICAR-NBPGR, New Delhi.
- B. Augustine Jerard, I. Jaisankar and V. Damodaran (2023). Identified conserved and obtained IC number (0647723) for Wild Okra (*Abelmoschus caillei*) from ICAR-NBPGR, New Delhi.

- I. Jaisankar, T.Subramani and Santhosh Kumar (2023). IC numbers 650659 to 650662 for Greater Yam (*Dioscorea alata*) obtained from ICAR-NBPGR, New Delhi.
- I. Jaisankar, T.Subramani and Santhosh Kumar (2023). IC numbers 650663 to 650665 for Taro (*Colocasia esculenta*) obtained from ICAR-NBPGR, New Delhi.
- I. Jaisankar, T.Subramani and Santhosh Kumar (2023). IC numbers 650666 to 650668 for Kewda (*Pandanus lerum*) obtained from ICAR-NBPGR, New Delhi.
- B. Augustine Jerard andV. Damodaran (2023). Nicobari Aloo (*Dioscorea alata*) IC numbers(0648563 to 0648568, 0648571 to 0648582 & 0648569 & 0648570) obtained from ICAR-NBPGR, New Delhi.

Germplasm registered

- B. Augustine Jerard, V. Damodaran, I.Jaisankar, V. Nirmal and N.R. Nagaraja (2023). Germplasm Andaman Arecanut Dwarf (INGR23064) registered by Plant Germplasm Registration Committee (PGRC) of ICAR.
- I. Jaisankar, D.R. Singh, Shrawan Singh and B.Augustine Jerard (2023). Noni (*Morinda citrifolia*) TRA-1 (CIARI-Samridhi) accession has been registered by Plant Germplasm Registration Committee of Indian Council of Agricultural Research (INGR22093).

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- Gupta, S., Bhattacharya, D. and De, A.K. (2023). Reality of global climate change: hopping foot print of malaria and arbovirus journey. In:Chaudhary *et al*. (Eds.). Souvenir-cum-Abstract Book of 2nd International conference on Prospects and Challenges of Environment and Biological Sciences in Food Production System for Livelihood Security of Farmers (ICFPLS-2023), 18-20 September, 2023 held at ICAR-CIARI, Port Blair, A & N Islands, India.

13 . Participation of Scientists in Conferences/ Seminars/ Symposia/ Meetings & Trainings

Scientist	Programme	Organizer	Date
Jai Sunder D. Bhattacharya T. Sujatha P.A. Bala A.K. De K. Muniswamy, P. Perumal R.R. Alyethodi	Interface meeting with ICAR-NBAGR	ICAR-CIARI and ICAR-NBAGR	8th May, 2023
Jai Sunder D. Bhattacharya T. Sujatha, P. A. Bala A. K. De K. Muniswamy P. Perumal R. R. Alyethodi Ajit Arun Waman Pooja Bohra K. Saravanan J. Praveenraj	Workshop on Sustainable Agro ecotourism for Andaman and Nicobar Islands: Opportunities and Challenges	Andaman Science Association, (ASA), ICAR-CIARI, Port Blair	22nd to 23rd May, 2023
Ajit Arun Waman	Annual Review Meeting of the CSS (MIDH) NHM Project on Spices	ARS, Mandor, Jodhpur, Rajasthan	8th to 9th June, 2023
	Invited technical expert for plant tissue culture laboratory at Organic Horticulture Farm, Sippighat during interaction programme with the Chief Secretary and DGP, ANI	UT Department of Agriculture, Andaman and Nicobar Islands	9th July, 2023
	Annual group meeting of AICRP on Palms Project	HRS, Kahikuchi, Assam	13th to 15th September, 2023
Ajit Arun Waman Pooja Bohra	International Seminar on Exotic and Underutilized Horticultural Crops: Priorities and Emerging Trends (ISEUHC- 2023)	ICAR-IIHR, Bengaluru	17th to 19th October, 2023

Scientist	Programme	Organizer	Date
A.K. De **Sharath S.Yeligar**	Training and Experience Sharing Workshop on Modelling STATA for Agricultural Economics and Policy Research at ICAR-NIAP New Delhi	International Food Policy Research Institute (IFPRI) and ICAR - National Institute for Agricultural Economics and Policy Research	7th to 8th November, 2023
D. Karunakaran **S.K. Zamir Ahmed**	Regional Workshop on Strengthening Medicinal Plant Sector in Andaman & Nicobar Islands	RFCSR, KFRI, ANMPB, CIARI, Department of Agriculture & Department of AYUSH & Department of Forest, A & N Islands	16th February, 2023
Jai Sunder	23rd Indian Veterinary Congress	IAAVR	3rd to 4th February, 2023
	Annual review meeting of national animal disease epidemiology network project	ICAR-NIVEDI	6th to 7th July, 2023
Jai Sunder **D. Bhattacharya** **T. Sujatha** **P. A. Bala** **A. K. De** **K. Muniswamy** **P. Perumal** **R. R. Alyethodi,** **P.K. Singh** **S.K. Zamir Ahmed** **R.Kiruba Sankar** **Ajit Arun Waman** **Pooja Bohra** **K. Saravanan** **J. Praveenraj** **D. Karunakaran**	Second International Conference (ICFPLS-2023) on "Prospects and challenges of environment and biological sciences in food production system for livelihood security of farmers	PISRF, Meerut and ASA, Port Blair from at ICAR-CIARI, Port Blair.	18th to 20th September, 2023

Scientist	Programme	Organizer	Date
K. Muniswamy	National Conference on Advances in Genetics and Genomics for Sustainable Livestock Transformation and XVII Annual Convention of Indian Society of Animal Genetics & Breeding	ICAR-NBAGR, Karnal	16th to 17th , November, 2023
	Genome editing in farm animals for improved productivity and health.	ICAR-NDRI, Karnal	3rd March, 2023
K. Saravanan **J. Praveenraj**	Workshop on Innovative Technologies in Support of a Safe and Sustainable Aquatic Food Supply (One Health Aquaculture Framework)	ICAR-CMFRI, Kochi and CEFAS, UK.	20th to 22nd February, 2023
	Launch Workshop and Sensitization Programme on National Surveillance Programme for Aquatic Animal Diseases, Phase- II	ICAR-NBFGR, Lucknow and Department of Fisheries, Government of India	27th to 28th February, 2023
	Review meeting of National Surveillance Programme for Aquatic Animal Diseases, Phase- II	ICAR-NBFGR, Lucknow and Department of Fisheries, Government of India	1st March, 2023
	3rd International conference on aquatic animal epidemiology (AquaEpi III)	ICAR-NBFGR, Lucknow	29th November, 2023 to 1st December, 2023
N. Bommayasamy	District Level Appraisal Committee Meeting	DC, N & M Andaman	27th April, 2023
P. Perumal	Workshop on Genome editing in farm animals for improved productivity and health	ICAR-National Dairy Research Institute, Karnal	3rd March, 2023
	6th International Conference on Veterinary and Livestock	Conference Mind	28th to 29th July, 2023
	10th International Conference (IARA) on Sustainable development through innovation and technology	Indian Academic Researcher Association, Tamil Nadu	13th August, 2023
	National Conference on Generative AI in Practice for Empowering Agricultural Research Productivity	ICAR-National Research Centre for Grapes, Pune	11th to 12th September, 2023

Scientist	Programme	Organizer	Date
P.K. Singh	Virtual Meeting cum- Preparation on Adopt Implementation of Seed Traceability System	ICAR-IISS, Mau	9th February, 2023
	Virtual Brain storming session on Direct-Seeded Rice - Global Activities and Accomplishments' and research priorities under AICRP on Rice	ICAR-IIRR, Hyderabad	12th April, 2023
	Annual Group Meeting of AICRP on Seed (Crop)held in TNAU, Coimbatore	ICAR-IISS, Mau	9th to 10th May, 2023
	41stAnnual Group Meet of Vegetable Crops	SKUAST-K, Srinagar	3rd to 5th June, 2023
	Meeting to finalize the technical programme of seed production and certification	ICAR-IISS, Mau	19th June, 2023
	Chaired the 59th meeting of Technical Committee of HVADA	Directorate of Agriculture, Haddo, Port Blair	28th July, 2023
Pooja Bohra	Invited lecture for one day workshop on 'Strengthening medicinal plants sector in Andaman and Nicobar Islands'	Kerala Forest Research Institute, Peechi and NMPB, New Delhi	16th February, 2023
R. Kiruba Sankar	AINP Mariculture annual review meeting	ICAR-CMFRI, Kochi	13th March, 2023
	DST Annual review meeting at Madhya Pradesh Bhawan, New Delhi	DST, New Delhi	21st November, 2023
S.K. Zamir Ahmed	Inaugural session on National Apprenticeship Awareness Workshop held at The Lemon Tree Hotel	Department of Training, A & N Administration in association with the Directorate General of Training (DGT), Ministry of Skill Development and Entrepreneurship (MSDE). GoI	27th July, 2023
S.K. Zamir Ahmed R. Kiruba Sankar	16th Agricultural Science Congress (ASC) and Expo	Kochi, Kerala	10th to 13th October, 2023

