वार्षिक प्रतिवेदन

ANNUAL REPORT

2024

भा.कृ.अनु.प.- केन्द्रीय तटीय कृषि अनुसंधान संस्थान, गोवा

ICAR - Central Coastal Agricultural Research Institute, Goa

(DARE, Ministry of Agriculture & Farmers' Welfare, Govt. of India)

Ela, Old Goa - 403 402, Goa, India

An ISO 9001:2015 Institution

Rice Terrace Fields (Canacona, Goa)| ©R. Solomon Rajkumar 2025

ICAR-CCARI

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भाकृअनुप
ICAR

Indian Council of Agricultural Research

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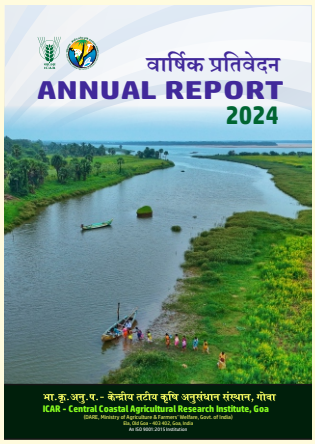

ICAR - CCARI Annual Report 2024

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Mission

The Institute was started with a mission to achieve, “Introduction and improvement of all potential crops and various species / breeds of livestock and scientific exploitation of various aquatic resources for improving fish production"

Mandate

- Researches on field and horticultural crops, livestock, and fisheries relevant to natural resource base of coastal India for sustainable productivity
- Develop climate resilient land use and farming systems for improved and sustainable livelihood through coastal agriculture
- Act as a centre of agro eco-tourism

Preface

Parveen Kumar
Director, ICAR - CCARI

I am immensely pleased to present the Annual Report 2024 of the ICAR–Central Coastal Agricultural Research Institute (ICAR–CCARI), Old Goa. This year marks the 36th year of our committed service to the farming communities of coastal India. Over the decades, the Institute has emerged as a leading center of excellence addressing the unique challenges and opportunities in coastal agriculture, contributing towards resilient, sustainable, and inclusive agricultural development.

The coastal regions of India, spanning nine states and two Union Territories, are home to 19.5 crore people and nearly 10% of the country's total geographical area. While ecologically fragile, these regions are rich in biodiversity and agricultural potential. However, they are increasingly exposed to risks such as soil salinity, sea-level rise, cyclones, and water scarcity. Against this backdrop, ICAR–CCARI has continued developing and disseminating climate-resilient, economically viable, and socially inclusive technologies tailored to the specific needs of coastal ecosystems.

The year 2024 witnessed several landmark achievements across the spectrum of research, extension, innovation, and policy engagement. Eleven varieties of various crops were submitted to the Central Varietal Release Committee (CVRC), and four elite cashew varieties were submitted to the State Varietal Release Committee (SVRC) in Goa. These varieties promise higher yields and are better adapted to coastal conditions. In addition, the Institute registered one important farmer variety and received two patents, reflecting our growing commitment to intellectual property and farmer-led innovation.

A significant scientific breakthrough this year was the development of the dual-stress-tolerant rice line 'Goa Dhan-5', which can withstand both salinity and submergence, challenges increasingly frequent under changing climatic scenarios. The Institute also expanded its genetic resource base by conserving 38 new traditional paddy varieties, taking the total germplasm collection to 190. Parallel breeding programs were initiated for aromatic, salt-tolerant rice and disease-resistant vegetable varieties such as okra, brinjal, and chilli.

In the domain of natural resource management, the Institute prepared scientifically validated land suitability maps for rice and coconut in the coastal region of India, along with a forest fire vulnerability map for Goa, which has already informed state-level planning. The revival of Khazan lands through integrated farming systems and land shaping interventions demonstrated a 72% reduction in soil salinity and a 300% increase in income compared to rice monoculture. This model has immense potential for replication across similar landscapes along India's western coast.

We continued to contribute significantly to the livestock and fisheries sectors. The release of the GOYA pig variety, well-suited to hot and humid climates, has gained traction with over 1,900 piglets distributed. Additionally, innovations such as duck-cum-

fish cage culture and crab farming models create alternative livelihood avenues for coastal farmers. Our portable bamboo-based aquarium, currently under commercialization, is a novel example of eco-friendly design inspired by local materials and needs.

ICAR–CCARI also maintained its leadership in scientific communication. During the reporting year, the Institute published 68 Scopus-indexed research articles, taking our cumulative tally to 499 with over 7,000 citations and an h-index of 41. Several of our scientists presented their work in international forums in China, Thailand, and Australia, reflecting the Institute's growing global presence.

The Institute's technology outreach continues to grow stronger. Our KVK and institutional extension programs benefited more than 1,000 SC/ST farmers across six states through SCSP and STC initiatives. Our digital platforms and mobile applications now reach over 60,000 users, and the Institute website recorded over 3.43 lakh hits in the past year. The Institute's achievements were featured in 135 news stories, enhancing our visibility and engagement.

We are also proud of our vibrant agribusiness ecosystem nurtured under the AGNI Agribusiness Incubation Center. With 35 incubatees from six states and an annual turnover of ₹90.5 lakh, this initiative is catalyzing rural entrepreneurship and job creation. Further, this institute has initiated a model agro-ecotourism village concept in the Canacona Taluka of Goa under the ICAR-STC Scheme. Our partnerships with IIT Delhi, Goa University, NGOs, and several government departments exemplify the spirit of collaborative science for development.

Beyond research and outreach, we have focused on holistic institutional development. Major infrastructure upgrades were undertaken, including guesthouse renovations, new training halls, and the inauguration of a new agroforestry block. The Institute pursued energy-efficient practices and waste-to-wealth models as part of our green initiatives, aligning with national priorities for sustainability and a low-carbon footprint.

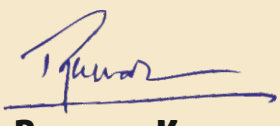
The Institute also celebrates its people our greatest asset. From recognizing the contributions of contractual staff through Shramik Samman Diwas to offering support to our team members' families and empowering farmworkers' children, we strive to be an inclusive and compassionate workplace.

This report is a tribute to the dedication of our scientific, technical and administrative staff, supporting staff, research scholars, and contractual staff, who have worked tirelessly to realize the Institute's mandate and aspirations. We also deeply acknowledge the guidance and support of the ICAR headquarters, our partners from academia, government, and industry, and the invaluable trust of the farming communities we serve.

As we move ahead, the Institute remains steadfast in its resolve to contribute meaningfully to Viksit Bharat @2047's national goals, the Sustainable Development Goals, and the vision of climate-resilient, demand-driven, and inclusive growth of coastal agriculture. Together, we continue walking the path envisioned by the luminaries of Indian agriculture, especially Bharat Ratna Dr. M.S. Swaminathan, whose words remind us:

"If agriculture goes wrong, nothing else will have a chance to go right in the country"

With renewed energy and a shared commitment to innovation and research as per stakeholders' needs, we look forward to another year of meaningful contributions.



Parveen Kumar
Director, ICAR - CCARI

कार्यकारी सारांश

भा.कृ.अनु.प. - केंद्रीय तटीय कृषि अनुसंधान संस्थान प्राकृतिक और आनुवंशिक संसाधनों का संरक्षण, प्रबंधन और उपयोग, फसल उत्पादन तकनीक, पशु और मत्स्य पालन, कटाई उपरांत प्रबंधन, प्रसंस्करण एवं मूल्य वर्धन तकनीकों और कृषि पर्यावरण-पर्यटन इत्यादि विषयों पर अनुसंधान करता है। वर्ष 2024 के मुख्य अनुसंधान उपलब्धियों की टिप्पणियाँ निम्नलिखित हैं:

प्राकृतिक संसाधन प्रबंधन

- दीर्घकालिक प्राकृतिक खेती (25 वर्ष अवधि) ने 90-95% पारंपरिक उपज को बनाए रखा और लागत में 20-25% कमी दर्ज किया। जबकि इसने मृदा की सेहत में महत्वपूर्ण सुधार किया-सूक्ष्मजीव जैव द्रव्यमान में 15-20%, मृदा के कार्बन और जल संरक्षण 20-22% तक की वृद्धि -प्राकृतिक खेती के तरीकों द्वारा जैसे कि अंतराल में घास का कवर, न्यूनतम जुताई, और नियमित रूप से जीवामृत और घनजीवामृत के अनुप्रयोग।
- पशुधन अपशिष्ट मूल्यवर्धन प्रणाली (LWVS) प्रति दिन 200 कि.ग्रा. गोबर को बायोगैस और ग्रेन्यूलेटेड फॉस्फो-ऊर्जा PROM में परिवर्तित करती है, जो वार्षिक रूप से ₹1.71 लाख उत्पन्न करती है। फॉस्फो-ऊर्जा के उपयोग ने धान की उपज में 23% तक की वृद्धि और फॉस्फोरस उपयोग दक्षता में 30% का सुधार किया, जो तटीय क्षेत्रों में पोषक तत्व पुनर्चक्रण और जैविक कृषि के प्रचार के लिए एक स्केलबल मॉडल प्रस्तुत करता है।
- गोवा के तटीय खजान भूमि का विज्ञान-आधारित पुनर्स्थापन, भूमि आकारण, लवण क्षेत्र ज़ोनिंग और मिनी खजान इकाइयों के माध्यम से मृदा की लवणता में 70% की क्षति और दोगुना उपज उपलब्ध हुआ। इससे बहु-उद्यमी प्रणालियों जैसेकि, एक्वाकल्चर और चारा(Co-5: 38-42 टन/हेक्टेयर) उत्पादन आदि केलिए सक्षमता, साथ ही कृषि-इकोटूरिज़्म की शुरूआत और किसान अभिग्रहण में वृद्धि (72%) हुई, जिससे अनुकूल भू-प्रयोग के स्केलबल मॉडल प्राप्त हुआ।
- तमिलनाडु, आंध्र प्रदेश, ओडिशा और पश्चिम बंगाल के तटीय जिलों के लिए चरम मौसम संकेतकों की गणना दैनिक

अधिकतम, न्यूनतम तापमान और वर्षा के डेटा सेट के उपयोग द्वारा की गई। प्रत्येक संकेतक के लिए सीमा मानों की पहचान उपज विसंगति सूचकांक (YAI) के साथ संकेतकों को प्रत्यावर्ती करके की गई। यह देखा गया कि चरम मौसम की घटनाओं का धान की उत्पादकता पर नकारात्मक प्रभाव पड़ा। बोरुटा फीचर चयन एल्गोरिदम के उपयोग द्वारा धान की उपज को क्षति पहुंचानेवाले महत्वपूर्ण चरम मौसम संकेतकों की पहचान किया गया।

- कर्नाटका और गोवा के तटीय जिलों से लगभग 260 मृदा के नमूने एकत्रित किए गए। उनके मृदा जलधारिता (FC) और स्थायी म्लानि बिंदु (PWP) पर नमी की मात्रा का अनुमान लगाया गया, जो 2.15-53.77% और 0.9-32.57% के बीच पाया गया, जिनका औसत मूल्य क्रमशः 20.67 और 12.68% था।
- कर्नाटका के छह जिलों (दावणगिरी, चित्रदुर्ग, टुमकुर, मंड्या, हासन और चिकमंगलुरु) में अमृत महल की घास-भूमियों (कुल २२० स्थानों) के वर्ष 2014 और 2024 के जैव भौतिक मापदंडों का मूल्यांकन किया गया। जैव द्रव्यमान पूर्वानुमान के लिए उपयोग किए गए नौ मशीन लर्निंग मॉडलों में, रैंडम फॉरेस्ट और एक्सजीबूस्ट ने सबसे अच्छा प्रदर्शन किया, जिसमें जैव द्रव्यमान उत्पादकता 1.61 से 4.25 टन प्रति हेक्टेयर के बीच रही, जो मिट्टी के मापदंडों, ऊँचाई और ढलान से प्रभावित थी।
- गोवा के प्रमुख फसलों का CWR 351-1284 मिमी/वर्ष के बीच रहा जबकि प्रभावी वर्षा और फसल के मौसम को ध्यान में रखते हुए, फसलों की सिंचाई की आवश्यकता 338-859 मिमी के बीच रही।
- विभिन्न RCP जलवायु परिवर्तन परिदृश्यों के तहत सुपारी और नारियल के CWR 2050 में 10.6-13.5%, 2.1-4.7% और 2080 में 11.2-18.1%, 2.6-8.9% के बीच तक बढ़ने की उम्मीद है।
- जलग्रहण क्षेत्रों के नमूनों के विश्लेषण से पता चला कि N, P और K क्रमशः 12.5-928.2 कि. ग्रा./हे., 2.6-173.4 2 कि. ग्रा./हे. और 40.1-369.6 2 कि. ग्रा./हे.के बीच पाए गए, जिसमें प्रमुख क्षेत्रों में N और P निम्न से मध्यम स्तर के अंतर्गत है और K मध्यम स्तर के पाए गए।
- जलग्रहण भूमि के नमूनों में जैविक कार्बन (SOC) में काफी भिन्नता, 0.29-6.43% , जिनका औसत माप 1.95 ± 0.93% था।
- गोवा में 0.5 हेक्टेयर क्षेत्रफल में फसलों, डेयरी, पोल्ट्री और मछली में धान आधारित एकीकृत कृषि प्रणाली (IFS) स्थापित की गई। इस प्रणाली से प्रति वर्ष 1.81 लाख रुपये की शुद्ध आय प्राप्त हुई जिससे धान-परती प्रणाली की तुलना में शुद्ध आय में 241% और 114% की वृद्धि हासिल हुई। चURITY अपलैंड स्थितियों के लिए 0.79 हेक्टेयर क्षेत्र में मानकीकृत किए गए प्लांटेशन फसल-आधारित IFS। उपभूमि केलिए रोपण फसल-आधारित 0.79 हेक्टेयर क्षेत्रफल के मॉडल से सुपारी व काजू, नारियल के उपज में एकल प्रणालियों की तुलना में क्रमश: 83.2% और 78.3% की वृद्धि पाई गई। जल संरक्षण उपायों द्वारा, जिनमें एक क्षेत्रीय तालाब शामिल है, ग्रीष्म ऋतु के सिंचाई के लिए ~400 क्यूबिक मीटर जल भंडारित किया गया। इस प्रणाली द्वारा प्रति वर्ष 2.01 लाख रुपये की शुद्ध आय उत्पन्न हुआ, जिसमें लाभ: लागत 3.4 और 309 श्रम दिवसों/वर्ष के रोजगार प्राप्त हुआ।
- विभिन्न धान-आधारित फसली प्रणालियों का मूल्यांकन किया गया ताकि लवणता प्रभावित तटीय मृदाओं में फसल उत्पादन की तीव्रता को बढ़ाया जा सके। इन प्रणालियों में धान–राजमा, धान–मीठी मकका, धान–बेबी कॉर्न, धान–मिर्च, धान–भिंडी, धान–हरी सब्जियाँ, और धान–चारा फसलें शामिल थीं। इनमें से, धान–भिंडी प्रणाली ने सबसे उच्च धान समकक्ष उपज (4.7 क्विंटल/हेक्टेयर) और शुद्ध आय (₹88,570/हेक्टेयर) का रिकॉर्ड किया गया, जो बेहतर लाभप्रदता का संकेत देता है। धान–मीठी मक्का और धान–मिर्च ने भी 2.4 और 1.6 क्विंटल/हेक्टेयर की REY के साथ आशाजनक प्रदर्शन दिखाया। उच्च मूल्य वाली फसलों जैसे भिंडी, मीठी मकई, मिर्च, और हाइब्रिड नपीयर (CO-5) का एकीकरण भारत के पश्चिमी तट के लवणता प्रभावित तटीय मृदाओं में उत्पादकता और लाभप्रदता को बढ़ाने में प्रभावी साबित हुए।

फसल विज्ञान

- कुल एक सौ चालीस धान के वंशाणु अभिगमनों, जिनमें लेंडरेसस, जंगली प्राजातियों और उन्नत प्रजनन पक्तियाँ शामिल हैं, की विभिन्न कृषि-सांगीतिक गुणों के लिए विशेषताएँ निर्धारित की गई।
- उनतीस भिन्न वांशिक आबादियों का प्रजाति विकास एवं लवणता सहिष्णु जीनों के मानचित्रण के लिए विकसित की गई, जिन्हें एकल बीज वंश (SSD) विधि का पालन करते हुए

आगे की पीढ़ियों में बढ़ाया गया। आगे के प्रयोग हेतु प्रत्येक पौधे से एकल पेनिकल्स का संग्रह किया गया।

- बत्तीस आशाजनक उन्नत प्रजनन पंक्तियों और सात चेक किस्मों का बारानी उथली तराई परिस्थितियों में सर्वश्रेष्ठ प्रविष्टियों की पहचान के लिए मूल्यांकन की गई। क्रमश: अधिकतम उपज ABL 18 में 7845.2 कि.ग्रा./हे., ABL 17 में 7397.6 कि.ग्रा./हे, ABL 24 में 7095.2 कि.ग्रा./हे, ABL 38 में 6952.4 कि.ग्रा./हे, ABL 33 में 6809. कि.ग्रा./हे और ABL 15 में 6483.3 कि.ग्रा./हे पाया गया।
- उपरोक्त पंक्तियों के साथ-साथ छ: चेक किस्मों को तटीय लवणता पारिस्थितियों के तहत मूल्यांकन किया गया ताकि सर्वश्रेष्ठ प्रविष्टियों की पहचान किया जा सके। ABL 142 में 5017.67 कि.ग्रा./हे., का उच्चतम उत्पादन दर्ज किया गया, उसके बाद ABL 155 में 4688.5 कि.ग्रा./हे., ABL 161 में 4395.24 कि.ग्रा./हे., ABL 151 में 4395.24, ABL 131 में 4390.5 कि.ग्रा./हे., और ABL 184 में 4257.5 कि.ग्रा./हे. पाया गया।
- जया x गोवा धान 2 के संकर RIL आबादी का मूल्यांकन सितंबर 2023 के खरीफ के दौरान सामान्य और तनावग्रस्त पारिस्थितियों में किया गया। सामान्य परिस्थितियों में, पचास प्रतिशत फूलने की अवस्था 61-135 (औसत 98.71)दिनों के बीच था, प्रति टीलर उत्पादक टिलर 3.6 से 12.8(औसत 6.52), पी-टेस्ट वजन 22.75 - 40.87 (जिसका औसत 31.70) और उपज 341.46 कि.ग्रा./हे. से 9985.0 कि.ग्रा./हे. (औसत 4324.95 कि.ग्रा./हे.) पाए गए।
- तनावग्रस्त परीस्थिति में, पचास प्रतिशत फूलने की अवस्था 82 -136 दिनों (औसत 108.62), प्रति हिल उत्पादक टिलर्स 3.4 से 13.00 के बीच(औसत 7.37), परीक्षण वजन 17.05 से 39.41 (औसत 28.05) ग्राम के बीच, धान की पैदावार 166.67 -8727.26 (औसत 2520.24) कि.ग्रा./हे.से के बीच था।
- धान की किस्में जैसे गोवा धान 1, गोवा धान 2, गोवा धान 3 और गोवा धान 4 और लोबिया की किस्म गोवा काउपी 3 में प्रजनक बीज उत्पादन की गए। प्रजनक बीजों के अलावा, धान की किस्मों जैसे जया, ज्योति, करजत 3 और सहभागी धान में टी.एल. बीज उत्पादन किया गया। वर्तमान वर्ष के दौरान संस्थान के खेत में कुल 16.5 टन बीज का उत्पादन हुआ।
- कनकोना ब्लॉक के गाँवडोंगरिम और कोतिगाँव में किसानों के खेतों में सूखा सहोशनु धान की किस्म सहभागीधान पर 18 फ्रंटलाइन डेमोंस्ट्रेशन आयोजित किए गए। सहभागीधान की अनाज पैदावार 44 से 48 कि.ग्रा./हे. तक थी जबकि चेक किस्मों में यह 29 से 33 कि.ग्रा./हे. थी। सहभागीधान किस्म का अनाज उत्पादन और भूसे की पैदावार स्थानीय किस्मों से श्रेष्ठ पाई गई।