Scientist	Programme	Organizer	Date
Y. Ramakrishna, P.K. Singh N. Bommayasamy	Scientific Advisory Committee	KVKs, A & N Islands	20th January, 2023
Y. Ramakrishna N. Bommayasamy	Workshop-Cum-Capacity Building Programme of Natural Farming	ICAR-ATARI	15th to 16th February, 2023
Y. Ramakrishna N. Bommayasamy	National Seminar on potential and scope for commercial floriculture in Andaman & Nicobar Islands	NABARD	25th to 26th February, 2023
Y. Ramakrishna K. Saravanan J. Praveenraj Sharath S Yeligar D. Karunakaran P. Prabhu Pooja Kapoor Thanmai Paul	National Conference on Spices, Aromatic and Medicinal Plants for Economic Prosperity and Ecological Sustainability-2023	Andaman Science Association (ASA), Port Blair, Andaman & Nicobar Islands in collaboration with Directorate of Arecanut and Spices Development (DASD), Kerala	5th to 6th October, 2023
I. Jaisankar	A meeting was attended at Vansadan, Haddo, Port Blair regarding the CAMPA third party monitoring project proposal	Department of Environment and Forests, A&N Administartion, Port Blair	10th January, 2023
	Participated workshop on sustainable Agro ecotourism for A&N Islands: Opportunities and challenges	Andaman Science Association with ICAR-CIARI, Port Blair	22nd to 23rd May, 2023
	Participated 2nd International Conference on Prospects and challenges of environment and biological sciences in food production system for livelihood security of farmers (ICFPLS–2023),	Pragati International Scientific Research Foundation (PISRF), Meerut, India, Andaman Science Association (ASA), Port Blair, A & N Islands, India, held at ICAR- CIARI, Port Blair	18th to 20th September, 2023

Scientist	Programme	Organizer	Date
I. Jaisankar	Participated virtual International Conference on Coconut as an Economic & Ecological security in Indian Coastal Managemnt (CEESICM-2K23) held at Rohini College of Engineering and Technology, Kanyakumari District, Tamilnadu	Finura Agro Tech LLP, Coastal Peace & Development (CPD) & Rohini College of Engineering and Technology	14th to 15th September, 2023
	Attended a meeting to examine the Identified quarry blocks in South Andaman.	APWD, Port Blair	23rd August, 2023
	Participated Annual Group Meeting of AICRP on Agroforestry,	organized (ICAR-CAFRI, Jhansi) at PJTSAU, Hyderabad.	16th to 18th October, 2023
	Participated National Conference on Tropical Tuber Crops for Sustainability, Tradition, Agri-Food Systems & Resilience	Indian Society for Root Crops, ICAR-CTCRI, Thiruvananthapuram.	28th to 29th November, 2023
	Attended Mid-term Review Meeting of AICRP on Tuber Crops 2023-24	ICAR-CTCRI, Thiruvananthapuram	30th November, 2023
	Attended a meeting at Vansadan, Port Blair to discuss the possibility of obtaining GI tag for Andaman Padauk tree	Department of Environment and Forests, A&N Admn., Port Blair	08th November, 2023
	Attended meeting on Expert Appraisal Committee to evaluate the proposals of Category B-2 Mining projects to be discussed in the SEAC meeting for grant of Environment Clearance	Andaman & Nicobar Admn., Pollution Control Committee, Department of Science and Technology, Port Blair	27th December, 2023

14. Human Resource Development

Category: Scientific staff

Sl. No.	Scientist & Designation	Program	Topic	Organizer	Date	Mode
1	**R.R Alyethodi, Scientist (SS)**	Laboratory Assessors Training Course	ISO/IEC 17025:2017	NABL at ICAR-NIVEDI, Bengaluru	06th to 10th February 2023	Offline
2	**Y. Ramakrishna, Principal Scientist & Head**	Workshop	Natural Farming	WBUAFS, Belgachia, kolkata	15th to 16th February, 2023	In Person
3	**P. Perumal, Senior Scientist**	21 Days Winter School	Emerging Problems and Recent Advances in Agriculture and Allied Sciences: Basic to Molecular Approaches	Astha Foundation, Meerut, UP, India	26th February to 18th March, 2023	Virtual
4	**P. Perumal, Senior Scientist**	Workshop	Genome editing in farm animals for improved productivity and health	ICAR-National Dairy Research Institute, Karnal	03rd March, 2023	Virtual
5	**I. Jaisankar, Senior Scientist**	21 days International training cum certificate course	Technology Innovation in Agriculture, Horticulture, Animal Husbandry, Fisheries, Sericulture and allied sectors for sustainable Entrepreneurship	College of Horticulture and Forestry, Central Agricultural University Pasighat, Arunachal Pradesh, India	16th June to 06th July, 2023	Virtual
6	**T. Subramani, Scientist**	21 days international training cum certificate course	Technology Innovation in Agriculture, Horticulture, Animal Husbandry, Fisherie, Sericulture and allied sectors for sustainable Entrepreneurship	College of Horticulture and Forestry, Central Agricultural University Pasighat, Arunachal Pradesh, India	16th June to 06th July, 2023	Virtual

Sl. No.	Scientist & Designation	Program	Topic	Organizer	Date	Mode
7	**Abhilash, Scientist**	NAARM Foundation FOCARS course	FOCARS foundation programme for newly recruited scientists	NAARM, Hyderabad	11th April, to 10th July, 2023	In Person
8	**Talaviya H., Scientist**					
9	**Ajit Arun Waman, Scientist**	Training	Hi-tech farming techniques (vertical farming, hydroponics, aeroponic, aquaponics) in horticultural crops	ICAR-IIHR, Bengaluru	25th July, 2023	Virtual
10	**P. Perumal, Senior Scientist**	21 Days Summer School	Emerging Challenges and Opportunities in Biotic and Abiotic Stress Management	Astha Foundation, Meerut, UP, India	10th to 30th August, 2023	Virtual
11	**Dr. Chittaranjan Raul, Scientist**	NAARM Foundation FOCARS course	FOCARS foundation programme for newly recruited scientists	NAARM, Hyderabad	18th July to 17th October, 2023	In Person
12	**K. Muniswamy, Scientist (SS)**	Workshop	Genome editing in farm animals for improved productivity and health.	ICAR-NDRI, Karnal	03rd October, 2023	Virtual
13	**Sharath S Yeligar, Scientist**	Training	Training and Experience Sharing Workshop on Modelling STATA for Agricultural Economics and Policy Research at ICAR-NIAP New Delhi	International Food Policy Research Institute (IFPRI) and ICAR-National Institute for Agricultural Economics and Policy Research	07th to 08th November, 2023	Virtual
14	**Sharath S Yeligar, Scientist**	Training	Professional Attachment Training Programme at ICAR-NIAP New Delhi	ICAR-National Institute for Agricultural Economics and Policy Research	23rd August to 22nd Novermber, 2023	In Person

Sl. No.	Scientist & Designation	Program	Topic	Organizer	Date	Mode
15	**Abhilash, Scientist**	Professional Attachment Training	Professional Attachment Training	ICAR-IARI, New Delhi	28th August, to 30th Novermber, 2023	In Person
16	**Talaviya H., Scientist**			ICAR-DMAPR, Anand	28th August, to 28th Novermber, 2023	In Person
17	**Prabhu P Scientist**	Professional Attachment Training	Morphological characterization and taxonomic delimitation of wild relatives of sesame	ICAR-NBPGR, (RS), Thrissur	28th August, to 30th Novermber, 2023	In Person

Category: Technical Staff

Sl. No.	Technical & Designation	Program	Topic	Organizer	Date	Mode
1.	**Nutan Roy, Technical Assistant**	Training	Trace level Analysis of Pesticides, Phytochemicals, sugars, and Organic acids	Indian Council of Agricultural Research New Delhi	15th - 21st February, 2023	In Person
2	**Naga Venkat Laxmi, T-3**	Training	Trace level analysis of pesticide, phytochemicals, sugars, and organic acids,	Division of Agricultural Chemical-ICAR-IARI, New Delhi	15th - 21st February, 2023	Virtual
3	**Er. Manoj Kumar, SMS**	Training	ICTs in Agricultural Marketing and Block Chain Technologies for FPOs	National Institute of Agricultural Extension Management, Hyderabad	20th - 22nd September, 2023	In Person
5.	**Er. Manoj Kumar, SMS**	Training	Training Program on Application of Remote Sensing and Geographical Information Systems in Agricultural Development (under CBC)	National Institute of Agricultural Extension Management, Hyderabad	25th - 27th September, 2023	In Person

Sl. No.	Technical & Designation	Program	Topic	Organizer	Date	Mode
6.	**Thanmai Paul, T-5**	Training	Drone Pilot Training	Mahatma Phule Krishi Vidyapeeth (MPKV) Rahuri, Maharashtra	18th November to 27th November, 2023	Online - Lecture Offline- Practical
7.	**Shyam Sundar Rao, T-3**	Training	Drone Pilot Training	Mahatma Phule Krishi Vidyapeeth (MPKV) Rahuri, Maharashtra	18th November to 27th November, 2023	Online- Lecture Offline- Practical
8.	**Alex Praveen Bala, T-3**	Training and Awareness	J-gate @CeRA regional training cum awareness program 2023- Southern region	TNAU, Coimbatore	5.12.2023	In person

15. Training and Capacity Building

a) Training to stakeholders

Sl. No	Training	Date	Particpants (No.) M+F=T	Type of participants	Venue	Coordinators
1	**Sea-based training program on inducting new trainees into marine fishing practices (Batch-II)**	2nd to 5th January, 2023	25+0=25	Tribal fishers	Chukchuka, Car Nicobar	R Kiruba Sankar Y Ramakrishna K Saravanan J Praveenraj Sirisha Adamala
2	**Training programme on Livestock Management in IFS for doubling farmer's income in Andaman and Nicobar Islands**	16th to 18th February, 2023	15+30=35	Livestock Farmers	Namunaghar	P. Perumal P.A. Bala T.P. Swarnam
3	**Training on mud crab culture and fattening**	17th February, 2023	10+17= 27	Farmers	Indira Nagar, South Andaman	K. Saravanan S.K. Zamir Ahmed J. Praveenraj R. Kiruba Sankar D. Karunakaran
4	**Training programme cum front line demonstration on Controlled breeding programme and artificial insemination in goat**	20th to 24th February, 2023	13+19=32	Goat Farmers	Sippighat	P. Perumal A. K. De T. Sujatha P. A. Bala K. Muniswamy R. R. Alyethodi Y. Ramakrishna Jai Sunder D. Bhattacharya
5	**Training Programme cum front line demonstration on Control of flies to prevent diseases and to improve productivity and reproduction performances in livestock species**	28th February to 02nd March 2023	15+10=25	Livestock Farmers	New Bimblitan	P. Perumal A.K. De T. Sujatha P. A. Bala K. Muniswamy, R.R. Alyethodi Jai Sunder D. Bhattacharya

Sl. No	Training	Date	Particpants (No.) M+F=T	Type of participants	Venue	Coordinators
6	**Scientific harvesting and post harvest management of spices in Andaman Islands**	3rd March 2023	16+59=75	Farmers, educated youth, business women	ICAR-CIARI, Port Blair	Ajit Arun Waman Pooja Bohra
7	**Training on Climate resilient scientific pig farming**	06th to 08th March, 2023	13+16=29	Farmers and rural youth	Wandoor and Chouldari	A.K.De P.A. Bala T. Sujatha Jai Sunder P. Perumal
8	**Training Programme cum front line demonstration on Control of flies to prevent diseases and to improve productivity and reproduction performances in livestock species**	21st to 23rd March 2023	15+10=25	Livestock Farmers	New Bimblitan	P. Perumal A.K. De T. Sujatha P. A. Bala K. Muniswamy R.R. Alyethodi Jai Sunder D. Bhattacharya
9	**Hands on Training on Nursery Techniques of Horticultural Crops (Customized paid training programme)**	3rd to 5th April 2023	0+1=1	Graduate student	HPPU, ICAR-CIARI	Ajit Arun Waman
10	**Training Programme cum front line demonstration on Popularization of Biological control of fly in Livestock species**	10th to 14th April 2023	15+10=25	Livestock Farmers	Indira Nagar	P. Perumal, A.K. De T. Sujatha P. A. Bala K. Muniswamy R. R. Alyethodi Jai Sunder D. Bhattacharya
11	**Training programme on Scientific pig farming**	17th to 20th April, 2023	23+25=48	Farmers and rural youth	Baratang and Nimbudera	A.K.De P. Perumal Jai Sunder D. Bhattacharya T. Sujatha R.R.Alyethodi

Sl. No	Training	Date	Particpants (No.) M+F=T	Type of participants	Venue	Coordinators
12	**Scientific cultivation of paddy in rainfed lowland conditions**	4th May 2023	18+22=40	Tribal farmers	Harminder Bay, Little Andaman	P.K. Singh
13	**Training on Conservation of indigenous animal genetic resources with special reference to Andaman pig**	9th to11th May 2023	30+70=100	farmers	North and Middle Andaman	A.K.De Jai Sunder D. Bhattacharya P. Perumal T. Sujatha
14	**Training on freshwater ornamental fish breeding**	10th to 12th May 2023	0+25=25	Youth	Fisheries Training Centre, Department of Fisheries, A & N Islands	J. Praveenraj R. Kiruba Sankar Megha Kumari S.K. Zamir Ahmed K. Saravanan Abdul Salam E.A. Nesnas
15	**Training Programme cum front line demonstration on Controlled breeding programme and artificial insemination in goat**	15th to 19th May 2023	21+10=31	Goat Farmers	Rangachang -5	P. Perumal A. K. De T. Sujatha P. A. Bala K. Muniswamy R. R. Alyethodi Jai Sunder D. Bhattacharya
16	**Training Programme cum front line demonstration on Controlled breeding programme and artificial insemination in goat**	12th to 16th June 2023	18+12=30	Goat Farmers	Makha pahar	P. Perumal A. K. De T. Sujatha P. A. Bala K. Muniswamy R.R. Alyethodi Jai Sunder D. Bhattacharya
17	**Training on rice production cum seed distribution**	3rd July 2023	54+7=61	Farmers	Off campus	P.K. Singh Y. Ramakrishna

Sl. No	Training	Date	Particpants (No.) M+F=T	Type of participants	Venue	Coordinators
18	**Good agriculture practices for paddy cultivation in rainfed lowland conditions**	27th July 2023	32+6=38	Farmers	Keralapuram North and Middle Andaman on	P.K. Singh V. Damodaran Manoj Kumar Bikash Chandra Mondal
19	**Hands on Training on Nursery Techniques of Horticultural Crops (Customized paid training programme)**	01th January, 2023	0+1=1	Educated youth	HPPU, ICAR-CIARI	Ajit Arun Waman
20	**Scientific Cultivation of Spices for Economic Prosperity**	1st to 3rd August, 2023	5+20=25	Farmers, educated youth, business women	ICAR-CIARI, Port Blair	Ajit Arun Waman Pooja Bohra
21	**Training programme and demonstration on scientific Kadaknath chicken management**	7th to 9th August, 2023	18+5=23	Farmers	ICAR-CIARIPort Blair	K. Muniswamy T. Sujatha P. Perumal A. K. De R. R. Alyethodi P. A. Bala Jai Sunder D. Bhattacharya
22	**Training Programme cum front line demonstration on Controlled breeding programme and artificial insemination in goat**	14th to 18th August 2023	12+13=25	Goat Farmers	Indira Nagar	P. Perumal A. K. De T. Sujatha P. A. Bala K.Muniswamy R. R.Alyethodi Jai Sunder D. Bhattacharya
23	**Training programme on scientific livestock and poultry production at N& M Andaman**	17th to 19th August 2023	30+13=43	Farmers and rural youth	Rangat	A.K.De P.A. Bala Jai Sunder Y. Ramakrishna P. Perumal

Sl. No	Training	Date	Particpants (No.) M+F=T	Type of participants	Venue	Coordinators
24	**Training on mud crab fattening and shrimp farming**	18th to 20th October 2023	16+9=25	Youth	Fisheries Training Centre, Department of Fisheries	S.K. Zamir Ahmed R. KirubaSankar D. Karunakaran K. Saravanan
25	**Training on aquatic animal diseases and health management in aquaculture**	31st October to 2nd November 2023	13+3=16	Fisheries Department Officials and Farmers	Diglipur, North Andaman	K. Saravanan, S.K. Zamir Ahmed J. Praveenraj R. Kiruba Sankar
26	**Climate resilient agricultural practices for island based cropping system**	1st to 3rd November 2023	147+47=191	Tribal farmers	Perka, Chukchucha and Tapoiming village of Car Nicobar Islands	I. Jaisankar Santosh Kumar T.Subramani
27	**Cultivation of pulses in rice fallow**	2nd November 2023	19+6=25	Farmers	KVK, Nimbudera	P.K. Singh V. Damodaran Manoj Kumar B.C. Monda
28	**Training Programme cum front line demonstration on Controlled breeding programme & artificial insemination in goat**	04th to 08th December 2023	18+22=40	Goat Farmers	Namunaghar	P. Perumal A. K. De T. Sujatha P.A. Bala K. Muniswamy R.R. Alyethodi Y. Ramakrishna Jai Sunder D. Bhattacharya
29	**Hands on training on nursery techniques of horticultural crops (Customized paid training programme)**	11th to 13th December 2023	8+3=11	Field officials of Department of Agriculture, UT Admn.	ICAR-CIARI, Port Blair	Ajit Arun Waman Pooja Bohra P.K. Singh