बागवानी विज्ञान

- संस्थान ने अपने सब्जी अनुसंधान परियोजना के तहत मोमर्दिका सह्याद्रिका 'साह्याद्री लौकी' पर अध्ययन द्वारा 'गायनो-सिस संकर' शब्दावली को विज्ञान संचार में पहली बार पेश किया गया।
- मोमोर्डिका सुबंगुलाटा उपभेद रेनिगेरा कलटिवर .अर्का भारत (टीसल गोर्ड) और मोमोर्डिका सह्याद्रिका (सह्याद्रि कद्दू) जीनोटाइप के बीच सफलतापूर्वक अंतरजातीय संकर किए गए और परिणामस्वरूप प्राप्त अंतरजातीय संकर बीज संतान में अंतरजातीय एकलिंगाश्रयी नर और अंतरजातीय एकलिंगाश्रयी मादा पाए गए।
- मोमोर्डिका सुबंगुलाटा उपप्रजाति रेजिनेरा कलटिवर अर्का भारत (एकलिंगाश्रयी मादा) और मोमोर्डिका सह्याद्रिका (एकलिंगाश्रयी नर) के बीच अंतरजातीय संकर केवल तब कम बीज वाले फल देते हैं जब मैन्युअल रूप से मोमोर्डिका सुबंगुलाटा उपप्रजाति रेजिनेरा कलटिवर अर्का भारत (एकलिंगाश्रयी नर) द्वारा परागित किया जाता है।
- मोमोर्डिका प्राजातियों के 11 जीनोटाइप्स का इन- situ रखरखाव ('गायनो-सिस संकर (03), मोमोर्डिका सुबंगुलाटा उपभेद रेनिगेरा कलटिवर .अर्का भारत और मोमोर्डिका सह्याद्रिका के मध्य एक अन्तर्जातीय संकर (04) तथा मोमोर्डिका सह्याद्रिका और मोमोर्डिका सुबंगुलाटा उपभेद रेनिगेरा कलटिवर अर्का भारत के बीच एक अंतर्विधीय संकर (02), अर्का भारत (02)} किया गया।
- सहायक फसलों के अखिल भारतीय समन्वयित परियोजना के अंतर्गत, कुल 15 परीक्षण 01 सरसों की साग (AVT I), 04 भिंडी (IET Hyb. रिसर्च, Var. रिसर्च IET, AVT I, AVT II), 07 टमाटर (IET BW, Hyb. Det. IET, AVT I, AVT II, Var. Det. IET, AVT I, Var. Indt. IET), 01 मिर्च हाइब्रिड AVT I, 01 फ्रेंच बीन्स (बुश IET), 01 क्लस्टर बीन्स IET का आयोजन किया गया और परियोजना समन्वय इकाई को रिपोर्ट पेश किया गया।
- कोकम बीजों से जैव-तापीय उपचार द्वारा बेहतर गुणात्मक

एवं उच्च निष्कर्षण दक्षता के साथ मखखन प्राप्त की गई।

- दो नए यीस्ट एक्सेसशन की पहचान एवं उनकी विशेषताएं निर्धारित की गईं और इन्हें ICAR-NBAIM भंडार में एक्सेस्शन नंबर के साथ जमा किया गया।
- कोकम के अपशिष्ट छिलके आधारित मर्मलाड को विकसित किया गया और उसके विसलेशन द्वारा पाया गया कि इसमें एंटीऑक्सीडेंट, विटामिन C और फेनोलिक सामग्री उपलब्ध है। इसे उपभोक्ताओं से स्वीकार्यता का उच्च दर भी प्राप्त हुआ।
- काजू के सेब से बने आटे, गेहूं तथा रागी के आटे से बने बिस्कुटों के प्रक्रिया का विकास एवं मानकीकरण किया गया और उनके बनावट, भौतिक-रासायनिक गुणों का परीक्षण किया गया।
- आर. टी. ई. जैकफ्रूट शाकुती के लिए प्रक्रिया मानकीकरण अग्नि फूड हब के प्रोग्रामेबल वॉटर शावर रिटॉर्ट का उपयोग करके किया गया। भंडारित किए गए उत्पादों में दो उपचारों की स्वीकार्यता का उच्च स्तर था और शेल्फ स्थिरता तथा एस-टेस्ट भी बेहतर पाए गए।
- नाटा-डे-काजू के संश्लेषण के लिए एक नए सूक्ष्मजीव की पहचान की गई और ICAR-NBAIM में स्वीकृति संख्या के साथ जमा किया गया।
- ·वर्ष 2024 में ICAR-CCARI एग्री बिजनेस सेंटर में कुल 12 नए इंक्यूबेट पंजीकृत किए गए, और छह ने अपना इंक्यूबेशन चरण अवधि को छह महीने (जनवरी - दिसंबर 2024) के लिए जारी रखा। सात इंक्यूबेटियों ने अपने व्यापार को पंजीकृत किया है। AGNI ने अपनी विविध गतिविधियों के माध्यम से 14,26,009/- रुपये की आय उत्पन्न की है।
- वर्ष 2024 में मास्टर ट्रेनर, डॉ. मतला जूलियट गुप्ता द्वारा ICAR-CCARI में पी एम एफ एम ई योजना के अन्तरगत जिला संसाधन व्यक्तियों का प्रशिक्षण आयोजित किया गया।

पशु विज्ञान और मत्स्य विज्ञान

- ·प्रजनन संबंधी बीमारियाँ डेयरी किसानों के लिए एक बड़ा मुद्दा हैं। रिपोर्टिंग अवधि के दौरान, गोवा और महाराष्ट्र में स्थित 13 डेयरी फार्मों से कुल 201 गायों के गर्भाशय स्वाब के साथ रक्त के नमूने एकत्रित किए गए और प्रजनन रोगजनकों की पहचान के लिए जांच की गई। डेयरी मवेशियों में दर्ज की गई महत्वपूर्ण प्रजनन समस्याएं पुनरावृत्त प्रजनन (6.46), गर्भपात (1.99%), निसंतानता (1.49%), एनेस्ट्रस (0.49%), एंडोमेट्रैटिस (0.49%), योनि प्रोलैप्स (0.49%), गर्भाशय प्रोलैप्स (0.49%) थे। इन स्थितियों में पाए गए रोगजनक ब्रुसेला (१२.९३%), ई. कोली(८.४५%), स्टाफिलोकोकस spp. (6.96%), एवं थीलेरिया ओरिएंटालिस (14.92%) थे।
- स्थानीय तटीय पारिस्थितिकी से संबंधित स्वदेशी पशु प्रजातियों का विस्तृत अध्ययन किया गया। इनके स्वदेशी शूकरों में स्खलन मात्रा और शुक्राणु घनत्व में महत्वपूर्ण रूप से कमी पाई गई, जबकि प्रतिक्रिया समय और पुनर्निवृत्ति अवधि महत्वपूर्ण रूप से अधिक थी। ये निष्कर्ष स्वदेशी शूकरों में कमजोर लिबीडो और कठिन वीर्य दाता चरित्र का संकेत देते हैं। शुक्राणु गतिशीलता और उन्नत शुक्राणु गतिशीलता मापदंडों का मूल्यांकन पहली बार स्वदेशी कोंकण कण्याल बकरियों और अगोंडा गोवं शूकर नस्लों में कंप्यूटर सहायता प्राप्त वीर्य विश्लेषण के उपयोग द्वारा किया गया। कोंकण कण्याल के लिए, शुक्राणु वक्र-रेखीय गति (VCL), सीधी रेखा गति (VSL), औसत पथ गति (VAP), पार्श्व सिर विस्थापन की एम्पलिटयूड (ALH) क्रमशः 60.69 µm/s, 27.37 µm/s, 52.40 µm/s और 7.71 µm के रूप में दर्ज की गई। अधिकांश प्रमुख शुक्राणु गतिशीलता और गतिशील मापदंड अन्य पश्चिमी ततीय नस्लों के साथ तुलनीय थे।
- उन्नत फ्लोरोसेंट रंगाई तकनीकों के उपयोग से इन-विट्रो शुक्राणु गुणों का जैसेकि शुक्राणु DNA, प्लाज्मा झिल्ली और एक्रोसोमल अखंडता का मूल्यांकन करने के लिए किया गया। कोंकण कन्याल अंडर शुक्राणुओं के नमूनों में, संपूर्ण DNA वाले शुक्राणुओं का औसत प्रतिशत (99.55%) अधिक पाया गया जबकि विकृत या खंडित न्यूक्लीयर DNA वाले शुक्राणुओं का औसत प्रतिशत केवल 0.45% था, जो उचित DNA अखंडता और जीवंतता का संकेत देता है।
- शूकरों में तरल वीर्य का उपयोग करते हुए कृत्रिम गर्भाधान और नियंत्रित प्रजनन जिसमें एस्टरस और समकालिकरण की मानकीकृत तकनीक शामिल थीं, संस्थान में और किसानों के प्रक्षेत्र में किए गए। कुल 428 पिगलेट 91 कृत्रिम गर्भाधान और 59 प्रसवों के माध्यम से पैदा हुए, औसत लिटर का माप 7.25 और दूध छुड़ाने के समय का लिटर माप 6.82 था।
- स्रीनिधि पक्षियों में एआई और कंप्यूटर सहायता प्राप्त वीर्य विश्लेषण के प्रक्रियाओं को मानकीकरण किया गया। संस्थान

की इकाइयों के चयनित झुंडों में एआई को 95.56% की औसत प्रजनन दर और 77.89% की हैचबिलिटी के साथ सफलतापूर्वक अपनाया गया।

- कैथारैंथस रोजियस (विंका रोज़ा), निर्गुंडी (विटेक्स नेगुंडो) पत्ते, पलाश (ब्यूटिया मोनोस्पर्मा), पलाश का फूल, अमरुद (पीसिडियम ग्वाज़ावा), शमी (प्रोसोपिस साइनरिया), अशोक (सारका एसोका) का पेड़ की छाल, तुलसी (ओसिमुम टेनीफ्लोरम), मधुनाशिनी (जिम्नेमा सिल्वेस्ट्रे), बेल (एग्ले मार्मेलोस) के पत्ते, गिलोय (टिनोस्पोरा कॉर्डिफोलिया) का ताना, अर्जुन पेड़ (टर्मिनालिया अर्जुन) की छाल, भूमि आमला (फाइलेंथस नीरुरी)। सबसे प्रभावी निष्कर्ष ओसिमुम टेनीफ्लोरम आदि पौधों के मेथेनॉलिक निष्कर्षों की एंटीमाइक्रोबियल गुणों का आकलन किया गया। सबसे प्रभावी अर्क ओसिमम टेनीफ्लोरम था जिसमें स्टैफीलोकॉक्सस ऑरियस और एस. एपिडर्मिडिस के खिलाफ 1.562mg/ml का MIC था।
- राष्ट्रीय पशु रोग महामारी विज्ञान नेटवर्क के हिस्से के रूप में, पशुधन रोग प्रकोप जांच और मासिक रोग प्रकोप रिपोर्टिंग की गई। थीलेरिया ओरिएंटालिस (44 प्रकोप) संक्रमण, बैबेसिया बॉविस (2), ब्रुसेलोसिस के कारण गर्भपात (2) और लंप्की स्किन डिजीज (1) और मिश्रित संक्रमण और ई कोलाई तथा स्ट्रेप्टोकोकस के साथ सेप्टीसीमिया (1) जैसे प्रकोपों को प्रयोगशाला विश्लेषण द्वारा पुष्टि की गई। । इनके अतिरिक्त अफ्रीकी स्वाइन बुखार के तीन संदिग्ध प्रकोप, एक पोल्ट्री में फाउल पॉक्स (1), ई कोलाई सेप्टीसीमिया (2) और तीन एवियन ल्यूकोसिस (3) प्रकोप भी पाए गए थे। गोवा के एक बकरी फार्म से सार्कोप्टेस स्कैबीई पैरेसाइट आइसोलेट का फाइलोजेनेटिक विश्लेषण 16S rRNA और ITS-2 अनुक्रमों के आधार पर किया गया और अनुक्रमों को NCBI जीनबैंक में जमा किया गया और अकसेसेन संख्या PP974324 और PP974325 प्राप्त की गई।
- फाइटोजेनिक फीड एडिटिव्स जैसे, ओसिमम टेनीफ्लोरम, मोरिंगा ओलेफेरा, सॉरोपस एंड्रोगाइनस, एंडोग्राफिस पैनिकुलेट, अल्पिनिया गैलंगा, कर्क्यूमा लोंग और जिंजिबर ऑफिसिनले को CARI डेबेंद्र मुर्गियों (चूजों, लेयर्स) के फीड में पूरक के रूप दिया गया ताकि उत्पादन प्रदर्शन और अंडों का पोषकतत्व- वर्धन का मूल्यांकन किया जा सके। प्रयोगात्मक आहार बनाने के पूर्व इन स्थानीय किस्मों में बायोमार्कर का स्क्रीनिंग UV-Vis, FTIR और GCMS के माध्यम से किया गया। नेटवर्क फार्माकोलॉजी, आणविक डॉकिंग और परीक्षण मूल्यांकन की एकीकृत रणनीति भी कार्य के तंत्र की जांच करने के लिए की गई। इन-फ़ीड पूरकताओं के 2% के उपयोग ने चूज़ों के विकास, इम्यून रिस्पॉन्स, रक्त विज्ञान और आंतों के स्वास्थ्य पर सकारात्मक प्रभाव डाला। लेट फेज लेयर्स में, प्रयोगात्मक आहार के 3% सुपरइंपोज़िशन द्वारा अंडों की गुणवत्ता और पोषण मूल्य में सुधार हुआ। उपचार समूहों में नियंत्रण समूह की तुलना में आवश्यक एमिनो एसिड, फैटी एसिड और विटामिन D3 सांद्रता में महत्वपूर्ण वृद्धि और उच्च ऊर्जा सामग्री दर्ज की गई।
- व्हाइटलेग झींगा पालन प्रणालियों की जीवन चक्र मूल्यांकन (LCA) में पाया गया कि HDPE-लाइनिंग वाले तालाबों का वैश्विक तापमान बढ़ाने की क्षमता (369.04 कि.ग्रा. CO_2 समतुल्यता) मिट्टी के तालाबों (268.06 कि.ग्रा. CO_2 समतुल्यता) की तुलना में 37.7% अधिक थी, जिसमें बीज उत्पादन और ऊर्जा उपयोग को प्रमुख योगदानकर्ता के रूप में पहचाना गया। एशियाई समुद्री बास खेती के आर्थिक मूल्यांकन में, मिट्टी के तालाबों में उत्पादन लागत सबसे कम (₹178/ कि.ग्रा.) और शुद्ध लाभ सबसे अधिक (₹355.67/ कि.ग्रा.) पाया गया, जबकि पिंजरे की खेती ने सबसे अधिक उपज (6.70 कि.ग्रा./घन मी.) दर्ज किया।
- जलवायु-स्थिर केकड़ा पालन के लिए फ्लोटिंग एचडीपीई बैरलों का उपयोग करने से प्रति बैरल ₹800-1,000 मासिक आय की वृद्धि हुई और इसे 300 प्रशिक्षित किसानों में से 120 ने अपनाया। परिष्कृत मसल कल्चर तकनीकों का बड़े पैमाने पर प्रदर्शन (1,000 m^2) ने 2.32 लाभ-व्यय अनुपात और प्रति रैक ₹27,900 की शुद्ध आय दर्शाया - पारंपरिक प्रणालियों की तुलना में लाभप्रदता दुगुना से अधिक दर्शाया गया।

Executive Summary

ICAR- Central Coastal Agricultural Research Institute conducts strategic and applied research under various research themes: conservation, management and utilization of natural and genetic resources, production technologies for crops, animals and fisheries, postharvest technologies, and agro eco-tourism. The research projects have been streamlined into five mega themes. The highlights of the research achievements for the year 2024 are presented below.

Natural Resource Management

- Long-term natural farming (25 years) reduced input costs by 20–25% while maintaining 90–95% of conventional yields. It improved soil health significantly—boosting microbial biomass by 15–20%, soil organic carbon, and water retention by 20–22%—through natural farming practices like interspace weed cover, minimal tillage, and regular application of Jeevamrut and Ghanajivamrut.
- The Livestock Waste Valorization System (LWVS) converts 200 kg/day of dung into biogas and granulated Phospho-Urja PROM, generating ₹1.71 lakh annually. Phospho-Urja enhanced rice yields by up to 23% and phosphorus use efficiency by 30%, offering a scalable model for nutrient recycling and organic farming promotion across coastal regions.
- Science-led restoration of Goa's coastal *Khazan* lands through land shaping, salinity zoning, and Mini *Khazan* units reduced soil salinity by over 70% and doubled yields, enabling multi-enterprise systems, aquaculture, and fodder cultivation (Co-5: 38–42 t/ha), while also introducing agro eco-tourism and boosting farmer adoption (72%), forming a scalable model for resilient land use.Extreme weather indices have been calculated for coastal districts of Tamil Nadu, Andhra Pradesh, Odisha and West Bengal using the daily maximum, minimum temperature and rainfall dataset. Threshold values for each indicator were identified by regressing the indices with yield anomaly index (YAI).It was observed that extreme weather events had negative impacts on rice productivity. Boruta feature selection algorithm was used to identify the important extreme weather indices causing rice yield loss.
- Around 260 soil samples were collected from coastal districts of Karnataka and Goa. The soil moisture content at field capacity (FC) and permanent wilting point (PWP) was estimated which varied from 2.15-53.77% and 0.9-32.57% with mean values of 20.67 and 12.68%, respectively.
- A survey of Amrit Mahal grasslands across six districts in Karnataka (Davanagere, Chitradurga, Tumkur, Mandya, Hassan, and Chikmagalur) was conducted, covering 220 locations and assessing biophysical parameters for 2014 and 2024. Among nine machine learning models used for biomass prediction, Random Forest and XGBoost performed the best with biomass productivity ranging from 1.61 to 4.25 tons per hectare, influenced by soil parameters, elevation, and slope.
- Crop water requirement (CWR) of major crops of Goa ranged from 351-1284 mm/year whereas considering the effective rainfall and cropping season, irrigation water requirement of the crops ranged from 338-859 mm.
- CWR of arecanut and coconut is expected to increase in the range of 10.6-13.5%, 2.1-4.7% in the year 2050 and 11.2-18.1%, 2.6-8.9% in the year 2080respectively under different RCP climate change scenarios.
- Analysis of watershed soil samples revealed that N, P and K ranged from 12.5-928.2 kg/ha, 2.6-173.4 kg/ha and 40.1-369.6 kg/ha respectively, with major area under low to medium level for N and P and medium level in K.
- There was a large variability in the SOC content of watershed soil samples, ranging from 0.29-6.43% with a mean value of 1.95 ± 0.93%.
- A rice-based farming system integrating crops, dairy, poultry, and fish has been established on a 0.5 ha area in Goa. This IFS realized a net return of Rs. 1.81 lakh/annum. IFS achieved 241% increase in yield and 114% increase in net income compared to the rice-fallow system. Plantation crop-based IFS standardized on 0.79 ha area for upland situations of Goa. Compared to monocrop systems, the IFS achieved a significant yield increase: 83.2% for arecanut and 78.3% for cashew in terms of arecanut equivalent yield (AEY). Water conservation measures, including a farm pond, saved ~400 m^3 of water used for summer irrigation. The IFS generated a net income of 2.01 lakh/annum with a B:C of 3.4 and provided employment for 309 man days/annum.

- Various rice-based cropping systems were evaluated to enhance cropping intensity in salt-affected coastal saline soils. The systems included rice–cowpea, rice–sweet corn, rice–baby corn, rice–chili, rice–okra, rice–leafy vegetables, and rice–fodder crops. Among these, the rice–okra (bhendi) system recorded the highest rice equivalent yield (4.7 quintals/ha) and net income (₹88,570/ha), indicating superior profitability. Rice–sweet corn and rice–chili also showed promising performance with Rice Equivalent Yields (REYs) of 2.4 and 1.6 quintals/ha, respectively. The integration of high-value crops such as okra, sweet corn, chili, and hybrid Napier (CO-5) proved effective in boosting both productivity and profitability in salt-affected coastal saline soils of India's west coast.