Sl. No	Training	Date	Particpants (No.) M+F=T	Type of participants	Venue	Coordinators
30	Training programme and demonstration on scientific Kadaknath chicken management	13th to 15th December 2023	6+24=30	Farmers	Lal Pahar	K. Muniswamy P. Perumal T. Sujatha A. K. De R. R. Alyethodi P. A. Bala D. Bhattacharya Jai Sunder Y. Ramakrishna Z. George Thanmai Paul
31	Hands on Training on Nursery Techniques of Horticultural Crops (Customized paid training programme)	14th to 16th December 2023	11+1=12	Field Officials of Department of Agriculture, UT Admn.	ICAR-CIARI, Port Blair	Ajit Arun Waman Pooja Bohra P.K. Singh
32	Training programme and demonstration on scientific Kadaknath chicken management	19th to 21st December 2023	1+34=35	Farmers	Guptapara	K. Muniswamy P. Perumal T. Sujatha A. K. De R. R. Alyethodi P. A. Bala D. Bhattacharya Jai Sunder Y. Ramakrishna Z. George Thanmai Paul
					Total Male	650
					Total Female	550
					Total	1200

b) Field day

Sl. No	Title	Date	Participants (No) M+F=T	Venue	Coordinators
1	**Field Day on Vegetable cultivation (Cabbage & Cauliflower) under coconut plantation**	1st March, 2023	12+3=15	ICAR- CIARI Regional Station, Minicoy	Y. Gladston S.M. Ajina S. Hassan M.I. Arif S.K. Zamir Ahmed |E.B. Chakurkar
2	**Controlled breeding programme and artificial insemination in goat**	3rd April, 2023	12+14=26	Namunaghar	P. Perumal A.K. De R.R. Alyethodi Jai Sunder D. Bhattacharya
3	**Controlled breeding programme and artificial insemination in goat**	6th April, 2023	16+15=31	Rangachang-5	P. Perumal A.K. De R.R. Alyethodi Jai Sunder D. Bhattacharya
4	**Field day on Control of iron deficiency anaemia in piglets**	20th April 2023	20+22=44	Baratang	A.K.De P. Perumal Jai Sunder D. Bhattacharya T. Sujatha R.R.Alyethodi
5	**Controlled breeding programme and artificial insemination in goat**	8th May, 2023	10+15=25	Guptapara	P. Perumal A.K. De R.R. Alyethodi Jai Sunder D. Bhattacharya
6	**Field day on Conservation of indigenous pig breeds of A & N Islands**	8th May, 2023	20+23=43	Nimbudera	A.K.De Jai Sunder D. Bhattacharya P. Perumal T. Sujatha
7	**Controlled breeding programme and artificial insemination in goat**	15th June, 2023	18+20=38	Indira Nagar	P. Perumal A.K. De R. R. Alyethodi Jai Sunder D. Bhattacharya

Sl. No	Title	Date	Participants (No) M+F=T	Venue	Coordinators
8	**Field day on Castration in piglets**	21st June, 2023	9+15=24	Indira Nagar	A.K. De Jai Sunder D. Bhattacharya P. Perumal
9	**Seed Day**	3rd July, 2023	46+4=50	Adajig, North and Middle Andaman	P.K. Singh Y. Ramakrishna N. Bommayasamy Shyam Sunder Rao
10	**Seed Day**	4th July, 2023	37+8=45	Kadamtala, North and Middle Andaman	P.K. Singh Y. Ramakrishna N. Bommayasamy Shyam Sunder Rao
11	**Seed Day**	4th July, 2023	58+02=60	Rangat, North and Middle Andaman	P.K. Singh Y. Ramakrishna N. Bommayasamy Shyam Sunder Rao
12	**Seed Day**	5th July 2023	55+0=55	Baratang	P.K. Singh Y. Ramakrishna N Bommayasamy Shyam Sunder Rao
13	**Field day on Importance of castration in piglets**	27th July 2023	13+18=31	Chouldari	A.K.De P. Perumal Jai Sunder D. Bhattacharya T. Sujatha R.R.Alyethodi
14	**Livestock and poultry production in Nicobar**	6th August, 2023	7+3=10	Nicobar	P.A. Bala R. R.Alyethodi
15	**Field day on Probiotics supplementation in piglets for control of weaning stress**	22nd September, 2023	13+23=36	Wandoor	A.K.De Jai Sunder D. Bhattacharya P. Perumal T. Sujatha

Sl. No	Title	Date	Participants (No) M+F=T	Venue	Coordinators
16	**Field Day on Farmer's participatory variety selection of rice**	31st October, 2023	20+4=24	Keralapuram, North and Middle Andaman	P.K. Singh V. Damodaran Manoj Kumar Bikash Chandra Mondal
17	**Field day on scientific tuber crops cultivation for improving the food security of islanders**	22nd December, 2023	4+34=38	Sippighat farm	I.Jaisankar Y.Ramakrishna T. Subramani
				Total Male	370
				Total Female	223
				Total	593

c) Interaction Meet

Sl. No	Title	Date	Participants (Nos.) M/F/T	Venue	Coordinators
1	**Scientist-Farmers interaction to promote entrepreneurship in animal husbandry activities**	28th April, 2023	50/43/93	ICAR-CIARI, Port Blair	Jai Sunder D. Bhattacharya T. Sujatha P.A. Bala P. Perumal A.K. De K. Muniswamy R. R. Alyethodi
2	**Interface meet on Characterization and Documentation of Animal Genetic Resources of Andaman & Nicobar Islands and Conservation initiatives for Teressa goat**	8th May, 2023	24/12/36	ICAR-CIARI, Port Blair	Jai Sunder D. Bhattacharya T. Sujatha P.A. Bala P. Perumal A.K. De K. Muniswamy R. R. Alyethodi ICAR-NBAGR Karnal
3	**Interaction meeting for commercialization of technology Dweep larval rearing technology for fancy guppy fish**	6th July, 2023	9+2=11	ICAR-CIARI, Port Blair	T.Sujatha E.B.Chakurkar Jai Sunder

Sl. No	Title	Date	Participants (Nos.) M/F/T	Venue	Coordinators
4	**Interaction with entrepreneurs for commercialisation of technology**	4th September, 2023	11+0=11	Online	T.Sujatha E.B.Chakurkar Jai Sunder
5	**Interaction with Agrinnovate India Limited for price fixation of tick formulation**	14th September, 2023	4+0=4	Online	T.Sujatha E.B.Chakurkar Jai Sunder
6	**Scientist Interaction with Tribal Captains of Nicobar group of Islands**	22nd September, 2023	14+0=14	KVK, Sippighat	ICAR-KVK ICAR-CIARI
7	**Stakeholders meet on Integrated Pest Management**	23rd December, 2023	18+57=75	ICAR-CIARI RS, Minicoy	Y. Gladston S.M. Ajina S. Hassan S.K. Zamir Ahmed
8	**Interaction meet with Expert with the team ICAR-CIARI RS, Minicoy**	23rd December, 2023	6+1=7	ICAR-CIARI, RS Minicoy	Y. Gladston S.M. Ajina S.K. Zamir Ahmed
				Total Male	136
				Total Female	115
				Total	251

d) Field Demonstration

Sl. No	Title	Date	Participants (No) M/F/T	Venue	Coordinators
1	**Demonstration cum training on mud crab fattening**	1st February, 2023	16+9=25	Hasmatabad, South Andaman	K. Saravanan J. Praveenraj R. Kiruba Sankar
2	**Demonstration on Iron supplementation in piglets to control iron deficient anaemia**	15th February, 2023	23+11=34	Chouldari	A.K. De Jai Sunder D. Bhattacharya P. Perumal

Sl. No	Title	Date	Participants (No) M/F/T	Venue	Coordinators
3	**Demonstrated Mobile app on horticultural crops to the farmers**	23rd February, 2023	5+0=5	Field locations Mathura, Wright Myo and Shoal Bay	D.Karunakaran
4	**Demonstration on Scientific castration of piglets**	17th March, 2023	12+15=27	Guptapara	A.K. De Jai Sunder D. Bhattacharya P. Perumal
5	**Controlled breeding programme and artificial insemination in goat**	8th June, 2023	12+14=26	Namunaghar	P. Perumal A.K. De Jai Sunder D. Bhattacharya
6	**Controlled breeding programme and artificial insemination in goat**	12th July, 2023	16+15=31	Rangachang-5	P. Perumal, A.K. De R.R. Alyethodi Jai Sunder D. Bhattacharya
7	**Field demonstration on the use of FAMACHA card in general health management of goats**	31st July, 2023	10+10=20	Nimbudera	Jai Sunder T. Sujatha R.R. Alyethodi
8	**Demonstration of the use of mineral mixture in Goat production**	31st July, 2023	10+10=20	Nimbudera	Jai Sunder T. Sujatha R.R. Alyethodi
9	**Demonstration on Use of mineral mixture in animal production**	18th August, 2023	30+13=43	Rangat	A.K. De P.A. Bala Jai Sunder Y. Ramakrishna P. Perumal
10	**Controlled breeding programme and artificial insemination in goat**	10th September, 2023	10+15=25	Guptapara	P. Perumal A.K. De Jai Sunder D.Bhattacharya
11	**Controlled breeding programme and artificial insemination in goat**	14th October, 2023	18+20=38	Indira Nagar	P. Perumal, A.K. De Jai Sunder D. Bhattacharya

Sl. No	Title	Date	Participants (No) M/F/T	Venue	Coordinators
12	**Demonstration on Iron supplementation in piglets to control iron deficient anaemia**	23rd October 2023	12+11=23	Indira Nagar	A.K. De P. Perumal Jai Sunder D. Bhattacharya
				Total Male	174
				Total Female	145
				Total	319

e) Workshop

Sl. No	Title	Date	Participants (No.) M/F/T	Type of participants	Venue	Coordinators
1	**Regional workshop on Strengthening medicinal plants sector in Andaman & Nicobar Islands**	16th February 2023	87+75=162	Farmers, Farm women, Dept. Staff, etc.	ICAR-CIARI, Port Blair	Ministry of AYUSH, GoI, New Delhi, (KFRI), Environment & Forest Department, ICAR-CIARI, Port Blair, Department of Agriculture, A&N Islands
2	**Value addition in coconut**	14th April 2023	40+35=75	Farmers, Farm women, Dept. Staff, etc	ICAR-CCARI, Goa	ICAR-KVK, CCARI, Goa
3	**Workshop on Scientist - Farmers Interaction to Promote Entrepreneurship in Animal Husbandry Activities**	28th April 2023	60+15=75	Farmers. SVOs and Scientists	ICAR-CIARI, Port Blair	Jai Sunder D. Bhattacharya T. Sujatha P. A. Bala P. Perumal A. K. De K. Muniswamy R.R. Alyethodi