Crop Science

- During Kharif 2024-25, 200 rice germplasm accessions, including 163 landraces, 14 wild rice, and 23 advanced breeding lines, were evaluated under rainfed shallow lowland conditions for characterizing them for various yield and agronomic parameters. The collection was enriched with 38 landraces from Kerala possessing tolerance to salinity, submergence, lodging, and other abiotic stresses. Two samples of Oryza coarctata (Porteresia), a salt-tolerant wild rice relative, were collected from St Estavam and Mankule islands and maintained at the Institute farm for future utilization.
- Evaluation of 38 advanced breeding lines developed from elite x elite crosses under rainfed shallow lowland conditions showed the highest yield in ABL 17 (7.88 t/ha), followed by ABL 27 (7.6 t/ha) and ABL 38 (6.98 t/ha). The average yield was 5.09 t/ha, with Jaya recording the highest among checks (5.4 t/ha).
- Under the hybridization and population development programme, 26 populations were maintained using Single Seed Descent (SSD). As populations reached F6/F7 stages, 79 single plants were selected for progeny evaluation in Rabi 2024-25. Based on their evaluations, 25 lines were shortlisted for station trials.
- Advanced breeding lines with dual tolerance to salinity and submergence were screened for bacterial leaf blight resistance under natural conditions. Six lines (ABL 6, 9, 13, 21, 30, and 33) exhibited strong resistance with a disease score of 3. Check varieties Jaya and Jyothi also showed resistance reaction.
- A breeding programme was initiated to combine salinity tolerance with superior grain quality by crossing high-yielding salt-tolerant varieties with local aromatic rice varieties. Seven F2 populations (~1500 segregants each) were evaluated under normal and coastal salinity conditions. From these, 25 desirable F2 segregants were selected, and their F3 progenies were evaluated during rabi 2024-25. Further, 27 single plants were selected to raise F4 progenies under coastal salinity in the upcoming Kharif season.
- For mapping QTLs governing salinity tolerance at seedling stage, phenotyping of 234 RILs (Jaya x Goa Dhan 2) was carried out under induced salt stress (12 dS/m). Nine RILs were highly tolerant (SES score 1), 34 tolerant (score 3), 69 moderately tolerant, while others were sensitive or highly sensitive. Physiological studies showed shoot lengths from 15.03 cm to 87.2 cm (mean 36.46 cm), and varied Na and K contents with Na/K ratios ranging from 0.239 to 6.714 (mean 2.593).
- Under the Quality Seed Production project, breeder seeds of Goa Dhan 1, 2, 3, 4, and Goa Cowpea 3 were produced as per indent requirements. TL seeds were produced in paddy varieties Jaya, Jyothi, Karjat 3, Sahbhagi Dhan, and in green gram varieties TM 96-2 and IPM 2-14.
- Additionally, 18,107 planting materials of horticultural crops, including arecanut, coconut, mango, cashew, black pepper, nutmeg, and chickoo, were produced for farmer distribution and stakeholder supply.

Horticulture Science

- Institute with its vegetable research project is first to introduced the terminology 'Gyno-Cis Hybrid' in science communication with study on Momordica sahyadrica using 'Sahyadri gourd' appellation.
- Successfully attempted interspecific hybrids between *Momordica subangulata* subsp. *renigera* cv. Arka Bharat(Teasel gourd) with Momordica sahyadrica (Sahyadri gourd) genotype and the resultant interspecific hybrid seed progeny observed to be as interspecific Dioecious male as well as interspecific Dioecious female.
- Interspecific hybrid between *Momordica subangulata* subsp. *renigera* cv. Arka Bharat(Dioecious Female) with *Momordica sahyadrica* (Dioecious male genotype)gives less seeded fruits only when hand-pollinated with *Momordica subangulata* subsp. *renigera* cv. Arka Bharat(Dioecious male).

- In situ maintenance of Momordica spp. 11 genotypes { Gyno-Cis hybrids (03), Interspecific hybrid between *Momordica subangulata* subsp. *renigera* cv. Arka Bharat with *Momordica sahyadrica*(04) and interspecific hybrid between *Momordica sahyadrica* with *Momordica subangulata* subsp. *renigera* cv. Arka Bharat (02), Arka Bharat (02) }.
- As per allocation, under AICRP-Vegetable crops project, total 15 trials, 01 Mustard green (AVT I), 04 Okra (IET Hyb. Res., Var. Res. IET, AVT I, AVT II), 07 Tomato (IET BW, Hyb. Det. IET, AVT I, AVT II, Var. Det. IET, AVT I, Var. Indt. IET), 01 Chilli Hyb. AVT I, 01 French bean (bush IET), 01 Cluster bean IET were conducted and reported to Project coordinating unit.
- Enhanced extracted efficiency with better qualitative properties were achieved with bio-thermal treatment of kokum seeds.
- New accessions identified were characterised and deposited with accession numbers at ICAR-NBAIM repository.
- Kokum waste rind based marmalade was developed and characterised showing high antioxidant, vitamin C and Phenolic content with very high rate of acceptability with consumers.
- Cashew flour based cookies with wheat and finger millet flour were standardised and tested for textural, physio-chemical properties.
- Standardisation for RTE Jackfruit Xacuti was done using the programmable Water Shower Retort of AGNI Food hub. The product had high rate of acceptability and two treatments were standardised for better flavor and shelf stability.
- A new microorganism for synthesis of nata-de-cashew was isolated, characterised and deposited with accession number at ICAR-NBAIM.
- A total of 12 new incubates were registered during 2024 at ICAR CCARI Agri Business Centre, AGNI and six continued their incubation phase for one more term (Jan – Dec 2024). Seven incubatees have graduated and registered their business. Through its various activities AGNI has generated a revenue of Rs.14,26,009/-.
- One training programs with total 5 participants, funded by Pradhan Mantri Formalization of district resource persons was organized at ICAR-CCARI during the year 2024 by Master Trainer, Dr. Mathala Juliet Gupta.
- A total of 62 machinery suitable for multi-enterprise farming systems of Goa were evaluated on farm and performance evaluation reports given.

Animal Science and Fishery Sciences

- Reproductive diseases are a great concern for the dairy farmers. During the reporting period, cervical swabs along with blood samples were collected from total 201 cows from 13 dairy farms situated in Goa and Maharashtra and investigated for detection of reproductive pathogens. The important reproductive problems recorded in dairy cattle were repeat breeding (6.46%) followed by abortion (1.99%), infertility (1.49%), anestrus (0.49%), endometritis (0.49%%), vaginal prolapse (0.49%%) and uterine prolapse (0.49%%). The important pathogens identified from these dairy farms were *Brucella* (12.93%), *E. coli* (8.45%), *Staphylococcus* spp. (6.96%) and *Theileria orientalis* (14.92%).
- Detailed seminal characterization of indigenous farm animal species relevant to coastal ecosystem were carried out. Ejaculate volume & sperm concentration were found to be significantly lower while reaction time and refractory period were significantly longer in indigenous pigs. These findings are suggestive of poor libido & difficult semen donor character in native pigs. Sperm motility and advanced sperm motion kinetic parameters were evaluated using Computer Assisted Semen Analysis for the first time in native Konkan Kanyal goat and Agonda Goan pig breeds. For Konkan Kanyal, Sperm Curvi-linear Velocity (VCL), Straight Line Velocity (VSL), Average Path Velocity (VAP), Amplitude of Lateral Head Displacement (ALH) recorded were 60.69 µm/s, 27.37 µm/s, 52.40 µm/s and 7.71 µm respectively. Most of the major sperm motility and kinetic parameters were comparable to other native breeds of the west coast region.
- Advanced fluorescent staining techniques were also employed to evaluate in-vitro sperm characteristics like sperm DNA, plasma membrane and acrosomal integrity. In Konkan Kanyal semen samples, mean percentage of sperms with intact DNA were found to be greater (99.55%) while mean percentage of sperms with denatured or fragmented nuclear DNA were only 0.45% indicative of optimal DNA integrity and viability.
- AI using liquid semen in pigs and controlled breeding involving standardized technique of

estrus induction and synchronization were undertaken in the Institute farm and farmers' field. Total of 428 piglets were born through 91 numbers of AI and 59 numbers of farrowings with average litter size at birth as 7.25 and litter size at weaning as 6.82.

- Procedures for AI and Computer Assisted Semen Analysis were standardized in Srinidhi birds. Poultry AI has been successfully adopted in selected flocks of the Institute units with average fertility of 95.56% and hatchability of 77.89%.
- Assessed the antimicrobial properties of methanolic extracts of the plants *Catharanthus roseus* (*Vinca rosea*), Nirgundi (*Vitex negundo*) leaves, Palash (*Butea monosperma*), Palash flower, Guava (*Psidium guajava*), Shami (*Prosopis cineraria*), Asoka (*Saraca asoca*) tree bark, Tulsi (*Ocimum tenuiflorum*), Madhunashini (*Gymnema sylvestre*), bael (*Aegle marmelos*) leaves, Giloy (*Tinospora cordifolia*) stem, Arjun tree (*Terminalia arjuna*) bark, Bhui amla (*Phyllanthus niruri*). The most effective extract was *Ocimum tenuiflorum* with MIC of 1.562 mg/mlagainst *Staphylococcus aureus* and *S. epidermidis*.
- As part of the National Animal Disease Epidemiology Network, Livestock disease outbreak investigations and monthly disease outbreak reporting were carried out. *Theileria orientalis* (44 outbreaks) infection, *Babesia bovis* (2), abortion due to Brucellosis (2) and Lumpy Skin Disease (1) and mixed infection and septicaemia with *E coli* and *Streptococcus* (1). There were three suspected outbreaks of African Swine Fever and one outbreak was confirmed by laboratory analysis. There were Fowl pox (1), *E colisepticaemia* (2) and three Avian Leucosis (3) outbreaks in poultry. Phylogenetic analysis of the *Sarcoptes scabiei parasite* isolate from an outbreak in goat farm in Goa based on 16S rRNA and ITS-2 sequences was carried out and the sequences were submitted to NCBI GenBank and obtained accession numbers PP974324 and PP974325, respectively.
- Phytogenic feed additives viz., *Ocimum tenuiflorum,Moringa oleifera, Sauropus androgynus, Andrographis paniculate, Alpinia galanga, Curcuma longa and Zingiber officinale* were supplemented in feed to CARI Debendra chicken (chicks, layers) to evaluate production performance and nutritional enrichment of eggs. Screening of biomarkers was donethrough UV-Vis, FTIR and GCMS in these local cultivars prior to formulating experimental diet in combinations. Integrated strategy of network pharmacology, molecular docking and experimental assessment was also done to investigate the mechanism of action. In-feed supplementation of these phytogenic feed additives at 2% positively influenced growth, immune response, haematology and gut health of chicks. In late phase layers, the quality and nutritive value of eggs was improved by superimposition of experimental diet by 3%. Significant increase in essential amino acids, fatty acids and Vit D3 concentration with higher energy content was recorded in treatment groups than control.
- A life cycle assessment (LCA) of whiteleg shrimp farming systems found that HDPE-lined ponds had a 37.7% higher global warming potential (369.04 kg CO_2 eq) than earthen ponds (268.06 kg CO_2 eq), with seed production and energy use identified as major contributors. In economic evaluations of Asian seabass farming, earthen ponds showed the lowest production cost (₹178/kg) and highest net profit (₹355.67/kg), while cage culture recorded the highest yield (6.70 kg/m^3).
- Climate-resilient crab farming using floating HDPE barrels added ₹800–1,000 monthly income per barrel and was adopted by 120 out of 300 trained farmers. Refined mussel culture technologies demonstrated at scale (1,000 m^2) led to a 2.32 benefit-cost ratio and net income of ₹27,900 per rack—more than doubling profitability compared to traditional systems.

Weather Report

Submergence | © Rimmi Bose 2025

Weather report

(January 2024 to December 2024)

Location of the observatory
15°29´22˝ N, 73° 55´ 10˝ E, 67 m above mean sea level.

Meteorological Observatory
Agro-meteorological Observatory, KVK farm, ICAR-CCARI, Old Goa, Goa

Time of observation
Morning session I – 0734 (7.34 AM) and afternoon session II – 1434 (2.34 PM)

Soil temperature

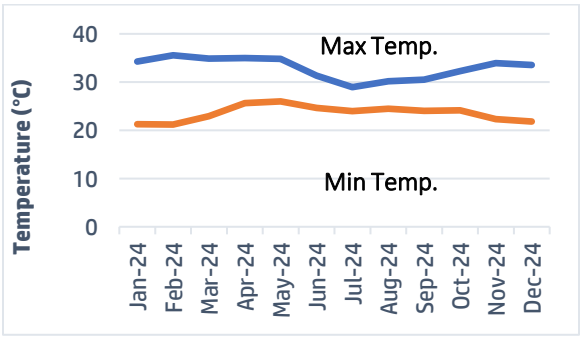
The ranges of mean monthly soil temperature recorded in morning hours at 5, 10 and 20 cm depths were 25.6-32.2 °C, 25.8-32.6 °C and 26.1-35.0 °C, respectively, whereas the corresponding ranges for afternoon observation were 28.4-43.4 °C, 28.1-42.6 °C and 27.0-36.2 °C.

Sunshine hours

The mean monthly sunshine hour recorded ranged from 0.3 hours (July 2024) to 9.4 (February 2024). As expected, mean monthly sunshine hours were lower during rainy season compared to rest of the months of the year.

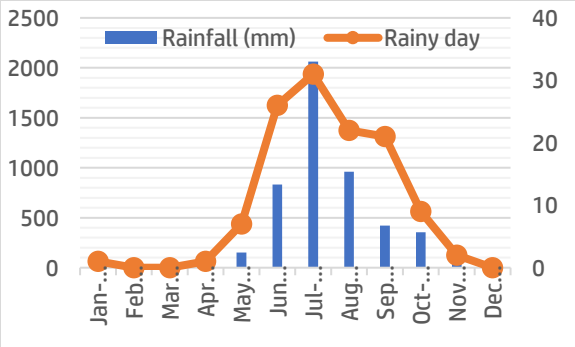
Air temperature

Mean monthly maximum temperature during January 2024 to December 2024 varied from 29.0 °C (July 2024) to 35.6 °C (February 2023), whereas mean minimum temperature varied from 21.2 °C (February 2023) to 26.0 °C (May 2024)



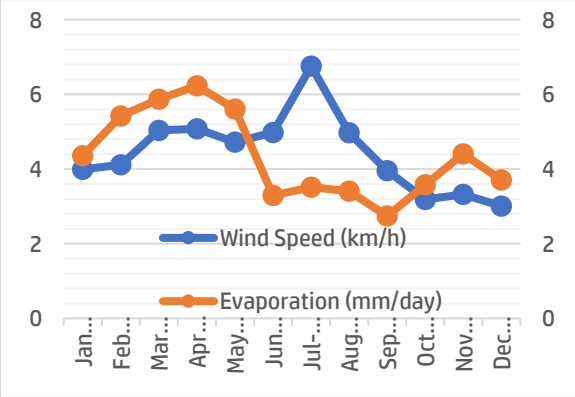
Rainfall and rainy days

The total rainfall received during January 2024 to December 2024 was 4881.0 mm. Total of 4277.8 mm was received during *kharif* (June 2024 to September 2024) (Table 1, Figure 2). The annual rainfall for this year was 1371.1 mm higher than that of 2023 (3509.9 mm). Total number of rainy days observed was 120 and was 28 days higher compared to last year (92 days).



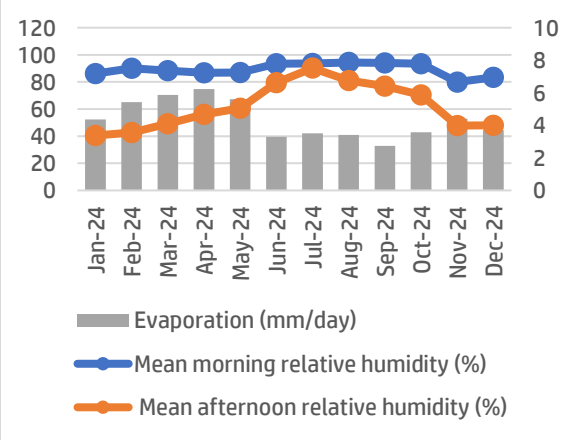
Wind speed

Mean monthly wind speed ranged from 3.01 km/h (December 2024) to 6.76 km/h (July 2024). Mean monthly wind speed started decreasing from July 2024 to October 2024 and it increased thereon.



Evaporation and relative humidity

Daily evaporation was measured using USWB-Class A open pan evaporimeter. The total water evaporated from January 2024 to December 2024 was 1517.7 mm. The highest monthly morning and afternoon relative humidity was observed during August and July 2024, respectively, whereas the corresponding lowest was recorded during November and January 2024.



Particular of weather parameter	Value	Date
Highest maximum temperature	37.2 °C	16-02-2024
Lowest minimum temperature	17.0 °C	24-01-2024
Highest rainfall	333.8 mm	08-07-2024
Highest evaporation	10.3 mm	31-05-2024
Highest wind speed	11.0 km/h	29-07-2024
Maximum sunshine hours	11.1 h	10-05-2024

Important dates of observations during January 2024 to December 2024 with the highest and lowest values of weather parameter

The annual rainfall 4881 mm was recorded this year which is 1371.1 mm higher than of last year

Research Achievements

Natural Resource Management

Low Land IFS Plot (ICAR - CCARI, Old Goa) | © Subhradip Bhattacharjee 2025

Evaluation of natural farming practices under plantation crop-based system

Gopal R. Mahajan, ***Raizada A.R., Paramesha V., Arunachalam V., Ramesh R., Maruthadurai R., Shripad Bhat, Uthappa A.R., Sujeet Desai, Amiya Ranjan Sahu, Rahul Kulkarni and Parveen Kumar***

The project focused on evaluating natural farming practices in key crops along the west coast of India, with a significant emphasis on developing inputs, products, and technologies that are well-suited to natural farming systems.

Effect of natural farming practices on soil health

To evaluate the effect of the natural farming scenarios, including long-term natural farming (25 years), abandoned natural farming (25 years), natural forest, conventional farming, and fallow land, soil samples were collected and analysed for physical, chemical, and biological properties. Under long-term natural farming, there was a 20–25% reduction in input costs while maintaining 90–95% of the yield compared to conventional farming. This system also showed notable improvements in soil health, including a 15–20% increase in microbial biomass and enhanced soil organic carbon levels. Additionally, long-term natural farming led to a 20–22% improvement in available water capacity compared to conventional and fallow systems. A key contributing factor to this improvement was the retention of approximately one-foot-high weed cover in the interspaces of perennial crops such as coconut and arecanut, combined with minimal soil disturbance through reduced tillage and the regular application of organic inputs like Jeevamrut and Ghanajivamrut. These practices collectively enhanced soil structure, improved water infiltration and retention, and supported overall soil health.

Natural farming field soil sampling

Mulching and maintenance of green cover as a practice of natural farming

Emphasis was placed on capacity building by integrating natural and organic farming as a key component of agroecotourism. This was achieved through interactions during the field level programmes, complemented by on-site demonstrations to the farmers, aimed at enhancing practical understanding and skills.

Dignitaries visit to experimental field

There is a need to develop innovative technologies and products for natural farming to address challenges in soil health, pest control, and yield optimization without harming the environment.

Livestock Waste Valorization System (LWVS): Waste to Energy

The Livestock Waste Valorization System (LWVS) is an integrated circular model designed to convert cattle dung into both biogas and Phosphate Rich Organic Manure (PROM), effectively transforming livestock waste into energy and wealth. This compact, above-ground biogas unit processes 200 kg of dung daily, producing 7 m^3 of biogas each day—equivalent to Rs. 300–Rs. 350 in fuel value, about 24.5 kWh of electricity, or 6.3 liters of diesel—resulting in an annual income of approximately Rs.99,000. Additionally, it generates 400 liters of slurry daily, which is further processed into granulated PROM branded as “Phospho-Urja.” This PROM production brings in around Rs.3,880 per 100 kg per day, totaling Rs.12.10 lakh annually, while also significantly reducing dependence on chemical fertilizers. The system demonstrates a total economic impact of Rs.1.71 lakh per year from both biogas and slurry outputs. It has successfully trained 100+ farmers and attracted over 4,000+ visitors, reflecting strong community engagement. LWVS supports India's goals for organic farming and indigenous cattle preservation, and it presents a scalable, replicable model for enhancing rural sustainability.

- ***From 200 kg dung a day to Rs.1.71 lakh a year – LWVS turns waste into wealth***
- ***One unit produces 7 m³ biogas daily—equal to 24.5 kWh electricity or 6.3 liters of diesel***
- ***Scalable and aligns with natural and organic farming***

Closed-loop system converting cattle dung into biogas, organic manure, and inputs for natural farming through integrated processing and nutrient recycling

Phospho-Urja: A granulated biofortified PROM for coastal acid soils

Phospho-Urja is a granulated Phosphate-Rich Organic Manure (PROM) developed from anaerobically digested biogas slurry, conforming to FCO guidelines and standards. Field trials have shown that Phospho-Urja increases rice yields by 18–23% compared to the control and by 14% over chemical phosphorus sources, while enhancing phosphate use efficiency by 15–30%. It also provides residual benefits for subsequent vegetable crops, fulfilling up to 30% of their phosphorus requirements. Commercially produced at an in-house facility, Phospho-Urja is well-suited for acidic West Coast soils. To date, 3,170 kg has been distributed

Phospho-Urja: A granulated biofortified PROM

over 30 hectares, with plans to pilot its use on 10,000 hectares across coastal regions of Maharashtra, Goa, Karnataka, and Kerala. Supporting India's Organic and Natural Farming Missions, this sustainable phosphorus source is being promoted through the STC and SCSP schemes and has already reached 60 farmers.