Sl. No	Title	Date	Participants (No.) M/F/T	Type of participants	Venue	Coordinators
4	**Workshop - on characterization and documentation of animal genetic resources of Andaman & Nicobar Islands and conservation initiatives for Teressa goat**	8th May 2023	20+30=50	Farmers and Scientists	ICAR-CIARI, Port Blair	Jai Sunder D. Bhattacharya T. Sujatha P. A. Bala P. Perumal A. K. De K. Muniswamy R.R. Alyethodi
5	**Sustainable Agro - Ecotourism for A&N Island: Opportunities and challenges**	23rd May 2023	47+35=82	Farmers, Farm women, Dept. Staff and students	ICAR-CIARI, Port Blair	ICAR-CIARI
6	**Workshop on Vasudhaiva Kutumbkam, related to Yoga day 2023**	19th to 21st June 2023	1+14=15	Employees of ICAR-CIARI, Regional Station, Minicoy	ICAR-CIARI, RS Minicoy	Y. Gladston S.M. Ajina S. Hassan S.K. Zamir Ahmed
7	**Workshop on power of silence to deal with challenges**	13th September 2023	30+20=50	Employees from ICAR-CIARI	ICAR-CIARI, Port Blair	S.K. Zamir Ahmed K. Saravanan S. Sundar Rao P. Mondal T. Paul P. Kakesh Rao M.N.V. Laxmi
8	**National workshop on Spices, Aromatic and Medicinal Plants for Economic Prosperity & Ecological Sustainability**	05th to 06th October 2023	100+50=150	Farmers, Farm women, Dept. Staff and students	ICAR-CIARI, Port Blair	P.K. Singh A.A. Waman Pooja Bohra
					Total Male	742
					Total Female	415
					Total	1157

f) Webinar/Seminar /Meet

Sl. No.	Title	Date	Participants (No.) M/F/T	Type of participants	Venue	Coordinators
1	**Science Exhibition in collaboration with GHHS, Minicoy**	23rd January 2023	102+148=250	Tribal population of Minicoy and officials of various Dept. of Lakshadweep	ICAR-CIARI, Regional station, Minicoy	Y. Gladston S.M. Ajina S. Hassan M.I. Arif S.K. Zamir Ahmed E.B. Chakurkar
2	**Plantation drive for mangrove restoration in Minicoy Islands**	5th June 2023	52+3=55	Scientific team of ICAR-CIARI and Students of Govt. Polytechnic College, Minicoy	Marsh land of Tundi, Minicoy Islands	Y. Gladston S.M. Ajina S. Hassan M.I. Arif S.K. Zamir Ahmed E.B. Chakurkar
3	**Skill development program scientific poultry farming**	6th to 10th November 2023	22+80=102	Farmers	RS, Minicoy	Y. Gladston S.M. Ajina S. Hassan M.I. Arif S.K. Zamir Ahmed E.B. Chakurkar
4	**Exhibition relation to Viksit Bharat Sankalp Yatra-2023**	18th November 2023	96+304=310	Tribal Population of Minicoy	Admn. of Minicoy,	Y. Gladston S.M. Ajina S. Hassan M.I. Arif S.K. Zamir Ahmed E.B. Chakurkar
5	**Stakeholders meet on integrated pest management**	23rd November 2023	18+57=75	Farmers	RS, Minicoy	Y. Gladston S.M. Ajina S. Hassan M.I. Arif S.K. Zamir Ahmed E.B. Chakurkar
					Total Male	290
					Total Female	592
					Total	882

g) Awareness campaigns

Sl. No	Title	Date	Participants (M/F/T)	Venue	Coordinators
1	**Awareness on responsible fishing practices**	5th January 2023	15+0=15	Tribal Council, Car Nicobar	R. Kiruba Sankar K. Saravanan J. Praveenraj Sirisha Adamala M. Sarief Y. Ramakrishna
2	**Awareness on National Surveillance Programme for Aquatic Animal Diseases (NSPAAD)**	27th January 2023	12+8=20	Teylerabad, South Andaman	K. Saravanan J. Praveenraj R. Kiruba Sankar
3	**Awareness on scope of mud crab fattening in Andaman Islands**	30th January 2023	16+7=23	New Wandoor, South Andaman	
4	**Awareness on National Surveillance Programme for Aquatic Animal Diseases (NSPAAD)**	1st February 2023	16+9=25	Hasmatabad, South Andaman	
5	**Awareness on National Surveillance Programme for Aquatic Animal Diseases (NSPAAD)**	15th February 2023	11+24=35	Guptapara, South Andaman	K. Saravanan S.K. Zamir Ahmed J. Praveenraj R. Kiruba Sankar D. Karunakaran
6	**Awareness on scope of mud crab culture and fattening in Andaman Islands**	15th February 2023	11+24=35	Guptapara, South Andaman	K. Saravanan S.K. Zamir Ahmed J. Praveenraj R. Kiruba Sankar D. Karunakaran
7	**Controlled breeding programme and artificial insemination in goat**	8th May 2023	10+15=25	Guptapara	P. Perumal A.K. De R.R. Alyethodi Jai Sunder D. Bhattacharya

Sl. No	Title	Date	Participants (M/F/T)	Venue	Coordinators
8	**Awareness on National Surveillance Programme for Aquatic Animal Diseases (NSPAAD)**	11th May 2023	0+25=25	ICAR-CIARI, Port Blair	K. Saravanan S.K. Zamir Ahmed J. Praveenraj R. Kiruba Sankar D. Karunakaran
9	**Awareness programme on FMD**	26th May2023	10+15=25	Calicut, South Andaman	Jai Sunder A.K. De D.Bhattacharya P. Perumal T.Sujatha R.R.Alyethodi K.Muniswamy P.A. Bala
10	**Controlled breeding programme and artificial insemination in goat**	8th June 2023	12+14=26	Namunaghar	P. Perumal A.K. De R.R. Alyethodi Jai Sunder D. Bhattacharya
11	**Awareness on marine plastics**	15th June 2023	19+1=20	ICAR-CIARI, RSD Minicoy	S.K. Zamir Ahmed A.K.O Ratheesh Y. Gladston S.M. Ajina S. Hassan
12	**Controlled breeding programme and artificial insemination in goat**	12th July 2023	16+15=31	Rangachang - 5	P. Perumal A.K. De R.R. Alyethodi Jai Sunder D. Bhattacharya
13	**Awareness on National Surveillance Programme for Aquatic Animal Diseases (NSPAAD)**	12th July 2023	16+12=28	Namunaghar, South Andaman	K. Saravanan S.K. Zamir Ahmed J. Praveenraj R. Kiruba Sankar D. Karunakaran
14	**Awareness of Scientific Goat farming**	31st July 2023	10+10=20	Nimbudera	Jai Sunder T. Sujatha R.R.Alyethodi

Sl. No	Title	Date	Participants (M/F/T)	Venue	Coordinators
15	**Awareness on National Surveillance Programme for Aquatic Animal Diseases (NSPAAD)**	18th August, 2023	22+8=29	Brindaban, South Andaman	K. Saravanan S.K. Zamir Ahmed J. Praveenraj R. Kiruba Sankar D. Karunakaran
16	**Guidelines for FMD vaccination in animals**	1st September 2023	18+12=30	DAHVS, Golghar Veterinary hospital	Jai Sunder
17	**World Coconut Day-2023**	2nd September 2023	14+10=24	Govt. Senior Secondary School, Rangachang	Ajit Arun Waman
18	**Awareness programme on prevention and control of foot and mouth disease in livestock**	15th September 2023	12+19=31	Bachrapahar village	Jai Sunder A.K. De D. Bhattacharya P. Perumal T. Sujatha R.R. Alyethodi K. Muniswamy P.A. Bala
19	**Awareness programme on prevention and control of foot and mouth disease in livestock**	15th September 2023	10+12=22	Burmanallah village	Jai Sunder A.K. De D. Bhattacharya, P. Perumal T. Sujatha R.R. Alyethodi K. Muniswamy P.A. Bala
20	**Awareness on National Surveillance Programme for Aquatic Animal Diseases (NSPAAD)**	12th October 2023	23+9=32	Ferrargunj, South Andaman	K. Saravanan S.K. Zamir Ahmed J. Praveenraj R. Kiruba Sankar D. Karunakaran

Sl. No	Title	Date	Participants (M/F/T)	Venue	Coordinators
21	**Vigilance Awareness Week - 2023 and PIDPI Awareness**	31st October to 20th November 2023	60+40=100	ICAR-CIARI, Port Blair	Jai Sunder Y. Ramakrishna, T. Sujatha T. Subramani P. Perumal D. Karunakaran, K. Saravanan, R.R. Alyethodi S. Sundar Rao
22	**Awareness on National Surveillance Programme for Aquatic Animal Diseases (NSPAAD)**	22nd December 2023	23+2=25	Mannarghat, South Andaman	K. Saravanan, S.K. Zamir Ahmed J. Praveenraj R. Kiruba Sankar D. Karunakaran
23	**Awareness on waste to wealth- Kitchen garden to School students of JNV Minicoy**	23rd December 2023	73+102=175	JNV, Minicoy	Y. Gladston S.M. Ajina S. Hassan, S.K. Zamir Ahmed E.B. Chakurkar
				Total Male	429
				Total Female	1581
				Total	2010

h) Health Camp

Sl. No.	No. of animals	Date	Venue	Coordinators
1	**25 goats**	10th June 2023	Guptapara	P. Perumal A. K. De Jai Sunder D. Bhattacharya
2	**20 goats**	15th July 2023	Indira Nagar	P. Perumal A. K. De Jai Sunder D. Bhattacharya