Growth of the cowpea (Goa Cowpea-3), locally known Alsando, applied with Phospho-Urja

Growth of the okra crop applied with Phospho-Urja)

Innovative Jeevamrut Assembly for Sustainable and Efficient Natural Farming

Jeevamrut, a fermented microbial culture made from cow-based ingredients, is a core input in natural farming. Padma Shri awardee Shri Sanjay Anant Patil has developed a unique Jeevamrut unit with a sand filter and drip fertigation system, enabling efficient field application. Unused dense Jeevamrut is also used to decompose household organic waste into manure. Over 12 years, the unit has produced 5,000 liters/month, supporting 10 acres via drip and sprinkler irrigation. An automated Jeevamrut plant has streamlined the process, resulting in 60–70% lower production costs, 25–30% higher yields, and annual savings of ₹3 lakh.To refine and adapt this farmer-led innovation for broader suitability, an improved unit is now being installed at ICAR-CCARI for demonstration and potential scaling up.

A farmer-led innovation, a Jeevamrut unit developed by Shri Sanjay Patil, ICAR – CCARI nominated Padma Shri Farmer

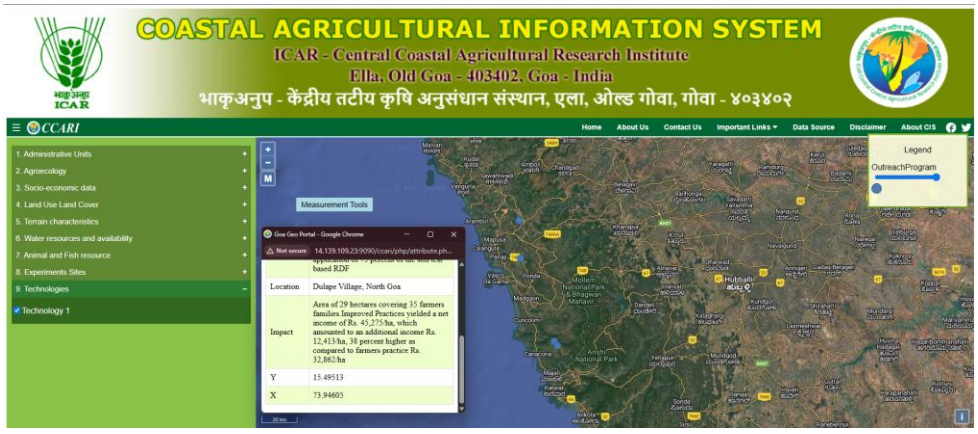
Coastal Agricultural Information System for India: An innovative digital platform for sustainable coastal agricultural research and development

Gopal R. Mahajan, Sujeet Desai, Bappa Das, Sreekanth GB and Shripad Bhat

In this phase, the project was realigned to the theme "Coastal Agricultural Information System– An Innovative Digital Platform for Sustainable Coastal Agricultural Research and Development", with revised objectives focused on developing a technology-oriented Coastal Agricultural Information System (CAIS) and promoting it as a tool to guide research priorities and support informed decision-making in coastal agriculture. To achieve this, several technology-driven initiatives were undertaken, including the development of integrated lime requirement maps for Goa on a pilot basis, and crop suitability mapping for rice and coconut across the coastal region, both intended for integration into the portal. Groundwater resource and quality maps were also developed using secondary data to support better irrigation planning. Key ICAR-CCARI technologies—such as improved crop varieties, production practices, and products—were geotagged, allowing users to visualize their development and dissemination locations. The portal, which is in the process of being copyrighted, has received over 25,000 views from a diverse group of stakeholders including R&D organizations, government agencies, farmers, researchers, and data scientists. Regular capacity-building programs are being conducted to engage these users.

New initiatives in CAIS

- ***Lime Requirement Maps for Goa (pilot basis)***
- ***Crop Suitability Mapping for rice and coconut across the coastal region***
- ***Creation of Groundwater Resource and Quality Maps to support irrigation decisions***
- ***Geotagging of ICAR-CCARI technologies to show development and dissemination locations***

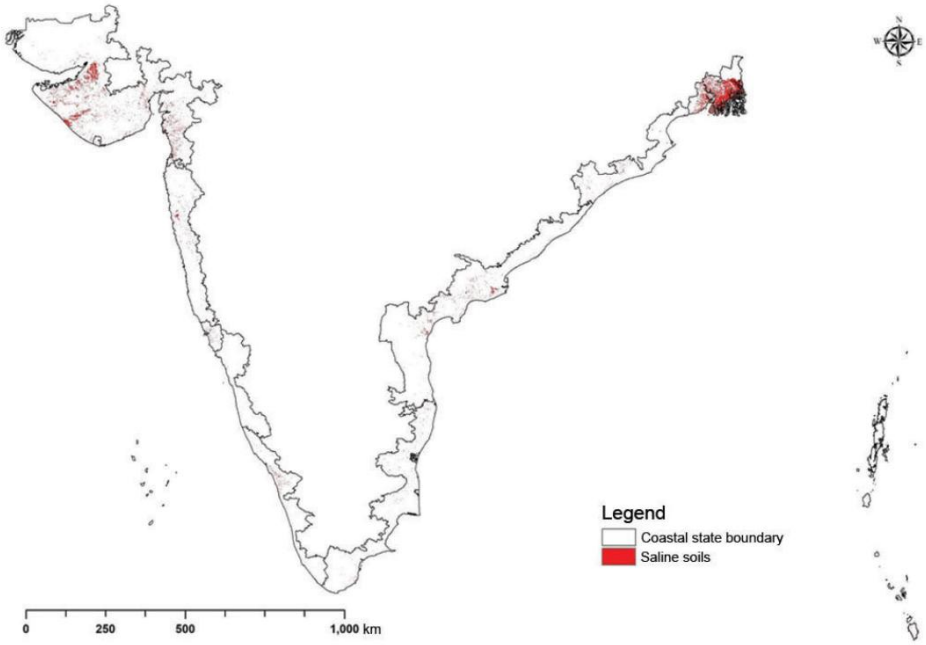


ICAR-CCARI technologies geotagged on CAIS

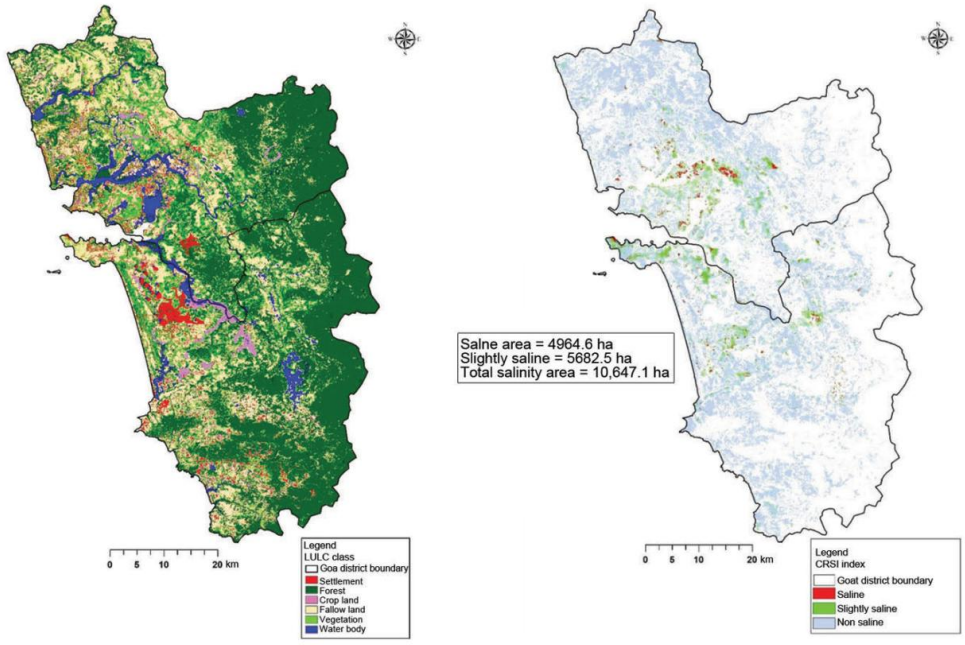
Mapping Coastal Salinity: A Remote Sensing Approach for Regional-Scale Soil Assessment

- ***Area of arable coastal saline soils is 1.29 Mha***
- ***Scalable salinity mapping protocols for informed coastal soil management***

Through collaborative research with ICAR-CSSRI, Canning Town (lead institute), salinity maps of coastal regions in India were developed using remote sensing-based protocols for regional-scale mapping of coastal saline soils. A protocol based on the Canopy Response Salinity Index (CRSISQR), derived from the Landsat-8 OLI sensor, was found to effectively predict soil salinity (EC_e) with significant accuracy. Using this approach, it was estimated that approximately 1.29 million hectares of arable coastal land in India are salt-affected, with the highest affected areas located in Gujarat (0.528 million ha), West Bengal (0.508 million ha), and Andhra Pradesh (0.106 million ha). As per the protocol-based assessment, the area under saline soils in Goa is estimated at 10,647 hectares, comprising 5,904 hectares in North Goa and 4,742 hectares in South Goa. State-wise and regional salinity maps were generated for the entire coastal region. This approach holds significant impact potential, as it provides a robust foundation for designing countermeasures and sustainable management strategies for coastal saline soils. The developed remote sensing protocols offer accurate and scalable mapping capabilities, supporting data-driven decisions for soil reclamation, resource allocation, and long-term land management in vulnerable coastal areas. Efforts are underway to integrate these salinity maps into the CAIS web portal for broader accessibility and application.

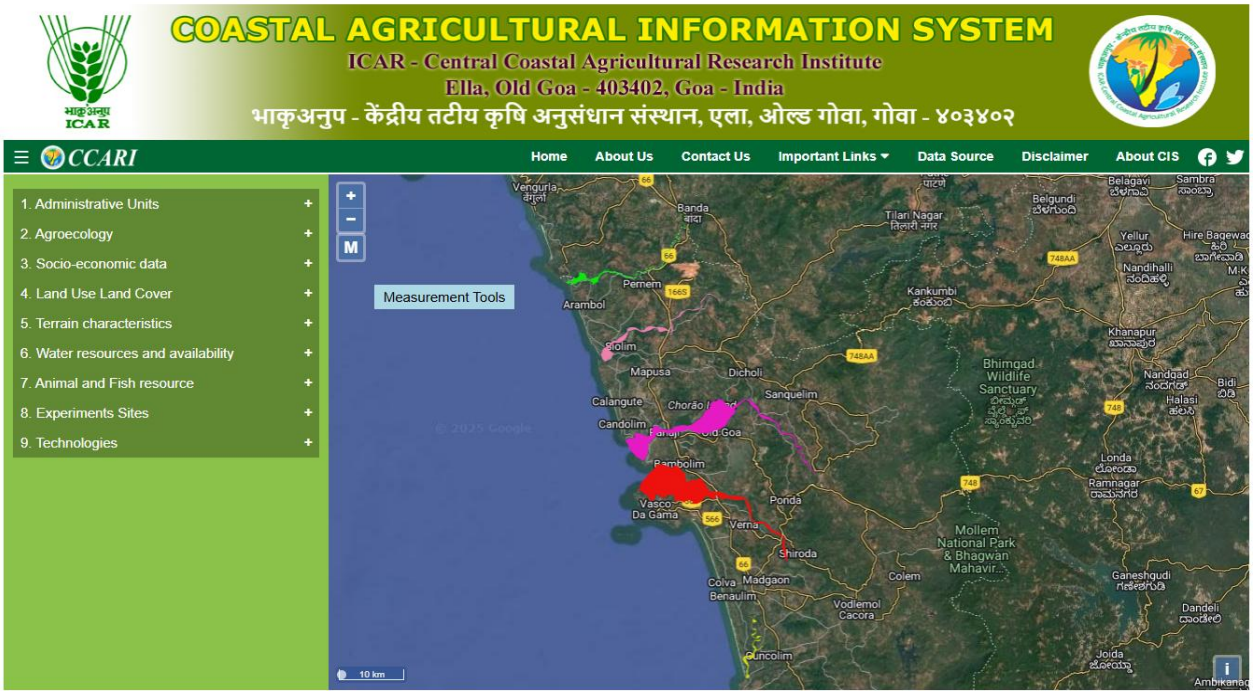


Distribution of saline soils in arable lands of coastal India



Land use land cover and salinity map of state of Goa

The portal is designed to dynamically update with the latest research findings and datasets, and it also features information on various R&D organizations working in coastal agriculture and allied sectors, thereby fostering stronger linkages and collaborations. Further, geotagging of the Agroecotourism farms in the coastal region is also planned for future. The portal serves as a pivotal tool in advancing sustainable coastal agricultural management through informed, data-driven decision-making.



Estuarine dataset for the coastal region updated in the portal

Evaluation of potential rice-based cropping systems under salt-affected coastal saline soils for enhancing cropping intensity, sustainability, and livelihood security

Paramesha V., Parveen Kumar, Manohara K.K., Shripad Bhat, Sukanta K. Sarangi and Gopal R. Mahajan

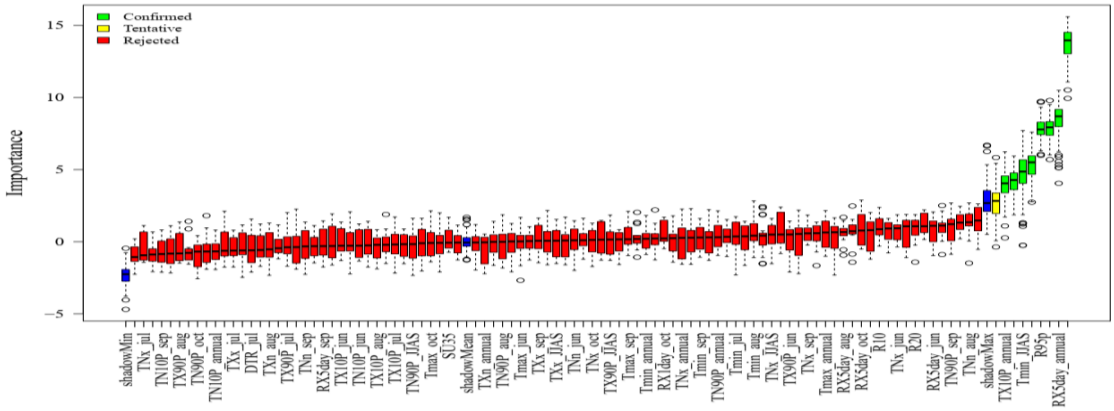
Farm trials conducted in Diwar Island aimed to enhance cropping intensity in salt-affected coastal saline soils, with the broader objective of promoting sustainable agriculture and improving the livelihood security of coastal farmers. Coastal saline soils often suffer from limited productivity due to high salinity and poor drainage, which restrict crop choices and cropping intensity. To address these challenges, rice-based cropping systems were evaluated, including rice–cowpea, rice–sweet corn, rice–baby corn, rice–chili, rice–okra, rice–leafy vegetables and rice–fodder crops. Among them, the rice–okra (bhendi) system emerged as the most productive and profitable, achieving the highest rice equivalent yield (REY) of 4.7 quintals per hectare and generating a net income of ₹88,570 per hectare. The rice–sweet corn and rice–chili systems also performed well, with REYs of 2.4 and 1.6 quintals per hectare, respectively, indicating their potential as viable alternatives. These results suggest that integrating short-duration, high-value crops like okra, sweet corn, chili, and hybrid Napier (CO-5) into traditional rice-based systems can significantly enhance overall system productivity, economic returns, and resource-use efficiency under the saline conditions prevalent along India's west coast. Such diversification not only optimizes land use in the dry season but also contributes to ecological sustainability and resilience in coastal agricultural landscapes.

Field experiment in the coastal saline situation

Impact assessment of extreme weather events on productivity of major crops in coastal region of India

Bappa Das, ***Raizada A., Arunachalam V. and Manohara K. K.***

Developing mitigation and adaptation measures requires identification of important extreme weather indices affecting crop yields as well as thresholds beyond which crop yields are impacted. Using the daily maximum, minimum temperature and rainfall dataset obtained from India Meteorological Department, Pune for the period of 1966-2017, different extreme weather indices have been calculated for 7 weather stations of coastal Andhra Pradesh. Rice yield data collected for these districts were converted into yield anomaly index (YAI) by subtracting the actual yield from technological trend yield as the percentage of technological trend yield. Individually indices were regressed with YAI to identify the thresholds. The trend analysis using Mann-Kendall test indicated that extreme weather events pertaining to both temperature and rainfall is increasing over the years with ~ 65% indicators across coastal districts showing positive trends. Rising temperature-related indicators had a primarily negative influence on rice production over the threshold (60.14%). The precipitation-based extreme weather indicators had a generally beneficial impact on the rice yield. The threshold values will aid in the development of climate resilient cultivars appropriate for coastal locations. The Boruta feature selection method was employed to identify significant temperature and precipitation-based extreme weather indicators that contribute to rice yield loss. The indicators selected through Boruta method was used to train machine learning models to predict the rice yield. These findings highlight the need of developing climate-resilient rice cultivars and region-specific adaptation measures for mitigating the negative consequences of climate change.



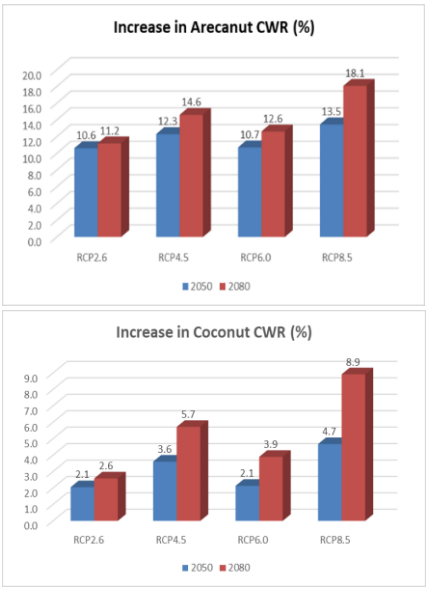
Results of Boruta algorithm for identification of important temperature and precipitation based extreme weather indices causing rice yield loss for East Godavari district

Thresholds identification of extreme weather events impacting rice yield

	East Godavari	Guntur	Krishna	Nellore	Srikakulam	Visakhapatnam	West Godavari
CDD	88.26 (-)	72.15 (-)	86.21 (-)	106.63 (-)	312.1	101.08	98.59
CSDI	5.82 (-)	2.86 (-)	7.21	NA	4.5 (-)	5.11 (-)	5.25 (-)
CWD	11.36 (-)	12.12	9.02 (-)	7.31	9.22	8.13	10.94
DTR_JJAS	7.8 (-)	8.37 (-)	8.39 (-)	10.01 (-)	7.42 (-)	6.77 (-)	8.2 (-)
PRCPTOT	1073.15 (-)	857.3 (-)	994.16 (-)	927.19	1220.31	1026.73	1241.75 (-)
R10	31.51 (-)	30.53	29.32 (-)	23.34	34.22	29	34.67 (-)
R20	13.91 (-)	19.09	10.97 (-)	13.71	17.46	14.22	18.57 (-)
R64.5	1.66 (-)	1.24 (-)	1.46 (-)	2.01	1.63 (-)	2.27	2.41 (-)
R95p	318.02 (-)	271.65 (-)	317.12 (-)	249.66	247.63 (-)	337.66	372.04 (-)
R99p	129.87 (-)	104.12 (-)	93.24 (-)	521.24 (-)	NA	93.32 (-)	122.23 (-)
RX1day_JJAS	72.7 (-)	19.94 (-)	78.45	NA	87.88	74.9	77.76 (-)
RX5day_JJAS	131.48 (-)	132.95	145.11	63.85	156.09	138.05	150.46 (-)
SDII	11.47 (-)	3.14 (-)	11.41 (-)	13.47	32.5	12.67	14.29 (-)
Tmax_JJAS	33.46	34.25 (-)	34.07 (-)	43.06 (-)	32.55 (-)	31.62 (-)	33.93
Tmin_JJAS	25.7	25.55 (-)	25.66 (-)	25	24.96 (-)	24.83 (-)	25.67
TN10P_JJAS	8.38 (-)	7.15 (-)	9.54	10.71 (-)	12.74	8.18 (-)	8.07 (-)
TN90P_JJAS	9.62	6.27 (-)	5.64 (-)	19.12 (-)	41.68	9.02 (-)	10.37
TNn_JJAS	23.38	23.78	23.2 (-)	22.85	23.31	22.83	23.25
TNx_JJAS	29.07	27.39 (-)	29.16 (-)	25.21	28.11 (-)	28.14 (-)	29.19
TX10P_JJAS	9.53 (-)	12.66	10.21	39.76 (-)	10.63	9.92	9.55 (-)
TX90P_JJAS	11.95 (-)	5.28 (-)	10.33 (-)	79.02 (-)	11.38 (-)	10.57 (-)	10.87
TXn_JJAS	27.6	27.41 (-)	26.64 (-)	29.65 (-)	27.96 (-)	26.3 (-)	27.63
TXx_JJAS	39.94	41.11 (-)	41.27 (-)	43.01 (-)	38.44 (-)	37.94 (-)	41.28
WSDI	39.84 (-)	11.11 (-)	15.7 (-)	31.4 (-)	14.96 (-)	15.65 (-)	22.39

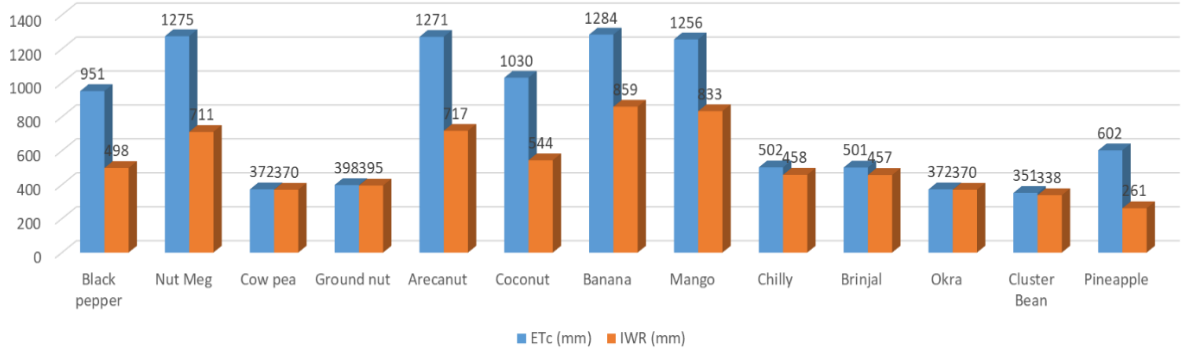
Estimation of crop water requirement of major crops of west coast region under climate change scenarios

Sujeet Desai, Bappa Das, Paramesh V. and Jitendra Kumar



Increase in CWR under climate change scenarios

Crop Water Requirement (CWR) and Irrigation requirement (IR) under the present climate were estimated for the coastal districts of Goa, Karnataka and Maharashtra states and under climate change scenarios for the districts of Goa. CWR of major crops of Goa ranged from 351-1284 mm/year whereas considering the effective rainfall and cropping season, irrigation requirement of the crops ranged from 338-859 mm. The district wise annual water resources in Million Cubic metre (MCM) required to irrigate each crop was calculated by multiplying the Irrigation requirement (mm) of crop with the area (Ha) under that particular crop. The maximum water required for irrigation annually in Goa is for Coconut crop (144.4 MCM). CWR was maximum for Banana, Nutmeg, Arecanut, Mango and Coconut ranging from 1030-1284 mm/year. Major irrigation requiring crops annually in the coastal districts of Karnataka are Arecanut and Coconut ranging from 143-468 MCM and 79.6-141.5 MCM, whereas in Maharashtra major IR is for Mango (100-231 MCM). Increase in the CWR of arecanut and coconut were estimated under Representative concentration pathway (RCP) climate change scenarios for Goa. It was found that CWR of these crops is expected to increase in the range of 10.6-13.5%, 2.1-4.7% respectively in the year 2050 and 11.2-18.1%, 2.6-8.9% in the year 2080 under different RCP scenarios as compared to the baseline CWR.

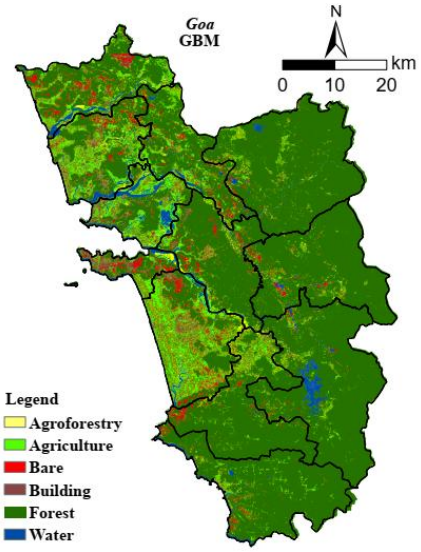


CWR and IR of major crops of Goa

Assessment and development of agroforestry systems for improved livelihood and climate change mitigation in coastal regions of India

Uthappa A.R., ***Raizada A., Desai A. R., Solomon Rajkumar R., Shripad Bhat, Gopal R. Mahajan, Paramesha V., Bappa Das, Sujeet Desai, Nagaratna B. Biradar and Vinod Kumar***

Arecanut based traditional agroforestry system (*Kulagar*) was mapped in Goa utilizing different machine learning models. A total of 374 non-agroforestry and 70 agroforestry locations were collected for model training and testing. Random Forest (RF), Support Vector Machine (SVM), and Gradient Boosting Machine (GBM) were employed. The findings showed that the GBM model had significantly higher overall accuracy (0.862) and kappa (0.833) scores than other models during validation. The Boruta analysis revealed NDWI2, B3, and SLAVI as important variables indicating the importance of water indices and vegetation parameters in mapping agroforestry. The GBM model achieved high accuracy in identifying arecanut based agroforestry region amounting to 58.64 km^2 followed by the RF with 53.36 km^2 and the SVM with 23.21 km^2. Using the average of three models, the estimated area under arecanut based agroforestry in Goa was 45.1 km^2.



Agroforestry (*Kulagar*) area mapping in Goa using machine learning models

In the coconut based silvo-pastoral experiment, highest green fodder yield was recorded in CO5 (47.07 t/ha) followed by DGG-1 (34.11 t/ha). The study also revealed that, green fodder yield was highest in continuous contour trench plot (29.88 t/ha) followed by staggered trench (27.32 t/ha).

Germplasm conservation and evaluation

To assess bamboo as a suitable species for coastal agroforestry system, a bambusetum with 60 bamboo species was established and is under evaluation. Additionally, a fodder cafeteria showcasing 42 promising fodder grasses, legumes, and trees was established in the interspace of coconut garden to act as a live demonstration plot for farmers.

Bambusetum with 60 different germplasm of bamboo

Evaluation of cashew based agroforestry systems on sloping lands of west coast region of India

Uthappa A.R., ***Gopal R. Mahajan, Paramesha V., Sujeet Desai and Bommayasamy N.***

This research project addresses the challenges of soil erosion, fodder scarcity, and declining farm productivity on the sloping lands of India's West Coast, particularly Goa. By integrating cashew (*Anacardium occidentale*) with different fodder grasses and intercrops, the study explores sustainable agroforestry models that optimize interspace utilization. The project was initiated in the year 2024. The project evaluates tree-crop interactions and identifies optimal species combinations to boost farmer income while conserving natural resources, especially under changing rainfall patterns and undulating terrain conditions. The initial results showed that, highest green fodder was recorded under CO5 sole crop (15.89 tons/ ha) and lowest in DGG1 sole crop (12.58 tons/ha).

Cashew- fodder based agroforestry system with staggered trenches in C block

Multi-slot devices installed to record the run-off data in cashew based agroforestry system

Evaluation of fast-growing tree species in the lateritic soils of west coast region of India for wood based industries

Uthappa A.R., and Gopal R. Mahajan

The project focuses on the evaluation of fast-growing tree species viz., *Casuarina* spp (seedling and clones (OV15, CH5, ITC-1761), *Eucalyptus* spp. (ITC-1803), *Leucaena leucocephala, Melia dubia* (K-10), and *Corymbia* hybrid for their potential in agroforestry and afforestation activities in the west coast region of India. This research aims to systematically evaluate the performance, growth characteristics, and wood properties of selected tree species under investigation. The project was initiated in the year 2024. Furthermore, the study will quantitatively assess the impact of these tree species on key soil physicochemical and biochemical properties. Finally, the project will determine the biomass yield and associated soil carbon stocks for each species to ascertain their carbon sequestration potential. Initial growth parameter assessments conducted (six months post-planting) revealed significant variation among species and clones. Eucalyptus exhibited the highest mean diameter (14.55 mm) and height (2.05 m), while the *Corymbia* hybrid recorded the lowest corresponding values (diameter: 6.78 mm; height: 0.84 m). In the *Casuarina* trial, clone OV15 demonstrated superior performance, displaying the largest mean diameter (12.51 mm) and height (2.13 m), in contrast to clone CH5 (diameter: 8.97 mm) and seedlings (height: 1.31 m), which exhibited the least growth in diameter and height, respectively. These preliminary findings suggest differential early growth patterns among the tested species and Casuarina clones.

Fast growing tree species experiment

Research Achievements

Crop Science

Genetic improvement of rice for coastal agro-ecosystem

Manohara K.K., and Paramesha V.

The main objective of the project is to develop salt-tolerant rice varieties suited for coastal saline soils. The project also aims to collect, conserve, and characterize native rice varieties, landraces, and wild relatives of rice from the west coast region of India. The different activities undertaken are given below.

a. Collection and characterization of rice germplasm of West Coast region

Field view of evaluation of germplasm of rice at the Institute farm during Kharif 2024

During the 2024-25 *Kharif* season, 200 germplasm accessions of rice comprising 163 landraces, 14 wild rice, and 23 advanced breeding lines were evaluated under rainfed shallow lowland conditions in an augmented design for various agro-morphological parameters. A total of 38 landraces of rice from Kerala state were collected and included them in the evaluation trial conducted during *Kharif* 2024. Our collection includes landraces possessing tolerance to salinity, submergence, lodging, and other important abiotic stresses. The grain quality parameters of these landraces were estimated for various quality parameters with the support of ICAR-NBPGR, New Delhi. We could find a wide variation for most of the grain quality parameters studied.

In addition to landraces and wild rice, this year we attempted to collect *Oryza coarctata*, a salt-tolerant wild relative of rice from estuarine places. We collected two samples of Porteresia, one from St Estavam and one from Mankule island adding to our germplasm collection. They are planted at the Institute for their further maintenance and utilization.

Porteresia in Chorao and St. Estavam Island, Goa

b. Evaluation of short-listed promising advanced breeding lines (Station trial – III year)

The evaluation of 38 lines developed from elite x elite crosses was carried out under rainfed shallow lowland and coastal salinity conditions. The trial under coastal salinity conditions was vitiated due to heavy rains immediately after planting. The trial under rainfed shallow lowland conditions is presented below. The trial was undertaken in RCBD design with two replications. All the yield and its attributing characters were recorded and the results are presented in the table below. The highest grain yield of 7.88 t/ha was recorded in ABL 17, followed by 7.6 t/ha in ABL 27, 6.98 t/ha in ABL 38, 6.54 t/ha in ABL 13, 5.5 t/ha in ABL 33 and 5.3 t/ha in ABL 17. Among the five checks tested, Jaya recorded the highest grain yield (5.4 t/ha). The average grain yield among the tested lines is 5.09 t/ha.

Descriptive statistics showing minimum, maximum and range for seven yield and its attributing parameters among the 45 lines under rainfed shallow lowland conditions

Parameters	Min	Max	Mean	Standard Deviation	Sample Variance	Kurtosis	Skewness
Days to 50% flowering	62	124	108.7	10.53	110.9	7.73	-2.09
Days for maturity	77	154	138.4	12.16	147.8	14.21	-3.04
Plant height (cm)	99.5	173.7	129	14.43	208.3	1.01	0.48
Productive tillers per hill	5	11.67	8.97	1.55	2.41	-0.37	-0.27
Panicle length (cm)	21.37	56.25	25.82	5.15	26.52	28.69	4.93
Grains per panicle	71.33	156.3	115.8	20.35	414.2	-0.73	0.3
Grain yield (kg/ha)	2.79	7.88	5.09	1.03	1.05	1.23	-0.68

Field view of station trial conducted under rainfed shallow lowland condition, kharif 2024

c. Hybridization and population development

Under the hybridization and population development programme, a total of 26 populations with varying population sizes are being maintained using the Single Seed Descent (SSD) method. These populations were developed through hybridization of selected parental lines to combine desirable traits, and are being advanced systematically each season to achieve homozygosity. Details of the populations maintained along with their respective filial generation stages are provided below.

Generation	Number of population	List of population maintained
F_6	9	Jaya x CSR 27; CSR 27 x Jaya; Karjat 3 x Goa dhan 4; Pusa 44 x Goa Dhan 2; Goa Dhan 4 x CSR 27; Jyothi x Karjat 3; Pusa 44 x KS 19-2; Jaya x Jaddubhatta (Jaya x CSR 27) x Jaddubhatta
F_7	15	Goa dhan 1 x Guddadani; Jaya x Kalame; Guddadani x Goa Dhan 4; Jaya x Choman; Goa Dhan 4 x Jyothi; Pusa 44 X CSR 27; (Jaya x CSR 27) x Goa dhan 1; Goa Dhan 3 x (Jaya x CSR 27); (Goa dhan 1 X Jaya) x (Pusa 44 x CSR 27); Mysore sanna x Jaya; Jyothi x Giddabhatta; (Goa Dhan 1 x Jaya) x Jaddubatta; Goa Dhan 1 x CSR 27; Jaya x Guddadani; CSR 27 x Pusa 44
F_9	1	Jaya x Goa Dhan 2
F_8	1	Jaya x CSR 27

As all the populations have now reached near-homozygous stabilized stages (F6/F7), single plant selections were carried out this season based on plant type, grain characteristics, and other relevant traits. A total of 79 single plants exhibiting desirable features were selected, and their seeds were harvested separately for raising 79 single plant progeny rows during the rabi season of 2024-25. Following their evaluation in the rabi season for plant type and other key agronomic parameters, 25 lines were shortlisted for further testing in the station trial.

Field view of evaluation of 79 selected lines during rabi 2024-25 season

Selected lines during rabi season

d. Field screening for Bacterial Leaf Blight disease in promising advanced breeding lines

High-yielding advanced breeding lines possessing dual tolerance to salinity and submergence were screened for bacterial leaf blight (BLB) resistance under natural field conditions. A total of 41 lines, including seven check varieties and 30 IRBB lines carrying different BLB resistance genes, were evaluated.

Screening of high-yielding dual stress-tolerant lines for Bacterial Leaf Blight resistance in field conditions

Among the screened lines, six lines, namely, ABL 6 (Goa Dhan 1 x Jaya), ABL 9 (Goa Dhan 1 x Jaya), ABL 13 (Goa Dhan 1 x Jaya), ABL 21 (Goa Dhan 3 x Jaddubatta), ABL 30 (Karjat 3 x KS 19-2), and ABL 33 (Jaya x CSR 27) exhibited strong resistance, each recording a disease score of 3. Among the check varieties, Jaya and Jyothi also showed resistance with a score of 3. Most other lines displayed moderate tolerance, while a few were highly susceptible.

e. Development of aromatic salt-tolerant rice varieties

To enhance grain quality, a separate breeding programme involving aromatic rice varieties was initiated to combine salinity tolerance with superior grain quality traits. Seven populations were developed by crossing high-yielding salt-tolerant rice varieties with local traditional aromatic rice varieties. During Kharif 2024, F_2 populations were raised at the Institute farm, each comprising approximately 1500 segregants. In the same season, all seven F_2 populations were also grown under coastal salinity conditions at Chorao Island to identify segregants exhibiting salt tolerance along with grain quality similar to aromatic rice varieties. From these populations, 25 individual F_2 segregants with desirable traits were selected, and their progenies were raised under normal conditions during the rabi season of 2024-25 as plant-to-progeny rows (F_3). From these 25 F_3 individual plant progenies, 27 single plants were further selected. The F_4 plant progenies will be raised during the forthcoming Kharif season under coastal salinity conditions for further selection and advancement.

F_2 population during Kharif 2024; Selected lines in F_3 populations, with short height and grain type of aromatic rice varieties during Rabi 2024-25

Bio-ecology and integrated management of cashew stem and root borers in coastal region of India

Maruthadurai R. and Ramesh R.

Diversity and abundance of cashew stem and root borer

The diversity and abundance of stem and root borers was studied in cashew ecosystem. Stem borer affected cashew trees beyond the recovery were selected for the intensive sampling. Selected trees were cut into 1 m long sections and cross-sectioned. The total number of larvae, pupae/cocoon and adults of wood borers were recorded. A total of twelve species of wood borers belonging to four families of coleopterans were recorded from the borer affected cashew trees. Among the wood boring beetles of cashew plantations, the species *Neoplocaederus ferrugineus* and *N. obesus* was found to be major ones and consisted of 24.10% and 21.60% of the total population of wood borers. The mango stem borer *Batocera rufomaculata*, buprestid *Belionota prasina*, ambrosia beetle *Euplatypus parallelus* and other cerambycids *viz*., *Xylotrechus subscutellatus* and *Coptops aedificator* were also found to be attacking the stem borer infested cashew trees. The maximum number of cocoons/pupae per tree were found in the species of *Neoplocaederus* spp, followed by *B. rufomaculata*. Early instars of cerambycid grubs were primarily found in the outer bark region. Matured grubs, cocoons and adults of cerambycid were recorded in the heartwood region. The wood borers damaging cashew plantations were dominated by the family Cerambycidae followed by Platypodinae.

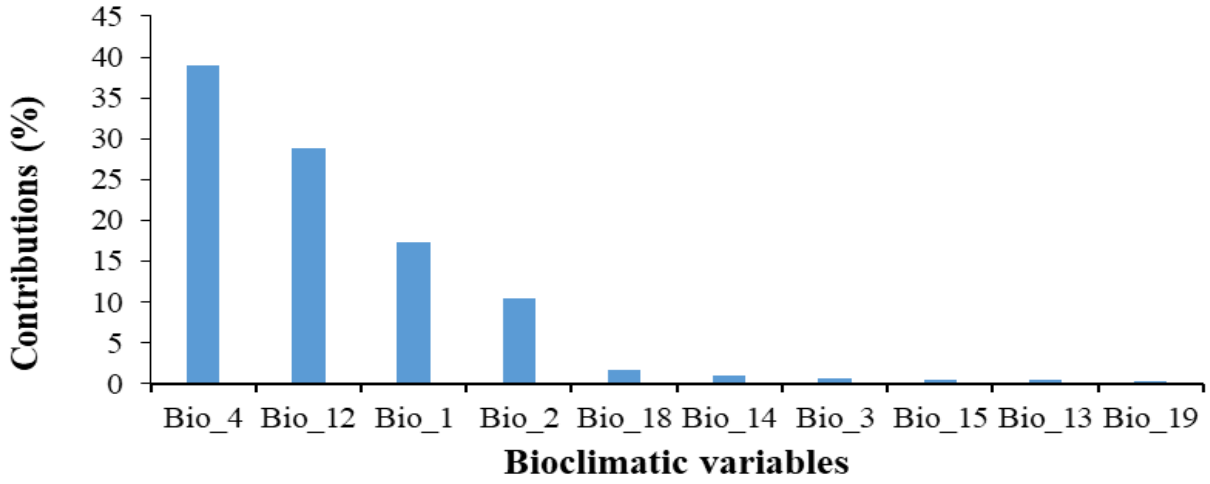
Xylotrechus subscutellatus

Coptops aedificator

Predicting the cashew stem and root borer under future climate change

The recent Coupled Model Intercomparison Project phase 6 (CMIP6) dataset was analysed to predict the distribution potential of CSRB under current and future (2050 and 2070) considering two

distinct emission scenarios namely shared socioeconomic pathway (SSP) 126 and SSP585 through MaxEnt modelling approach. Habitat suitability of *N. ferrugineus* was mainly driven by temperature and precipitation-based variables contributing 95.5% of the potential distribution. Jackknife test results showed that temperature seasonality (BIO4; 39%), annual precipitation (BIO12; 28.8%) followed by annual mean temperature (BIO1; 17.3%) and mean diurnal range (BIO2; 10.4) were the significant predictors contributing to the potential spread of CSRB. The entire coastal, peninsular India and parts of Northeastern states are forecasted with higher suitability for CSRB colonization.