Sl. No.	No. of animals	Date	Venue	Coordinators
3	**30 goats**	4th August 2023	Chouldari	P. Perumal A. K. De Jai Sunder Y. Ramakrishna D. Bhattacharya
4	**12 goats**	9th August 2023	Sippighat	P. Perumal, A. K. De Jai Sunder Y. Ramakrishna D. Bhattacharya
5	**40 goats**	11th August 2023	Guptapara	P. Perumal A. K. De Jai Sunder Y. Ramakrishna D. Bhattacharya
6	**21 goats**	22nd August 2023	Indira Nagar	P. Perumal, A. K. De Jai Sunder Y. Ramakrishna D. Bhattacharya
7	**53 goats**	20th September 2023	Namunaghar	P. Perumal A. K. De Jai Sunder Y. Ramakrishna D. Bhattacharya
8	**28 goats**	31st October 2023	Mithakhari	P. Perumal A. K. De Jai Sunder Y. Ramakrishna D. Bhattacharya
9	**25 goats**	25th November 2023	Guptapara	P. Perumal A. K. De Jai Sunder Y. Ramakrishna D. Bhattacharya
10	**18 goats**	25th November 2023	Mithakhari	P. Perumal A. K. De Jai Sunder Y. Ramakrishna D. Bhattacharya

Sl. No.	No. of animals	Date	Venue	Coordinators
11	**22 goats**	12th December 2023	Makhapahar	P. Perumal A. K. De Jai Sunder Y. Ramakrishna D. Bhattacharya
12	**25 goats**	24th December 2023	Sippighat	P. Perumal A. K. De Jai Sunder Y. Ramakrishna D. Bhattacharya

i) Exposure visit for Students/Farmers

Sl. No.	Programme	Participants (No.) M+F=T	Date	Coordinators
1	**Exposure Visit for DIET students to ICAR-CIARI**	60+60=120	15th February, 2023	S.K. Zamir Ahmed D. Karunakaran
2	**Students from DIET, Garacharma were oriented on underutilized fruits, spices and medicinal plants during their visit to Horticultural Plants Propagation Unit**	60+60=120	15th February 2023	Pooja Bohra Ajit Arun Waman
3	**Students from TGCE were oriented on underutilized fruits, spices and medicinal plants during their visit to Horticultural Plants Propagation Unit**	80+28=108	23rd February 2023	Pooja Bohra Ajit Arun Waman
4	**Educational trip for B.Ed. 1st year students of Tagore Government College of Education (TGCE), Middle Point, South Andaman, along with six faculties**	80+28=108	23rd February 2023	S.K. ZamirAhmed D. Karunakaran
5	**Exposure visit of students from Science Centre, Port Blair to Horticultural Plants Propagation Unit**	50+5=55	24th February 2023	Pooja Bohra Ajit Arun Waman
6	**Exposure visit of 1st year students of Tagore Government College of Education (TGCE).**	40+10=50	24th February 2023	S.K. ZamirAhmed D. Karunakaran

Sl. No.	Programme	Participants (No.) M+F=T	Date	Coordinators
7	**Educational trip for B.Sc. Zoology and Allied Zoology (B.Sc. Botany & Chemistry) of Jawaharlal Nehru Rajkeeya Maha Vidyalaya, Port Blair**	60+20=80	15th March 2023	S.K. ZamirAhmed D. Karunakaran
8	**Exposure visit of ONGES to CIARI**	14+7=21	9th June 2023	S.K. Zamir Ahmed
9	**Visit to Central Instrumentation Facility, study the existing instruments and analytical facilities.**	4+0=4	7th August 2023	R.R. Alyethodi
			Total Male	448
			Total Female	218
			Total	666

j) Radio Talks/Advisory

Title	Date of broadcast	Expert
Spices and its value addition for enhancing farmers' income	30th August 2023	Ajit Arun Waman
Advisory on diagnosis of diseases and health management of livestock and poultry Tamil – All India Raio-PortBlair	9th November 2023	T. Sujatha

k) Doordarshan Interview (live)

Title	Date of broadcast	Expert
Control of FMD in livestock	8th June 2023	Jai Sunder
Agriculture – Green Revolution	15th June 2023	S.K. Zamir Ahmed
धान की उन्नत किस्मे एवं फसल प्रवंधन	25th June 2023	P.K. Singh
Live phone in programme on "Integrated Farming System"	13th July 2023	Y. Ramakrishna
Citizen science programmes in marine conservation	20th July 2023	R. Kiruba Sankar
ICT in agriculture	3rd August 2023	D. Karunakaran
Importance of balanced diet for women and children	08thAugust 2023	Pooja Kapoor
Sustainable pig farming for livelihood security and income generation'	31st August 2023	Arun Kumar De
Scientific duck farming	5th September 2023	T. Sujatha
Ornamental fish culture	7th September 2023	J. Praveenraj
Prevention and control of FMD in livestock	14th September 2023	Jai Sunder

Title	Date of broadcast	Expert
Balanced feed for rural poultry	26th September 2023	T. Sujatha
Aquatic animal disease surveillance and fish health management measures	28th September 2023	K. Saravanan
Entrepreneurship potentials of Quail farming in Andaman and Nicobar Islands	14th October 2023	R.R. Alyethodi
Animal genetic resources of Andaman and Nicobar Islands and importance of their conservation	2nd November 2023	Arun Kumar De
Bacterial wilt disease management in brinjal	9th November 2023	P.K. Singh
Agriculture technologies for self-employment CIARI initiatives	7th December2023	S.K. Zamir Ahmed
Clean milk production and concept of A1A2 milk	14th December 2023	Arun Kumar De
Pulse cultivation in rice fallow	21st December2023	P.K. Singh

l) Newspaper advisories

Title	Date of publication	Expert/ coordinator
Kisan Mela on Natural Farming	16th to 17th March 2023	P.K. Singh

(m) Demonstration of technology

S. No.	Technology	Venue	Number of participants			Coordinators
			Male	Female	Total	
1	**Demonstration of Dweep vertigrow**	Chuk Chu Cha, Perka and Tapoiming	3	-	3	I. Jaisankar T. Subramani Santosh Kumar

(n) Student guided

Name of the Scientist	Student Name	Degree/ University	Period
R.R. Alyethodi	Uday Kumar	M. Tech/ Bharathidasan University	6 months
K. Saravanan	Swastika Ghoshal	B.Sc. (Molecular Medicine and Stem Cell Technology)/ Amity University, Haryana	1 month

16. Linkage and Collaboration

ICAR-CIARI has developed linkages and Research, academic and extension.

Academic exchange with Agricultural Universities (OUAT, WBUAFS, BCKV, TNAU, TNAUVAS and TNFU)

Research Collaboration

- Chau Chak Wing Museum, University of Sydney
- Coconut Development Board, Kochi
- DAHVS, A&N Administration.
- DASD, Kozhikode, Kerala
- Directorate of Agriculture, A & N Administration
- ICAR Research Complex for NE Hill Region, Tripura centre
- ICAR-AICRP on Palms, Floriculture, Fruits, Vegetables, Tuber crops
- ICAR-Central Potato Research Institute, Shimla
- ICAR-Central tuber Crops Research Institute, Trivandrum
- ICAR-CIBA, Chennai
- ICAR-CIFT, Kochi
- ICAR-CIPHET, Ludhiana
- ICAR-CMFRI, Kochi
- ICAR-CPCRI, Kasaragod, Kerala
- ICAR-CTCRI, Thiruvananthapuram
- ICAR Institutes; IVRI, PD_ADMAS, CIRG, DPR, D-FMD, NRC Pig
- ICAR-CMFRI, Kochi
- ICAR-DFR, Pune
- ICAR-DMR, Solan
- ICAR-IARI, New Delhi
- ICAR-IIFSR, Modipuram
- ICAR-IIHR, Bengaluru, Karnataka
- ICAR-IISR, Kozhikode, Kerala

- ICAR-IISR, Mau, UP
- ICAR-NBAIM, Mau, UP
- ICAR-NBFGR, Lucknow
- ICAR-NBPGR, New Delhi
- ICAR-NFDB, Hyderabad
- ICAR-NRCB, Tiruchirapalli, Tamil Nadu
- ICFRE, Coimbatore
- IIRR, Hyderabad
- India Meteorological Department, Pune
- Indian Institute of Pulses Research, Kanpur
- Muséum national d'histoire naturelle, Paris
- NABARD, Port Blair
- National Horticulture Board, Gurugram
- NBAIR, Bengaluru
- NMPB, New Delhi
- RMRC, ICMR, Port Blair
- SAC, ISRO, Ahmedabad.
- Smithsonian institution, Washington
- Thackeray Wildlife Foundation, Mumbai, India
- University of Horticultural Sciences, Bagalkot, Karnataka
- UT Administration of Lakshadweep
- Zoological Survey of India, Kolkata