Proportional contributions of environmental factors for CSRB distribution

Evaluation of entomopathogenic fungus for the management of cashew stem and root borer

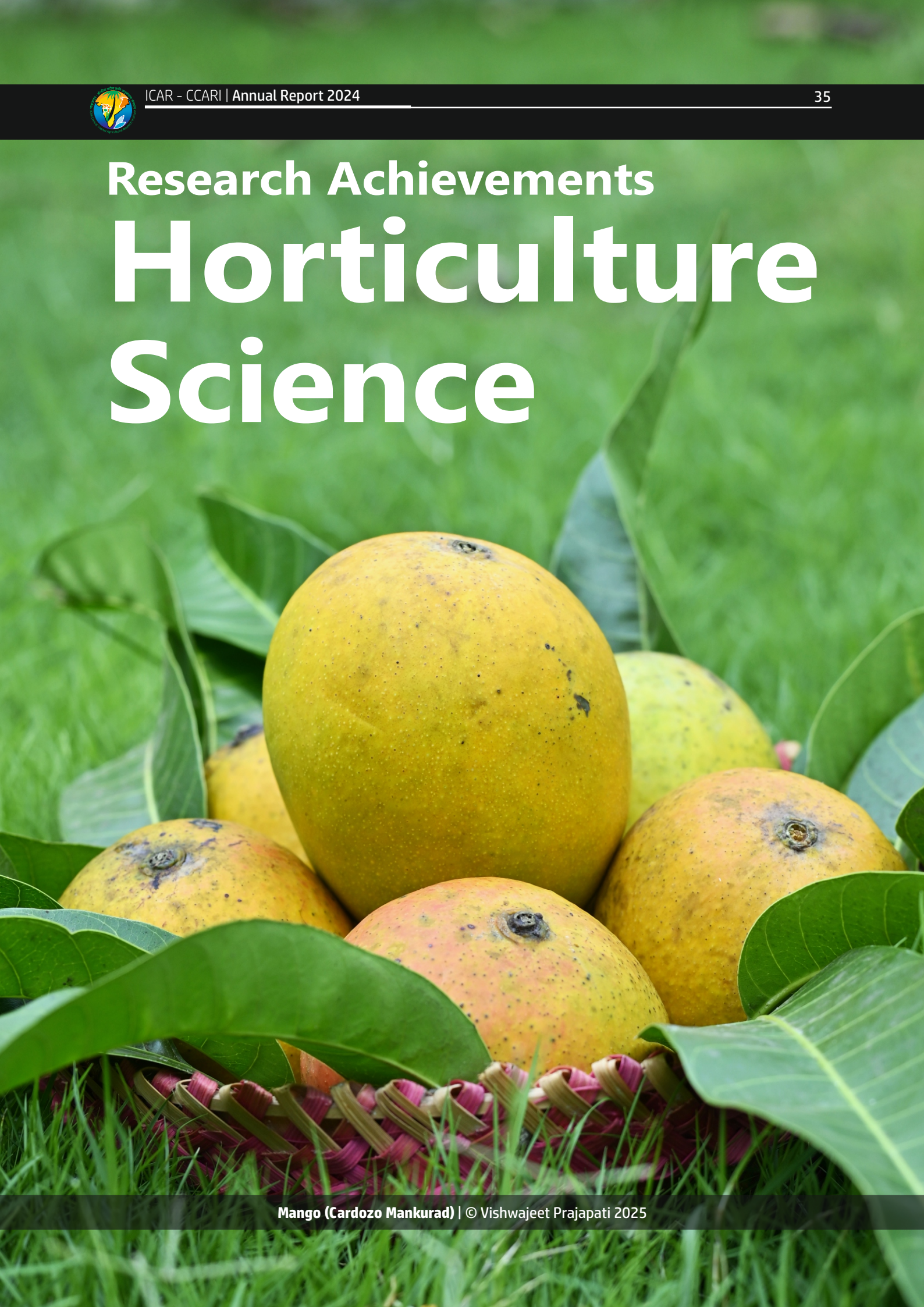
Entomopathogenic fungus *viz*., *Beauveria bassiana* and *Metarhizium anisopliae* were evaluated for the management of cashew stem and root borer under laboratory conditions. Field collected grubs of *N. ferrugineus* were reared individually on fresh cashew bark pieces in an insect breeding dish. Different larval instars *viz*., first, second and third instars, were selected for the immersion exposure bioassay. Both the fungus caused significant mortality on various larval stages of CSRB. Early instar grubs were found to be highly susceptible to *Beauveria bassiana* and *Metarhizium anisopliae*. The percent mortality varies from 40-82 %.

***Metarhizium* infected larva**

***Beauveria* infected larva**

Research Achievements

Horticulture Science



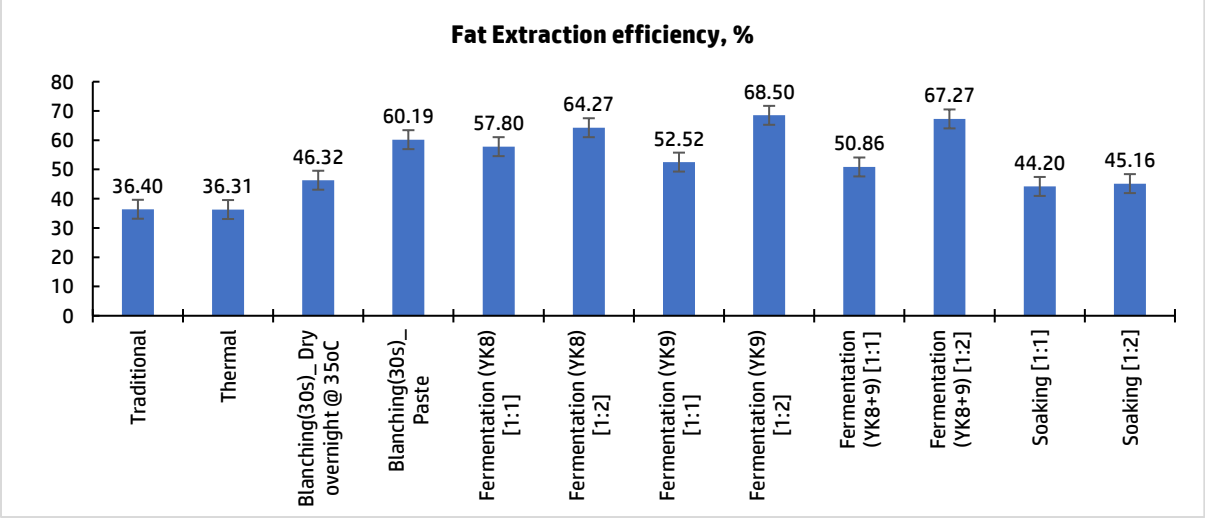
Mango (Cardozo Mankurad) | © Vishwajeet Prajapati 2025

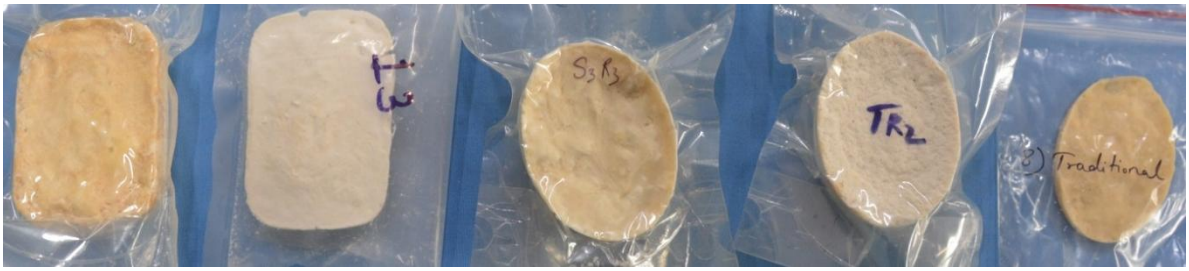
Development of value-added products from Kokum, Jackfruit, Cashew Apple and their Byproducts

Mathala Juliet Gupta, R. Solomon Rajkumar, Shripad Bhat, Chaudhari Ganesh Vasudeo and Vinod Ubarhande

Kokum butter

An improved mechano-bio-thermal method for kokum butter extraction form kokum seeds standardised. The butter samples were assessed for quality improvement. Parameters such as color, acid values, free fatty acid (FFA) profiles, saponification value (SV) and iodine value (IV) were assessed and significantly high SV, lower IV were observed in YK9 and (YK8+YK9) treatments. The color also was improved by YK8. Thus YK9 and consortia of YK8+YK9 had bio-refining characteristics. The two strains have been registered with accession numbers at ICAR-NBAIM repository.

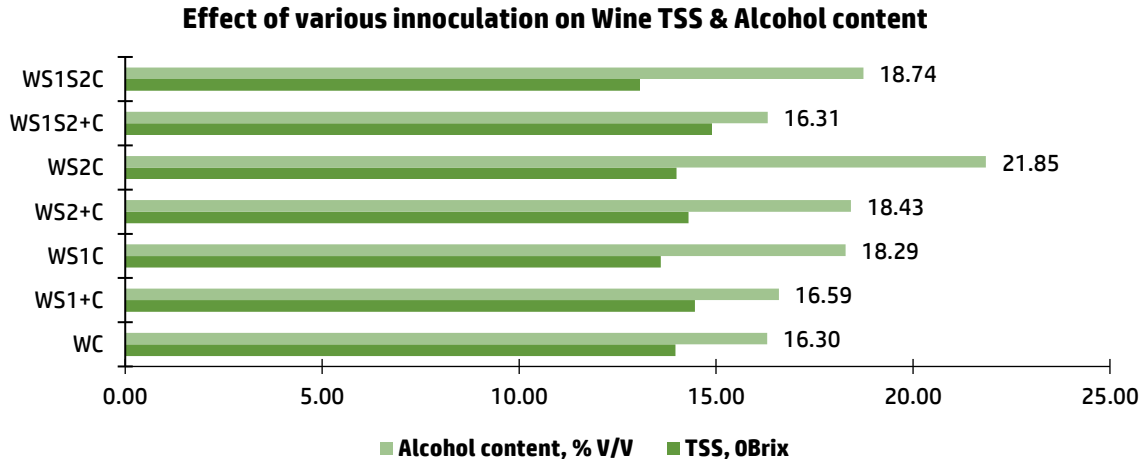




YK8 YK9 YK8+YK9 Thermal Traditional

Kokum Wine

Improved process for making wine from kokum juice has been standardised with better phenolic, anthocyanin and antioxidant content.



Kokum (*Gracinia indica*) wine

Development and Characterization of Multicomponent Kokum (*Gracinia indica*) Rind-based Marmalade

A novel source of value-added product was investigated i.e. Kokum rind-based marmalade. Kokum rind enriched marmalade with unique colour and antioxidant properties. Sensory attributes, physicochemical, rheological, textural and antioxidant properties of marmalade were studied. Anthocyanin, vitamin C and antioxidant activity changed significantly ($p<0.05$) with a change in the composition of raw materials. The sample containing 16% spent kokum rind, 10% banana pulp, and 14% pineapple pulp (T2) was the most favourable.

Kokum rind-based marmalade

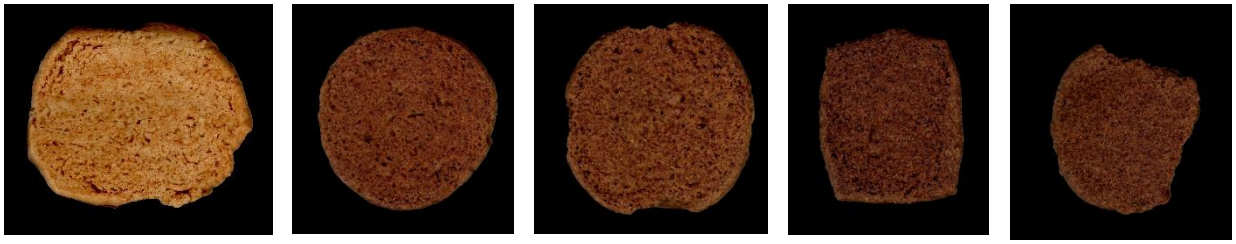
Physiochemical properties of kokum rind-based marmalade compared with fresh and dried sugar syrup extracted rind

Parameter	Fresh rind	Dried sugar syrup extracted rind	T_1	T_2	T_3	T_4
TSS (°Brix)	11 ± 0.92^{a}	25 ± 1.12^{b}	64.67 ± 0.58^{c}	64.33 ± 0.57^{c}	63.33 ± 0.58^{c}	66.0 ± 1.0^{d}
Titratable Acidity (%)	11.38 ± 0.04^{e}	0.65 ± 0.02^{a}	1.48 ± 0.03^{d}	1.35 ± 0.00^{c}	1.38 ± 0.02^{c}	0.81 ± 0.07^{b}
Water activity	0.937 ± 0.004^{d}	0.421 ± 0.03^{a}	0.753 ± 0.005^{bc}	0.76 ± 0.00^{c}	0.753 ± 0.015^{bc}	0.73 ± 0.017^{b}
Moisture Content (%)	82.15 ± 0.45^{e}	5.56 ± 0.23^{a}	29.97 ± 0.67^{c}	32.13 ± 0.42^{d}	31.58 ± 0.30^{d}	27.90 ± 0.43^{b}
Ash content (%)	2.09 ± 0.03^{e}	0.46 ± 0.05^{a}	0.81 ± 0.01^{c}	1.07 ± 0.04^{d}	0.84 ± 0.02^{c}	0.57 ± 0.04^{b}
Fat content (%)	10 ± 0.98^{c}	2.10 ± 0.23^{b}	0.044 ± 0.001^{a}	0.0577 ± 0.012^{a}	0.058 ± 0.023^{a}	0.070 ± 0.024^{a}
Protein content (%)	2.89 ± 0.43^{c}	2.82 ± 0.07^{c}	2.75 ± 0.065^{b}	2.16 ± 0.12^{a}	2.027 ± 0.27^{a}	2.56 ± 0.16^{b}
Fiber content (%)	2.97 ± 0.53^{c}	1.57 ± 0.82^{d}	2.07 ± 0.09^{a}	2.10 ± 0.04^{a}	2.23 ± 0.05^{a}	2.43 ± 0.13^{b}
Carbohydrates (%)	2.87 ± 0.12^{a}	89.06 ± 1.32^{e}	67.91 ± 0.83^{c}	65.48 ± 0.59^{b}	65.21 ± 0.10^{b}	69.78 ± 0.31^{d}
Energy value (Kcal)	113.04 ± 1.8^{a}	386.42 ± 3.23^{e}	283.048^{c}	271.073^{b}	269.482^{b}	290.03^{d}

Different superscript letters in the same row indicate significant differences between the samples according to Duncan multiple range test (DMRT) at $p<0.05$

Cashew flour: Wheat: Finger Millet composite-based cookies

Composite of above flours in various proportions were used for cookies. The physio-hemical properties, organoleptic and textural properties of the same were analysed.



T1 T2 T3 T4 T5

The overall acceptance was the best for T1 (8.00) closely followed by T2 (7.83) But acceptability of T3, T4, T5 (7.17, 6.27, 7.00) were close to T1 & T2.

Microorganism producing Nat-de-cashew

A new accession of microorganism synthesizing nata-de-cashew from cashew apple juice was identified and isolated. The new accession has been registered and submitted for safe deposit with ICAR-NBAIM. The same has been shared with DCR, Putur for further experiment.

Treatment	T1	T2	T3	T4	T5
Proportion	100-0-0	80-10-10	60-20-20	40-30-30	20-40-40
% Titratable acidity	0.26	0.26	0.33	0.36	0.36
M/C(%W.B.)	4.38	4.18	4.25	4.26	4.44
Ash content, %	3.77	3.5	3.62	3.3	3.51
Fibre Content, %	2.4	3.1	3.4	3.9	4.8
Protein Content, %	6.8	7.24	7.39	8.29	8.62
Antioxidant activity, %	18.82	23.25	41.32	63.99	65.21
TPC µl/100 g	650.87	1172.92	1570.87	2253.95	2089.85
% of water absorption capacity	172.63	193.48	164.64	173.94	155.27
% of oil absorption capacity	245.06	256.49	261.46	273.22	231.65
Vit. C (mg/100g)	1.73	1.76	1.86	1.91	1.92
Hardness	419.52	1074.7	1031.54	1245.41	797.09
Adhesiveness	-10.15	3.93	2.88	4.28	4.53
Resilience	0.05	1.75	4.62	3.28	4.28
Cohesion	0.1	0.03	0.12	0.07	0.11

Springiness	4.02	51.61	63.71	41.13	57.26
Gumminess	25.31	30.74	118.32	91.08	82.43
Chewiness	54.97	23.34	74.98	37.46	48.65

Retort Processed Ready to Eat (RTE) Jackfruit Xacutti

The process for retorted RTE Jackfruit Xacutti was standardised at the institute. The process parameters were F_0 value of 7 at 121°C, maintaining a pressure of 1.5 bars. Initially 5 treatments were taken and based on sensory reduced to two. Further standardization and sensory analysis have shown one treatment with a overall acceptance of 7.29. The product is being commercialised.

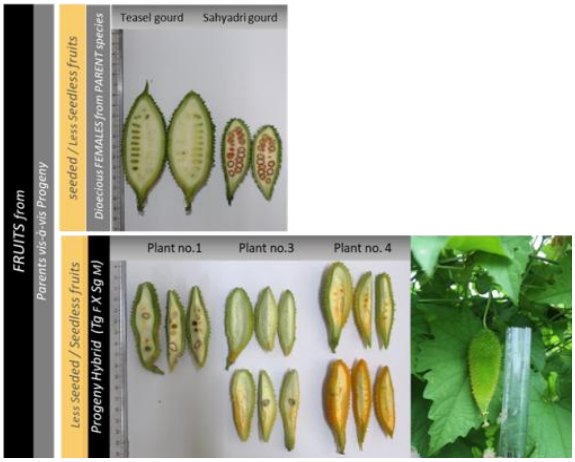
Assessment and strengthening of vegetable production in coastal region through utilization of local germplasm and strategic introduction of commercial vegetables

Chaudhari G.V., Maruthadurai R. and Shripad Bhat

With and objective to utilise local germplasm, interspecific hybrids between *Momordica subangulata* subsp. *Renigera* cv. Arka Bharat (Dioecious Female) with *Momordica sahyadrica* (Dioecious Male genotype) were successfully bred. The resultant seed progeny germinated and produced interspecific Dioecious male hybrid plants as well as interspecific Dioecious Female plants.

During *in situ* evaluation interspecific hybrid between *Momordica subangulata* subsp. *renigera* cv. Arka Bharat (Dioecious Female) with *Momordica sahyadrica* (Dioecious Male genotype) produced less seeded fruits only when hand-pollinated with *Momordica subangulata* subsp. *renigera* cv. Arka Bharat (Dioecious Male).

Flowers from Interspecific hybrids between *Momordica subangulata* subsp. *Renigera* cv. Arka Bharat (Dioecious Female) with *Momordica sahyadrica* (Dioecious Male genotype)

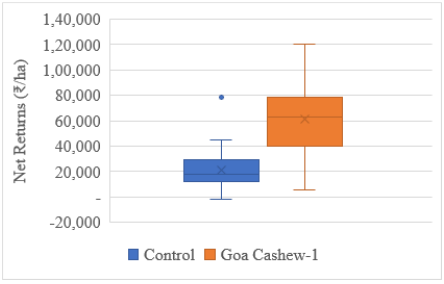


Fruits from Parents species *vis-à-vis* Interspecific hybrids

Interspecific hybrids between *Momordica sahyadrica* (Dioecious Female genotype) with *Momordica subangulata* subsp. *renigera* cv. Arka Bharat (Dioecious Male) were also attempted but resultant hybrid seed progeny showed very less germination and fruit received from the hybrid progeny were also non-appreciable.

Impact analysis of ICAR-CCARI technologies

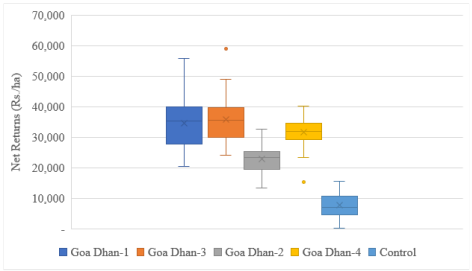
Shripad Bhat, ***Manohara K.K., Mahajan G.R., Paramesha V. and Amiya Ranjan Sahoo***



Impact of interventions carried out by the Institute under STC programme in a community-owned 10 hectares farm in Gaondongrim, Canacona was assessed. Interventions implemented were: (i) rejuvenation of barren land through planting of improved cashew varieties, (ii) improved nutrient and production technologies, (iii) effective utilization of interspace and available natural resources and (iv) value addition through preparation of feni from cashew apples. Results indicated that employment at the farm rose from 730 mandays/year (2017-18 – before the interventions) to 1,710 mandays (2023-24). Across these periods, family labour income increased from Rs. 1,29,500 to Rs. 8,82,415 (an increase of Rs. 7,52,915), and net returns from Rs.1,44,250 to Rs. 2,41,165 (an increase of Rs. 3,85,415).

Impact of Institute's cashew variety-Goa Cashew-1 was assessed by comparing with control/local variety (40 farmers each). The yield of obtained from Goa Cashew-1 was 9.36 q/ha while that from control was 4.22 q/ha. From Goa Cashew-1, gross returns of Rs. 1,26,650/ha and net returns of Rs. 61,519/ha were obtained while the control/non-descript local variety provided gross returns of Rs. 52,844/ha and net returns of Rs. 21,558/ha. The net returns obtained from Goa Cashew-1 and control varieties were statistically different (t value = 8.23; $p<0.001$). The benefit-cost ratio was higher for Goa Cashew-1 (1.94) compared to the control farmers (1.68).

Satellite images of the location: before & after interventions



Impact of the salt-tolerant paddy varieties (Goa Dhan 1, Goa Dhan 2, Goa Dhan 3 and Goa Dhan 4) developed by the Institute were compared with the local traditional salt-tolerant variety – *korgut* (45 farmers each). Results of two-sample t-tests indicated that net returns from cultivating improved salt-tolerant varieties were significantly higher compared to *korgut*. The average yield levels in the farmers' fields were 3.25 t/ha (net return of Rs. 35,904/ha) in Goa Dhan 3, 3.19 t/ha (Rs. 34,576/ha) in Goa Dhan 1, 2.96 t/ha (Rs. 31,664/ha) in Goa Dhan 4 and 2.57 t/ha (Rs. 22,942/ha) in Goa Dhan 2, while it was 1.89 t/ha (Rs. 7,716/ha) in *korgut*.

Research Achievements

Animal and Fishery Sciences

Cattle conservation efforts at Shikeri Gaushala, Goa | ©Vishwajeet Prajapati 2025

Studies on prevalence, etiopathology, risk factors and management of infectious reproductive disorders in dairy cattle of west coast region

Shirish D Narnaware, Gokuldas P.P., Susitha Rajkumar and Sanjay Udharwar

Progress

Reproductive diseases are common in dairy cows and are associated with overall negative impact on the economy of dairy farm. Therefore, surveillance, monitoring and management of infectious reproductive disorders in dairy cattle are very important. In this study, the prevalence of important reproductive disorders and the associated pathogens were analyzed from the dairy cows of the west coast region.

To determine the prevalence of major infectious reproductive disorders, different dairy farms located in coastal areas of Goa and Maharashtra were visited, history of the herd was collected and biological samples such as blood, cervical swabs and uterine swabs were collected from 201 dairy cows of 13 dairy farms.

Details of sample collection from dairy cows of different farms

S.N.	Name/Location of farm	Total cattle	Samples collected	Disease problem recorded	Bacteria isolated/ identified
1.	Dairy farm, Kundai, Goa	30	11	Repeat breeding (2), Theileriosis (2), infertility (1), foot rot (1)	*Theileria orientalis (10), Staphylococcus* spp *(2), Fusobacterium (1), E. coli (5)*
2.	Dairy farm, Bicholim, Goa	8	3	Repeat breeding (3)	*Staphylococcus* spp *(3), Theileria orientalis (1)*
3.	Siquera Dairy Farm, Nigude, Swantwadi, Sindhudurg, Maharashtra	85	44	Anestrus (1), repeat breeding (2), abortion (2)	*Brucella abortus (9), E. coli (3), Theileria orientalis (12)*
4.	Dairy Farm, Mayem	16	6	Repeat breeding (1)	*Staphylococcus* spp *(3)*
5	Gomantak Gauseva Maha sangh Gaushala, Sikeri, Bicholim, Goa	3000	11	Repeat breeding (2), Abortion (1)	*Brucella abortus (2), Theileria orientalis (3), E. coli (5)*
6.	Gomanchal dairy, Kudne, Sanquelim, Goa	150	49	Abortion (1)	*Brucella abortus (14)*

7.	Jai Shriram Gosanvardhan Kendra, Valpoi, Goa	431	33	Repeat breeding (1)	*Theileria orientalis (1)*
8.	Shatixa dairy farm, Kotarli, Goa	107	5	--	--
9.	Tapobhumi Gaushala, Kundai, Goa	45	11	Infertility (1)	*Theileria orientalis (2)*
10.	Dairy farm, Wayangini, Mayem, Bicholim, Goa	12	3	Repeat breeding (1)	*Staphylococcus* spp *(1), Brucella abortus (1)*
11.	Dairy Unit, ICAR-CCARI, Goa	52	12	Uterine Prolapse (1), vaginal prolapse (1) Endometritis (1), infertility (1)	*Staphylococci* spp *(1), E. coli (1), Streptococcus* spp*(1), yeast (1)*
12.	Naik Agro farm, Hankhane, Ibrampur, Goa	17	7	--	*Staphylococci* spp *(3), E. coli (1),Theileria orientalis (1)*
13.	Dairy farms, Ibrampur, Bicholim, Goa	20	6	Repeat breeding (1)	*Staphylococcus* spp*(1), E. coli (2)*

Cervical swab collection from a Goshala at Bicholim, Goa

Reproductive examination in a dairy farm at Kundai, Goa

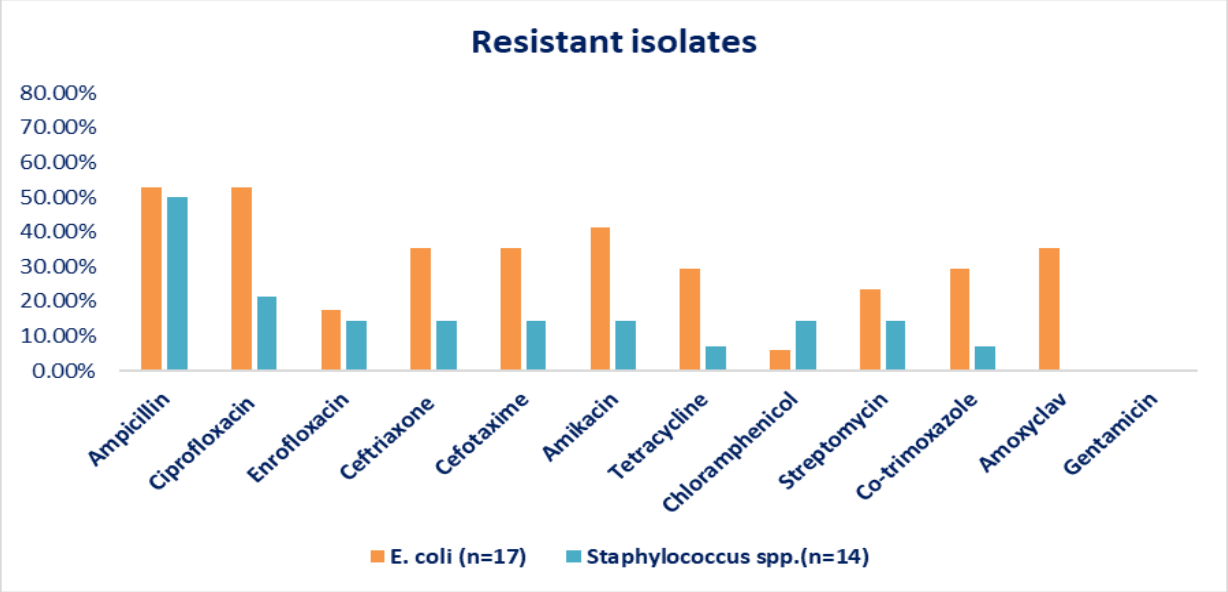
Vaginal prolapse in a Sahiwal cow

Uterine prolapse in a Shweta Kapila cow

The important reproductive problems recorded in dairy cattle were repeat breeding (6.46%) followed by abortion (1.99%), infertility (1.49%), anestrus (0.49%), endometritis (0.49%), vaginal prolapse (0.49%) and uterine prolapse (0.49%). The cervical and uterine swabs collected from cattle were used for bacterial isolation. For confirmation of bacterial isolates, the genomic DNA was isolated from the bacterial colonies and PCR was carried out using the oligonucleotide primers for amplification of *EcAlr* gene of *E. coli*, *gap* gene of *Staphylococcus* spp and *tuf* gene of *Streptococcus* spp. The amplified PCR products were further sequenced using Sanger sequencing and the gene sequences obtained were matched with the NCBI genbank database using BLAST analysis. Based on microbiological and molecular diagnosis the bacteria identified from different reproductive conditions were *Staphylococcus* spp., *E. coli* and *Streptococcus* spp. The antibiotic sensitivity test (AST) of these isolates was performed using the disc diffusion method. The AST results of all bacterial isolates against the tested antibiotics are summarized.

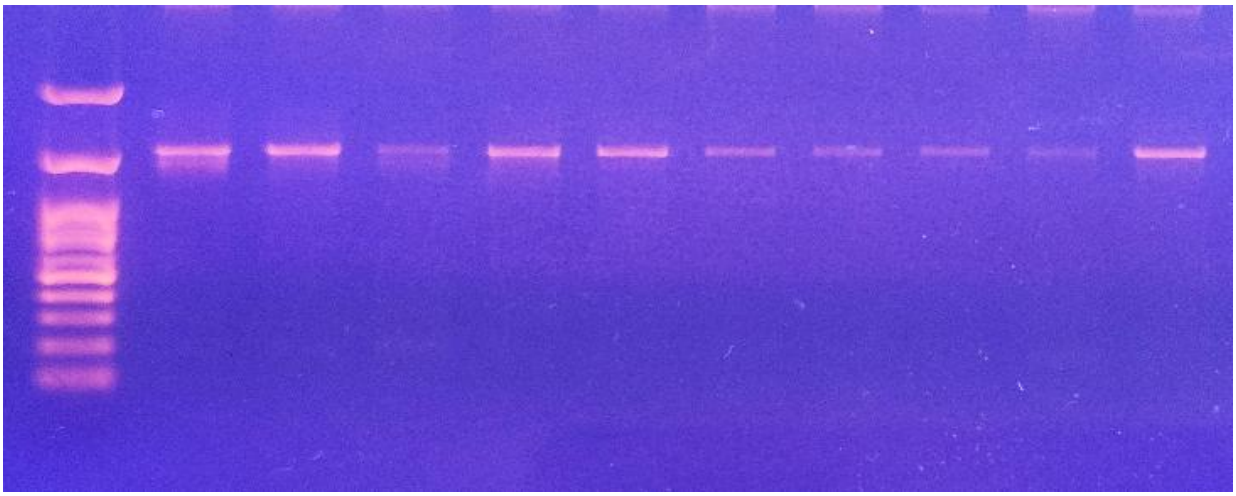
Antibiotic sensitivity test results of isolated bacteria

		Resistant isolates	
No.	Antibiotic discs used	*E. coli* (n=17)	*Staphylococcus* spp.(n=14)
1.	Ampicillin-10µg	9 (52.94%)	7 (50%)
2.	Ciprofloxacin- 5µg	9 (52.94%)	3 (21.42%)
3.	Enrofloxacin- 5µg	3 (17.64%)	2 (14.28%)
4.	Ceftriaxone- 30µg	6 (35.29%)	2 (14.28%)
5.	Cefotaxime- 30µg	6 (35.29%)	2 (14.28%)
6.	Amikacin- 30µg	7 (41.17%)	2 (14.28%)
7.	Tetracycline- 30µg	5 (29.41%)	1 (7.14%)
8.	Chloramphenicol- 30µg	1 (5.88%)	2 (14.28%)
9.	Streptomycin- 10µg	4 (23.52%)	2 (14.28%)
10.	Amoxyclav- 20/10µg	6 (35.29%)	-
11.	Co-trimoxazole- 1.25/23.75µg	5 (29.41%)	1 (7.14%)



Number of resistant bacteria (%) against different antibiotics in antibiotic sensitivity test

For diagnosis of brucellosis Rose Bengal Plate Test (RBPT) was performed on all the serum samples collected from different dairy farms, of which 26 (12.93%) samples were detected positive. The blood samples from dairy cattle were also subjected to DNA extraction. The DNA was subjected to PCR for screening of hemoprotozoan parasites such as *Babesia bovis, Babesia bigemina, Theileria annulata* and *Theileria orientalis*. Among 201 blood DNA samples from Goa and Maharashtra tested by PCR, 30 (14.92%) samples detected positive for *Theileria orientalis* (Fig 4). The PCR products of *T. orientalis* were sequenced using Sanger sequencing and the resultant sequences were submitted in NCBI GenBank database for which accession numbers were assigned (Accession ID: PP669812, PP669999, PP683141, PP694390).



PCR for *Theileria orientalis* showing bands at 1538 bp

Alternative herbal strategies for management of bovine mastitis

Susitha Rajkumar, Shirish Narnaware and Sanjay Udharwar

Screening of herbal extracts for antimicrobial property

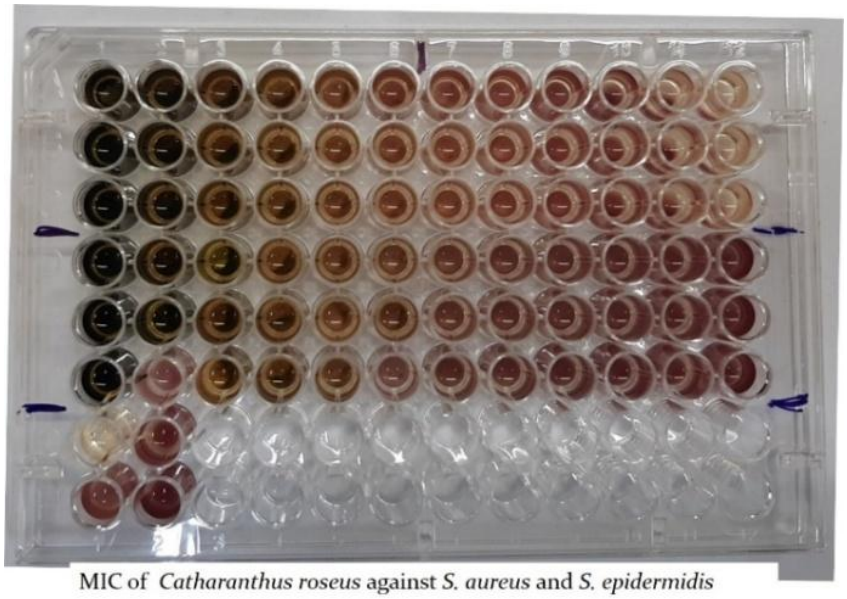
Assessed the antimicrobial properties of methanolic extracts of 12 herbal extracts for antibacterial effect against *Staphylococcus* sp. and *E. coli* by disc diffusion test. The plants used were *Catharanthus roseus* (*Vinca rosea*), Nirgundi (*Vitex negundo*) leaves, Palash (*Butea monosperma*), Palash flower, Guava (*Psidium guajava*), Shami (*Prosopis cineraria*), Asoka (*Saracaasoca*) tree bark, Tulsi (*Ocimum tenuiflorum*), Madhunashini (*Gymnema sylvestre*), bael (*Aegle marmelos*) leaves, Giloy (*Tinospora cordifolia*) stem, Arjun tree (*Terminalia arjuna*) bark, Bhui amla (*Phyllanthus niruri*). The methanol extract was prepared and carried out the study of the antimicrobial effect against *Staphylococcus aureus, Staphylococcus haemolyticus, S. epidermidis* and *E. coli* isolated from mastitis by disc diffusion method. The extract was dissolved in DMSO and the minimum inhibitory concentration against *Staphylococcus* sp. was assessed by growth in Mueller Hinton broth with serial dilutions of the extracts. The most effective extract was *Ocimum tenuiflorum* with MIC of 1.562mg/ml against *Staphylococcus aureus and S. epidermidis*.

Antimicrobial potency of herbal extracts against *Staphylococcus aureus* and *S. epidermidis* by disc diffusion method

Extract	Average diameter of zone for *S. aureus*	Average diameter of zone for *S. epidermidis*
Catharanthus roseus	Nil	Nil
Ocimum tenuiflorum	10 mm	10 mm
Vitex negundo	Nil	Nil
Terminalia arjuna bark	10 mm	10 mm
Butea monosperma leaves	10 mm	10 mm
Butea monosperma flower	Nil	Nil
Enrofloxacin	35 mm	35 mm

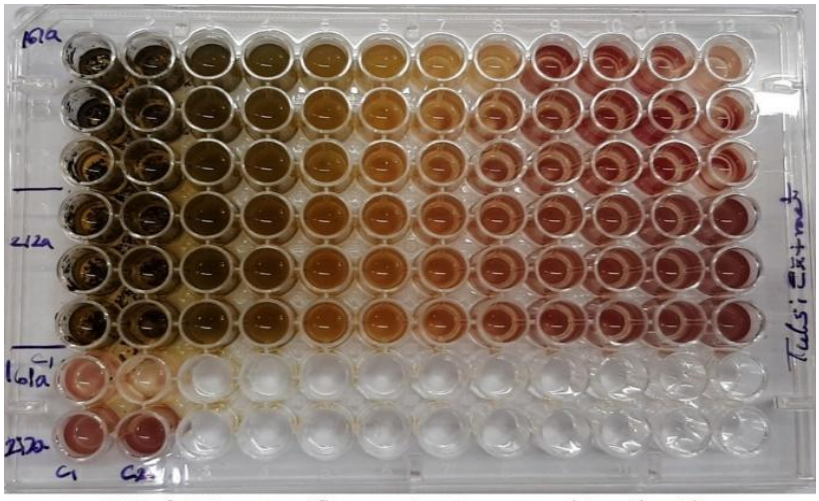
Minimum inhibitory concentration (MIC) of herbal extracts against *Staphylococcus haemolyticus & S. epidermidis*

Extract	MIC against *S. haemolyticus*	MIC against *S. epidermidis*
Catharanthus roseus	25 mg/ml	25 mg/ml
Ocimum tenuiflorum	1.562 mg/ml	1.562 mg/ml
Butea monosperma leaves	25 mg/ml	25 mg/ml



MIC of *Catharanthus roseus* against *S. aureus* and *S. epidermidis*

Micro-titre plate showing MIC of *Catharanthus roseus*



MIC of *Ocimum tenuiflorum* against *S. aureus* and *S. epidermidis*

Micro-titre plate showing MIC of *Ocimum tenuiflorum*

Herbs used for antimicrobial property screening

Conservation of major farm animal resources in the coastal region through evaluation of seminal traits, semen processing and preservation protocols

Gokuldas P.P. and Amiya R. Sahu

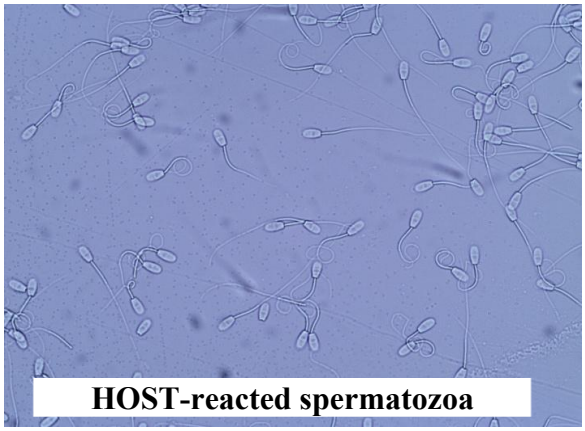
Characterization of seminal attributes in indigenous farm animals

Characterization of seminal attributes of indigenous farm animals is important in terms of animal productivity enhancement, breed development programs and conservation efforts. Detailed characterization of seminal traits of native farm animal species relevant to coastal ecosystem were carried out during the period. Basic seminal characteristics like semen volume, sperm concentration, live count and progressive motility were recorded in indigenous agonda goan pigs and compared with other breeds. Ejaculate volume and sperm concentration were found to be significantly lower ($p \leq 0.05$) while Reaction time and Refractory period were significantly longer ($p \leq 0.05$) in indigenous pigs. These findings are indicative of poor libido and difficult semen donor character in native pigs.

Comparison of basic seminal characteristics in different breeds of pigs

Breed/Variety	Ejaculate Volume (ml)	Concentration (million/ml)	Live Sperm %	Progressive motility %	% HOST reactive cells
Indigenous AG	81.50±8.8^{a}	297.30±20.2^{a}	74.42^{a}	75.20^{a}	63.75^{a}
LWY	142.50±8.1^{b}	696.70±28.9^{b}	81.75^{a}	86.25^{b}	72.40^{a}
Goya variety	154.5±13.4^{b}	329.35±18.5^{a}	73.25^{a}	77.40^{a}	72.13^{a}
Overall	126.17±9.7	441.12±27.2	76.47	79.62	69.43

Hypo-osmotic Swelling Test (HOST) was employed to evaluate sperm membrane integrity in Konkan Kanyal goats. Coiled spermatozoa, graded as HOST ++ and HOST+ reacted cells, were classified as those with intact and functional sperm membrane. A favourably greater proportion of HOST++ reacted cells (77.91%) were identified in Konkan Kanyal semen samples. Mean percent of total HOST responsive sperms were 90.22%. This test has been proved to be a valuable one for evaluation of functional integrity of sperm plasma membrane.