17. Personnel

Director Dr. Eaknath Bhanudasrao Chakurkar

HEAD / INCHARGE DIVISIONS / SECTION/ KVK

Head, Division of Animal Science	Dr. Jai Sunder
Head(A), Division of Natural Resource Management	Dr. T.P. Swarnam
Head(A), Division of Horticulture and crop improvement	Dr. Pankaj Kumar Singh
Head (A), Division of Fisheries Science	Dr. S.K. Zamir Ahmed
Senior Scientist & Head, KVK (South Andaman)	Dr. Y. Ramakrishna
Head of Office I/c	Shri. Sridham Kr. Biswas
Senior Administrative Officer I/c	Shri. Sridham Kr. Biswas
Finance & Accounts Officer I/c	Smt. Ashima Saha
Incharge, Priority setting, Monitoring & Evaluation Cell	Dr. Jai Sunder
Incharge, AKMU	Shri. D. Karunakaran
Incharge, Library	Dr. T. Sujatha
Incharge, Central Instrumentation Facility	Dr. Rafeeque Rahman Alyethodi
Incharge, Estate Section	Er. M. Arul Selvam
Incharge, Guest House	Shri. A.K. Tripathi
Incharge, Security Officer	Shri. P. Karupaiah
Farm Coordinator, Garacharma	Dr. T. Subramani
Farm Coordinator, Sippigaht Farm	Dr. Ajit Arun Waman
Farm Coordinator, Bloomsdale Farm	Dr. P.K. Singh
Farm Coordinator, Marine Hill	Dr. R. Kirubasankar
Incharge, ITMU	Dr. T. Sujatha
Incharge PG Cell	Dr. T. Sujatha
Hindi Cell I/c	Shri. Shyam Sunder Rao
Nodal Officer, Regional Centre, Minicoy	Dr. S.K. Zamir Ahmed
Incharge, Regional Station, Minicoy	Dr. Y. Gladston
Farm manager, Garacharma Farm	Shri. A.K. Tripathi
Farm manager, Sippighat Farm	Dr. V. Damodaran
Farm manager Bloomsdale Farm	Shri. Shyam Sunder Rao
Vigilance Officer	Dr. Jai Sunder
Nodal Officer, HRD	Dr. T.P. Swarnam
Central Public Information Officer	Dr. Rafeeque Rehman Alyethodi
Nodal Officer online ARMS	Dr. Jai Sunder
Nodal Officer, ASRB Online, ERP, SPARROW, E-OFFICE, E-HRMS & Krishi Kosh	Shri. D. Karunakaran
Nodal Officer, Court Case Monitoring System	Shri. Sridham Kumar Biswas
Nodal Officer, Swachh Bharat Abhiyan	Dr. I. Jaisankar
Nodal Officer, MGMG	Dr. S.K. Zamir Ahmed
Nodal Officer, STC	Dr. K. Saravanan

Division of Horticulture and Crop Improvement

- Dr. Pankaj Kumar Singh, Principal Scientist (Plant Breeding) & Head (A).
- Dr. Ajit Arun Waman, Scientist-SS (Spices, Plantation Crops, Medicinal and Aromatic Plants).
- Dr. Pooja Bohra, Scientist - SS (Fruit Science)
- Dr. Prabhu P., Scientist (Economic Botany & Plant Genetic Resources).

Division of Animal Science

- Dr. Jai Sunder, Principal Scientist (Veterinary Microbiology) & Head.
- Dr. D. Bhattacharya, Principal Scientist (Vet. Parasitology).
- Dr. T. Sujatha, Pr.Scientist (Poultry Science)
- Dr. P.A. Bala, Sr. Scientist (Animal Nutrition)
- Dr. A.K. De, Scientist (Animal Biotechnology).
- Dr. P. Perumal, Scientist (Animal Reproduction and Gynaecology).
- Dr. K. Muniswamy, Scientist (Animal Biotechnology).
- Dr. Rafeeque Rahman Alyethodi (Animal Genetics & Breeding).
- Dr. Sharath S. Yeligar, Scientist (Agricultural Economics).

Division of Natural Resource Management

- Dr. T. Subramani, Senior Scientist (Agronomy) and Head (A).
- Dr. I. Jaisankar, Senior Scientist (Agroforestry).
- Dr. Abhilash, Scientist (Agricultural Meteorology).
- Dr. Talaviya Harshangkumar, Scientist (Agricultural Chemicals).
- Dr. T. Bharathimeena, Scientist.

Division of Fisheries Science

- Dr. S.K. Zamir Ahmed, Principal Scientist (Agrl. Extension) Head(A)
- Dr. R. Kirubasankar, Sr. Scientist (Fish & Fisheries Science)
- Shri. D. Karunakaran, Scientist (Computer Application in Agriculture)
- Dr. K. Saravanan, Scientist (Fish Health)
- Shri. J. Praveenraj, Scientist (Fish Health)
- Dr. Chittranjan Raul, Scientist (Aquaculture)

Regional Station, Minicoy

- Mr. Gladston Y., Scientist (Fisheries Resource Management)
- Mrs. Ajina S.M., Scientist (Fisheries Resource Management)

Krishi Vigyan Kendra, Port Blair

- Dr. Y. Ramakrishna, Pr. Scientist & Head
- Dr. Zachariah George, Subject Matter Specialist (Animal Science)
- Dr. Pooja Kapoor, Subject Matter Specialist (Home Science)

Krishi Vigyan Kendra, North & Middle Andaman

- Dr. T. Damodaran, Sr. Scientist & Head.
- Er. Manoj Kumar, Subject Matter Specialist, (Agricultural Engineering).

Krishi Vigyan Kendra, Nicobar

- Dr. Santhosh Kumar, Sr. Scientist & Head.

18. New Entrants/ Transfer/ Promotion/ Retirement/Death

Appointment

- Dr. Chittranjan Raul, Scientist (Aquaculture) on 13th April, 2023.
- Dr. Abhilash, Scientist (Agricultural Meteorology) on 20th July, 2023.
- Shri. P. Prabhu, Scientist (Agricultural Meteorology) on 20th July, 2023.
- Shri. Sharath S. Yeligar, Scientist (Agricultural Economics) on 20th July, 2023.
- Shri. Talaviya Harshangkumar, Scientist (Agricultural Chemicals) on 20th July, 2023.
- Dr. V. Damodaran, Sr. Scientist-cum-Head KVK, Nimbudera on 3rd October, 2023.
- Shri. Santosh Kumar, Sr. Scientist-cum-Head KVK, Nicobar on 20th October, 2023.

Promotion

- Shri T.A. Kumar Tirkey, SSS to Technician (T-1) on 23.02.2023 (FN).
- Dr. K. Abirami Sr. Scientist to Pr.Scientist on 14th June, 2023.
- Dr. Jai Sunder, Pr. Scientist to Head, Animal Science Division on 16th June, 2023.
- Dr. T. Sujatha, Sr. Scientist to Pr. Scientist on 27th June, 2023.

Transfer

- Dr. R. Jaya Kumaravaradan, Scientist to ICAR-CICR, Nagpur on 31st March, 2023(Afternoon).
- Dr. Augustine B. Jerard, Pr. Scientist promoted as Project Coordinator in CPCRI, Kasaragod in AICRP on Palms on 4th May, 2023.
- Dr. T.P. Swarnam, Pr. Scientist transferred to ICAR-IIFSR, Modipuram, Meerut on 24th July, 2023.
- Dr. N. Bommayasamy, SMS transferred to ICAR-CCARI, Old Goa on 4th October, 2023.
- Dr. Bijaya Kumar Nanda, SMS transferred to ICAR-KVK, South Tripura on 3rd November, 2023.
- Dr. Sirisha Adamala, Scientist transferred to ICAR-NBSSLUP, Nagpur on 15th December, 2023.
- Dr. V. Baskaran, Pr. Scientist transferred to ICAR-IIHR, Bangaluru on 20th December, 2023.
- Dr. K. Abirami, Pr. Scientist transferred to ICAR-IIHR, Bangaluru on 20th December, 2023.

Retirement

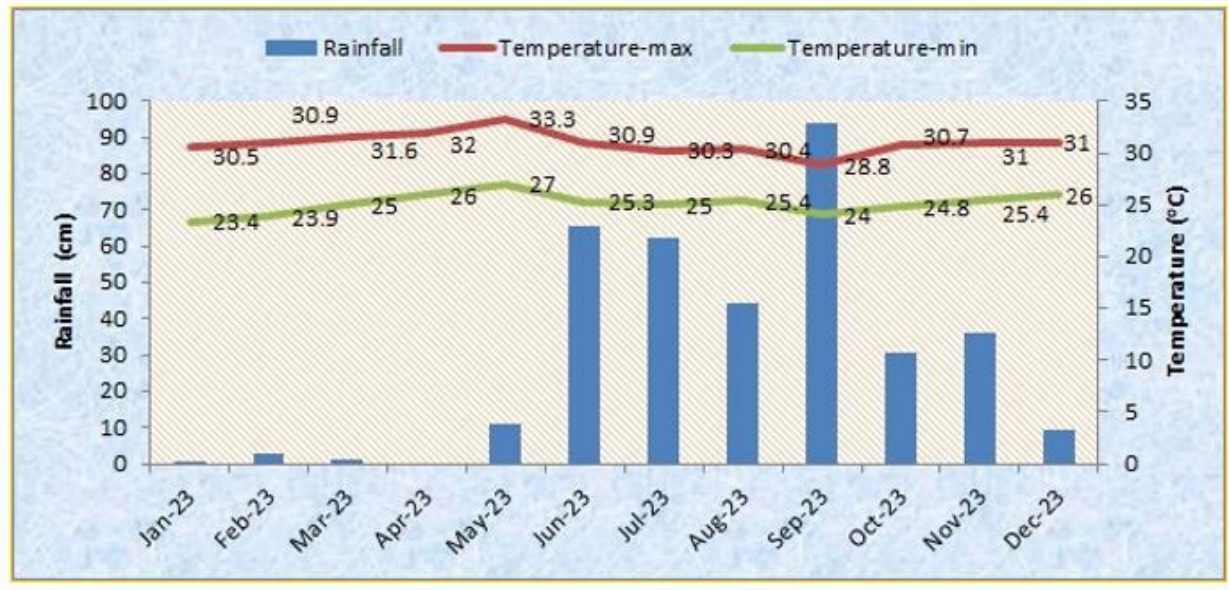
- Shri. Krishna Roy, SSS on 31st January, 2023.
- Shri M. Selvaraju, SSS on 28th February, 2023.
- Smt. Gynam, SSS on 31st March, 2023.
- Dr. S. Murugesan, ACTO on 31st March, 2023 (VRS).
- Dr. Benny Varghese retired on 31st May, 2023 (VRS).
- Shri. Sunil Chakraborty, STA on 30th November, 2023.
- Smt. K. Mangaiamma, SSS on 30th November, 2023.
- Smt. Radha, SSS on 30th November, 2023.
- Shri. K. Ali, SSS on 31st December, 2023.

Obituary

- Late Shri. Ganesh Bhagat, Skilled Supporting Staff , Animal Science on 16th August, 2023.

19. Weather Conditions at Port Blair, Andaman And Nicobar Islands: an Overview

Port Blair, Andaman and Nicobar Islands received a rainfall of 357.3 cm during the year (January 2023 – 26 December, 2023) in 142 rainy days. Analysis revealed that around 19% surplus precipitation was received in comparison to climatic normal, which was more than last year by 35% of 131 rainy days in 2022. Of this rainfall, 265.94, 75.88 and 15.48 cm were received from South-West (June - September), North-East (October-December) and post monsoon period (January-May), respectively. Rainfall received was the highest (94.01 cm) in September and the least in April (0.0 cm). The overall performance during the year was rated as normal. The year has recorded a mean annual temperature of 28.02 °C with a mean maximum and minimum temperatures of 30.9 and 25.1°C, respectively. Mean monthly temperature was the highest during May 2023 (33.3 °C) and the lowest during January, 2023 (23.4 °C). The climatic parameters are depicted in the figure below.



The Daily Telegrams
...the Largest Circulating Daily of the Islands
No. 73 Port Blair, Friday, March 17, 2023 Web: dt.andaman.gov.in

Two-day 'Kisan Mela' gets underway at ICAR-CIARI campus

CS stresses on the need for adoption of smart farming through use of technology & innovation

Exhorts for transferring technology from 'Lab to Field for the benefit of farming community

Urges for developing 'Brand Andaman' for its wider market reach

Staff Reporter

Port Blair, March 16 The two days Kisan Mela' on the theme 'Promoting Natural Farming' being organised by ICAR-CIARI, Port Blair along with its KVKs got underway with its inauguration by the Chief Secretary, A & N Administration, Shri Keshav Chandra, IAS as the chief guest at its Mela ground at Garacharma Research Complex here this morning. The Commissioner-cum-Secretary

the occasion. is to provide gathering, the Chief Horticulture Agriculture Pisciculture, Anima Husbandry Veterinary an Farming etc. must b passed on to th farming community at ground level an they must b encouraged to adop such technologie and reap the benefit to increase thei produce manifold The technical know how, researc activities technologica advancement whic are developed in th Research methods developed institutions should

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Field Day-cum-demo on "Speciality flower cultivation – a potential commercial venture in the Islands"

PORT BLAIR, AUG 2/--/The climatic H. psittacorum Cv. Parrot Beak, H.

ANDAMAN CHRONICLE
THE DAILY DIARY OF THE ISLANDS.

Second International Conference ICFPLS-2023 by PISRF & ASA at Port Blair Concludes

Denis Giles – 21 September 2023

Port Blair, Sept. 20: The Second International Conference on "Prospects and challenges of environm biological sciences in food production system for livelihood security of farmers (ICFPL-2023)" jointly organized by Pragati International Scientific Research Foundation (PISRF), Meerut, UP, India and An Science Association (ASA), Port Blair, Andaman & Nicobar Islands, India, in collaboration with ICAR-Island Agricultural Research Institute, Port Blair, Andaman & Nicobar Islands, India and Sardar Valla Patel University of Agriculture and Technology, (SVPUAT), Meerut, India, from September 18-20, 202 CIARI, Port Blair concluded today.

The Daily Telegrams
...the Largest Circulating Daily of the Islands
. 221 Port Blair, Thursday, August 17, 2023 Web: dt.andaman.gov.in

Hon'ble Lt. Governor, A&N Islands presenting LG's Commendation Certificates to the recipients on the occasion of 77th Independence Day

Hon'ble Lt. Governor presenting LG's Commendation Certificate to Dr. R Kiruba Sankar, Senior Scientist, Fisheries Resource Management, ICAR-CIARI.

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PUBLISHED SIMULTANEOUSLY FROM KOLKATA, SILIGURI, GANGTOK, GUWAHATI and PORT BLAIR
NO 28 PAGES 8 PORT BLAIR • TUESDAY • MAY 23, 2023

ASA, ICAR-CIARI organize workshop on 'Agro-Ecotourism'

PORT BLAIR, MAY 22/--/A two-day workshop on "Sustainable Agro-Ecotourism for A&N Islands: Opportunities and Challenges" to commemorate International Biodiversity day organized by Andaman Science Association (ASA), ICAR-Central Island Agricultural Research Institute in collaboration with Zoological Survey of India (ZSI), Botanical Survey of India (BSI), Anthropological Survey of India (ASI), National Institute of Ocean Technology (NIOT), Fishery Survey of India (FSI), Department of Ocean Studies and Marine Biology Department of tourism A&N Administration with financial support by NABARD, Port Blair was inaugurated today on 22nd May, 2023 at ICAR-CIARI, Port

initiatives of the Institute in conducting such important workshops for the stakeholders. He informed that A & N Islands has evolved as the best destination not only at National but also gaining more popularity elsewhere due to its exposure to sustainable practices that is local culture, food and behaviour.

The Guest of Honours, Smti. Archana Singh, General Manager, USP of ANI. She advocated that NABARD can facilitate launching of "My District My Project" to promote Agro eco-tourism in a team mode. She referred to the introduction of showcasing the local culture of ANI as that of Rajasthan local culture Chokhi Dahni. Dr. P. Abdul Salam, Asst. Professor, JNRM College, Port Blair informed that stakeholder should have wider and comprehensive understanding, so that agro eco-tourism can be promoted both nationally and internationally thus creating job opportunities and adding to National exchequer. Mr. Ankit Kumar Tripathi, Member Secretary, Tourist Vehicle Owners Association, Port Blair stressed to highlight resources of the Island (Flora & Fauna) followed by noting

अण्डमान निकोबार
द्वीप समाचार
संख्या 339 पोर्ट ब्लेयर, मंगलवार, 19 दिसम्बर 2023 web: www. and.n

द्वीपों में मसाला क्षेत्र को मजबूती प्रदान करने की पहल

आईसीएआर–सीआईएआरआई द्वारा कृषि विभाग के कर्मचारियों को नर्सरी तकनीक पर व्यावहारिक प्रशिक्षण दिया गया

पोर्ट ब्लेयर, 18 दिसम्बर।

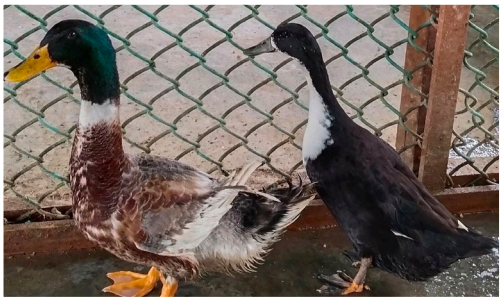
मसाले द्वीपों की प्रमुख व्यावसायिक फसले हैं, हालांकि द्वीपो मे उनकी खेती को कई चुनौतियों का सामना करना पड़ता है। इनमे से एक चुनौती गुणवत्तापूर्ण रोपण सामग्री की उपलब्धता है। भारतीय कृषि अनुसंधान परिषद (आईसीएआर)–केन्द्रीय द्वीपीय कृषि अनुसंधान संस्थान (सीआईएआरआई) में वर्षो के शोध के माध्यम से विभिन्न मसालो की कई बेहतर किस्मो को विकसित/पहचान किया गया है। साथ ही संस्थान में इन फसलो के लिए नर्सरी तकनीको का भी मानकीकरण किया गया है। इन तकनीको का प्रसार करने और कृषि विभाग के लिए विभिन्न फार्मों में काम करने वाले जमीनी स्तर के कार्यकर्ताओं को शिक्षित करने के लिए केन्द्रीय द्वीपीय कृषि अनुसंधान संस्थान द्वारा 'बागवानी फसलों (मसालों) की नर्सरी

पर सीएसएस–एमआईडीएच (एनएचएम) परियोजना तथा ताड़ परियोजना पर अखिल भारतीय समन्वित परियोजना के सहयोग से किया गया।

Registered Animal breeds of Andaman & Nicobar Islands

Andamani Pig

Andamani Goat



Andamani Duck

ICAR-Central Island Agricultural Research Institute

Port Blair -744105

Andaman & Nicobar Islands, India