HOST-reacted spermatozoa

Sperm motility and advanced sperm motion kinetic parameters were evaluated using Computer Assisted Semen Analysis (CASA) for the first time in native Konkan Kanyal goat and Agonda Goan pig breeds. For Konkan Kanyal goats, Sperm Curvi-linear Velocity (VCL), Straight Line Velocity (VSL), Average Path Velocity (VAP), Amplitude of Lateral Head Displacement (ALH) recorded were 60.69 µm/s, 27.37 µm/s, 52.40 µm/s and 7.71 µm respectively. Important motion linearity parameters derived using basic motion kinetic parameters were Linearity (45.58%), Straightness (59.41%) and Wobbliness (65.60%). Most of the major sperm motility and kinetic parameters were comparable to other native breeds of the west coast region.

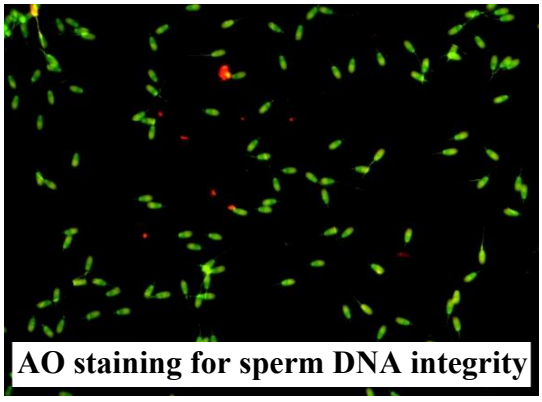
CASA Motion Kinetic parameters in Konkan Kanyal goats

	VCL (µm/s)	VSL (µm/s)	VAP (µm/s)	ALH (µm)	DAP (µm)	DCL (µm)
n	28	28	28	28	28	28
Mean	60.69	27.37	52.40	7.71	10.98	18.78
SEM	±1.36	±0.65	±3.42	±0.09	±0.15	±0.67

For Agonda Goan pigs, CASA values of VCL, VSL, VAP, ALHwere 131.01 µm/s, 32.22 µm/s, 81.65 µm/s and 5.84 µm respectively. Higher values of VAP and VSL were recorded which are indicative of optimal fertility in this indigenous pig breed. Advanced Computer Aided Semen analysis method was found to be more accurate in objectively assessing progressive motility, liveability and sperm motion kinetic parameters in native small animal species.

CASA Motion Kinetic parameters in Agonda Goan pigs

	VCL (µm/s)	VSL (µm/s)	VAP (µm/s)	ALH (µm)	DAP (µm)	DCL (µm)
n	20	20	20	20	20	20
Mean	131.01	32.22	81.65	5.84	15.63	34.52
SEM	±1.11	±0.73	±1.07	±0.51	±1.40	±3.01


AO staining for sperm DNA integrity

Advanced fluorescent staining techniques were employed to evaluate *in-vitro* sperm characteristics like sperm DNA, plasma membrane and acrosomal integrity. Important fluorescent probes like Acridine Orange (AO), Propidium Iodide (PI), Fluorescein isothiocyanate-PNA (FITC-PNA), Carboxy fluorescein diacetate (CFDA) were used for different fluorescent staining methods. Acridine Orange test helps in examining sperm DNA integrity and distinguishes between normal double-stranded and abnormal denatured or single-stranded DNA using the metachromatic properties of the stain. In Konkan Kanyal semen samples, the mean percentage of sperms with intact DNA were found to be greater (99.55%) while mean percentage of sperms with denatured or fragmented nuclear DNA were only 0.45% indicative of optimal DNA integrity and viability. This method could be useful in studying potential linkage between sperm DNA damage and fertility in indigenous animals.

Genetic variability studies for thermotolerance in selected breeds of livestock under coastal environment

Amiya Ranjan Sahu and Gokuldas P. P.

The study was carried out to identify single nucleotide polymorphisms (SNPs) of heat shock protein gene (HSP90AA1) in Shweta Kapila cattle adapted to hot and humid coastal climate. Genomic DNA was extracted and amplified for HSP90AA1 gene using designed oligonucleotide primers and sequenced. Sequence data of all the amplified regions of HSP90 gene was analyzed using Edit Seq and SeqMan of LASERGENE software. Analysis of custom sequencing data unveiled the presence of 10 novel SNPs located at g.G4733C, g.C4765A and g.A4848G in 3' UTR, g.C1012T and g.A1209G in exon 3, g.C1300T in intron 3, g.C2245T and g.T2266G in exon 5, and g.T3814A and g.G4212T in exon 10. The identified SNPs were genotyped by PCR-RFLP (AciI and HpyCH4III enzymes) and Tetra-primer ARMS-PCR. Genotypic and allelic frequencies for the studied regions were ranged between 0.094 to 0.760, and 0.2645 to 0.7355, respectively.

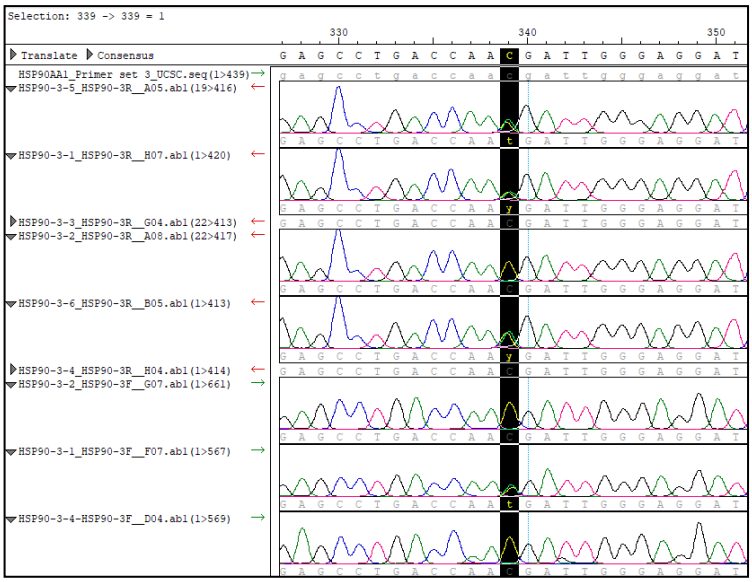
Sampling and PCR amplification

Blood samples collected from indigenous Shweta Kapila cattle from different herds of Goa. Genomic DNA isolated by ReliaPrep™ Blood gDNA Miniprep system. DNA quality checked using 0.7 Agarose gel and DNA purity and concentration estimated taking absorbance at 260 and 280 nm in the NanoDrop™ 1000 Spectrophotometer. HSP90AA1 gene amplification was performed using five primer pairs designed with Primer3 (version 0.4.0).

Blood sample collection

Sequencing and genotyping

PCR amplicons from seven samples of Shweta Kapila cows were sequenced in both forward and reverse directions, using an ABI PRISM 3730XL Genetic Analyzer. Sequence data were analyzed with LASERGENE software (version 7.1.0) for SNP identification. Codon changes and amino acid alterations were verified using the ExPASy translate tool and compared with the HSP90AA1 reference sequence from NCBI. Genotyping was performed using two methods: Restriction Fragment Length Polymorphism (RFLP) and Tetra-Primer Amplification Refractory Mutation System-Polymerase Chain Reaction (ARMS-PCR).



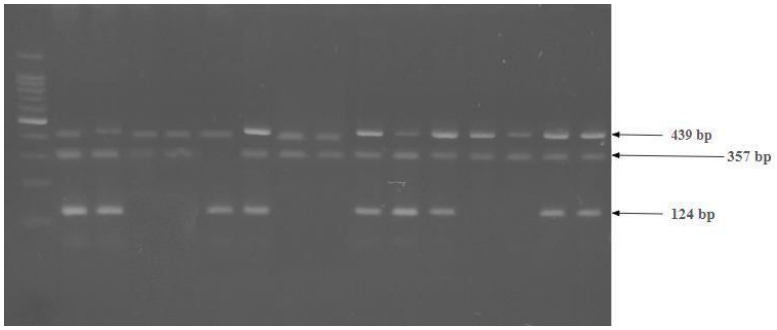
Chromatogram for SNP 2245C>T in Exon 5

Comprehensive analysis of the HSP90AA1 gene across the studied cattle populations revealed the presence of ten single nucleotide polymorphisms (SNPs). Notably, three SNPs were identified within the 3' untranslated region (UTR) at positions g.G4733C, g.C4765A, and g.A4848G, with the first two resulting in amino acid substitutions—Cysteine to Serine (g.G4733C) and Glutamine to Cysteine (g.C4765A). Additionally, seven SNPs were detected in other regions of the gene: g.C1012T and g.A1209G in exon 3, g.C1300T in intron 3, g.C2245T and g.T2266G in exon 5, and g.T3814A and g.G4212T in exon 10.

Eight out of the ten identified SNPs in the HSP90AA1 gene were successfully genotyped. The SNPs g.T2266G in exon 5 and g.A1209G in exon 3 were genotyped using RFLP with the AciI and HpyCH4III enzymes, respectively. The remaining six SNPs—g.C1012T, g.C2245T, g.T1300C, g.G4212T, g.G4733C, and g.C4765A—were genotyped using the ARMS-PCR method with allele-specific tetra primers, demonstrating polymorphic variations within the HSP90AA1 gene. These observed variations highlight potential genetic diversity related to thermotolerance and heat stress adaptation in examined Shweta Kapila cattle.

Sequence Submission to NCBI

The identified variant of the HSP90AA1 gene, characterized by SNPs deposited in the NCBI GenBank database using the BankIt submission tool and published (Accession ID: PP583569.1 and PP694916.1).



Lane 1: 100 bp DNA ladder
Lane 2, 3, 7, 10, 11, 12 and 15, 16: CT genotype (439 bp+ 357 bp+ 124 bp);
Lane 4, 5, 8, 9, 13 and 14: CC genotype (439 bp + 357 bp), and
Lane 6: TT genotype (439 bp +124 bp).

Augmentation of backyard poultry production through technological interventions in breeding, feeding and management aspects in Indian West Coast

Nibedita Nayak, Gokuldas P. P., Susitha Rajkumar and Amiya Ranjan Sahu

Phytogenic feed additives

Shyama tulsi *(Ocimum tenuiflorum),* Moringa *(Moringa oleifera),* Chekurmanis *(Sauropus androgynus),* Kalmegh (*Andrographis paniculate*), Alpinia *(Alpinia galanga),* Turmeric *(Curcuma longa)* and Ginger *(Zingiber officinale)* were superimposed in feed of CARI Debendra chicken. Spectroscopic wavelength scan was done by UV-Vis spectrum analyzer and FourierTransform Infrared analyzer (FTIR) to assess the presence of phytoconstituents. FTIR methanolic extract showed the presence of functional groups like hydroxyl, Carbonyl, aromatic and organosulfur in the range of 589.39 cm^{-1} -2917.82 cm^{-1}. Active constituents of these herbal additives were evaluated through GC-MS profiling revealing phytocompounds in *O. tenuiflorum*contain 2-nonen-1-ol, (Z)- with anti-inflammatory effects, 3-ethyl heptanoic acid with antioxidant effects and 4-amino cyclohexanone, n-acetyl- with antimicrobial effects. *M. oleifera* contains acetic acid n-octadecyl ester as an antioxidant agent acting as free radical terminator, hexacosyl acetate as antimicrobial agent and 1-docosanol, acetate as antioxidant agent. *S. androgynus* contains 1-hepten-4-ol, 4-propyl with antimicrobial activity, cyclohexanol, 3,5-dimethyl with antibacterial and antifungal activity. To investigate their potential synergistic benefit and mechanism, we adopted integrated study of network pharmacology, molecular docking and in vivo method.

Nutritive value analysis of Egg samples

Analysis of eggs for their quality from 200 numbers late phase layers (62-70 weeks) were done by egg analyser. Chemical quality and nutritional composition of eggs after in-feed inclusion of phytogenic additives (Shyama tulsi, Neem and Chekurmanis) respectively in different treatment (T1/T2/T3) were evaluated. Neem (*Azadirachta indica*) fed group had lowest carbohydrate content (g/100g) in eggs with highest protein concentration (12.63g/100g) among treatments. Significant increase in essential amino acid arginine and methionine concentration (mg/Kg) in all the treatment groups compared to control. The concentration of arginine in eggs ranged from 5.75 to 9.07 mg/kg compared to 4.81 mg/kg in control group. Similarly, methionine concentration was 2.13 to 2.77 mg/kg in treatment compared 1.85 mg/kg in control. Vit D3 conc. (mg/kg) was comparable among Chekurmanis (1.57 vs 1.52) Neem fed groups respectively. Level of cholesterol was 2065.15 mg/kg in eggs of moringa fed group, which was lowest among all. Variation in energy level (Kcal) rallies in trend of Chekurmanis followed by Shyama tulsi and control.

Development of Ready-To-Eat (RTE) animal and fish-based traditional foods of coastal India by retort processing

(Inter-Institutional Project with ICAR-CIFT, Kochi)

R. Solomon Rajkumar, C. O. Mohan, Mathala Juliet Gupta, Susitha Rajkumar and Trivesh Mayekar

Traditional Jackfruit Xacuti and Dry Bombil Curry recipes were standardised through consultations with local housewives and cooks, trials, and sensory evaluations. In both cases, the curry base and main ingredient were prepared separately. Finalised recipes were packed in retortable multilayer pouches (12µ PET ALOX / 15µ Nylon / 70µ CPP, 16 × 18 cm) and processed using a pilot-scale water bath retort at 121.1°C with 1.05 bar steam and 2.1 bars overpressure for 55.76 minutes. F_0 value optimisation was done at 6, 7, and 8 minutes, with sensory evaluation guiding standardisation. Product core temperature was monitored using high-precision copper-nickel thermocouples. Copper-nickel thermocouples capable of measuring temperature in the range of 85°C to 145°C with an accuracy of ±0.1°C and a response time of 0.2 s, were used. The lag factor for heating (Jh), the slope of the heating curve (fh), time in minutes for sterilisation at retort temperature (U), and lag factor for cooling (Jc) were calculated. The parameters, final temperature deficit (g), process time (B), and total process time (TB) were calculated using the mathematical method of Stumbo (1973). The parameters were determined by plotting temperature deficit (RT - Tc) on semi-log paper. Total process time (TB) was determined by adding process time (B) to the effectiveness of the come-up time. The product core temperature and the lethal rates (F_0 value) were noted, and the F_0 value was calculated. After retorting, pouches were stored at ambient conditions (25–30°C). Commercial sterility was confirmed on the 45th day per IS: 2168 (1971), validating both products as commercially sterile and suitable for market-ready, shelf-stable packaging.

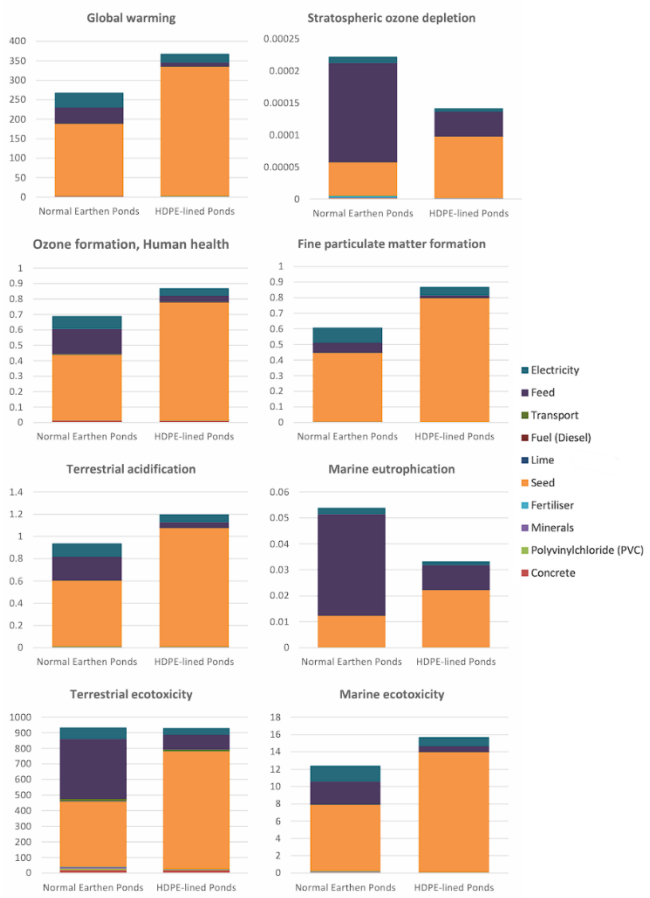
Traditional Dry Bombil Curry

Assessing status of coastal aquaculture practices and improvement through technology intervention for promoting livelihood of fish farmers in west coast of India.

Trivesh Mayekar, Sreekanth G. B., Gopal R. Mahajan, Manohara K.K., R. Solomon Rajkumar and Paramesha V.

Comparative Life Cycle Assessment of White leg Shrimp Farming Systems on India's West Coast

A comparative life cycle assessment (LCA) of white leg shrimp (*Litopenaeus vannamei*) farming systems was conducted on India's west coast, specifically examining Earthen Ponds (semi-intensive) versus HDPE-lined ponds (intensive). Field surveys assessed 20 shrimp ponds (15 Earthen, 5 HDPE-lined) across five western Indian states from February-July 2024. Following ISO guidelines, the cradle-to-farm-gate LCA used SimaPro 9.3.0.2 with ReCiPe 2016 Midpoint method to analyze environmental impacts across eight categories. Structured interviews collected farm input-output data, with one metric ton of live shrimp serving as the functional unit. Analysis focused primarily on global warming potential, terrestrial acidification, and marine eutrophication. The LCA results revealed that HDPE-lined ponds generated significantly higher environmental impacts than Earthen Ponds in most categories. For global warming potential, HDPE-lined ponds produced 369.04 kg CO_2 equivalent versus 268.06 kg CO_2 equivalent for Earthen Ponds (37.7% higher). Terrestrial



Comparison of characterization results of Earthen ponds and HDPE-lined ponds for the production of one metric ton live weight of shrimp

acidification was also higher in HDPE-lined ponds at 1.19 kg SO_2 equivalent compared to 0.94 kg SO_2 equivalent for Earthen Ponds. However, Earthen Ponds showed higher marine eutrophication at 0.054 kg N equivalent versus 0.033 kg N equivalent for HDPE-lined ponds. The study identified seed production, electricity consumption, and feed inputs as the primary contributors to environmental impacts in both systems. HDPE-lined ponds required nearly twice the number of seeds but used less feed per ton of production compared to Earthen Ponds. The research concluded that Earthen Ponds have a more favorable environmental profile and recommended strategies such as implementing solar-powered aeration systems and replacing fishmeal with plant-based alternatives to improve sustainability in Indian shrimp aquaculture.

Characterization result of HDPE-lined ponds and earthen ponds

Sr No	Impact category	HDPE-lined Pond	Earthen pond
1	Global warming (Kg CO_2eq)	369.04 ± 75.139	268.06 ±75.350
2	Stratospheric ozone depletion (kg CFC11 eq)	0.0001 ± 0.0000	0.0002 ± 0.0001
3	Ozone formation, Human health (kg NOx eq)	0.8714 ± 0.1701	0.6895 ± 0.2033
4	Fine particulate matter formation (kg PM2.5 eq)	0.8706 ± 0.1814	0.6068 ± 0.1704
5	Terrestrial acidification (kg SO_2eq)	1.1987 ± 0.2381	0.9355 ± 0.2748
6	Marine eutrophication (kg N eq)	0.0333 ± 0.0056	0.0538 ± 0.0322
7	Terrestrial ecotoxicity (kg 1,4-DCB)	949.88 ± 162.63	933.29 ± 358.81
8	Marine ecotoxicity (kg 1,4-DCB)	15.9496 ± 3.1073	12.4063.6792

Economic viability assessment of Asian seabass aquaculture systems along India's west coast

This research evaluated the economic viability of Asian seabass (Lates calcarifer) aquaculture systems along India's west coast. The methodology involved surveying 20 aquaculture operations across Karnataka, Goa, Maharashtra, and Kerala using standardized questionnaires and on-site observations. Both cage culture systems (with various dimensions and stocking densities of 5-13.72 fish/m^3) and pond systems (earthen and HDPE-lined ponds) were assessed. Parameters measured included growth rates, survival percentages, feed conversion ratios, and economic indicators. Cage culture achieved the highest production (6.70 kg/m^3) compared to HDPE-lined ponds (0.89 kg/m^2) and earthen ponds (0.33 kg/m^2), while earthen ponds demonstrate the lowest production cost (₹178/kg versus ₹476/kg for cages and ₹309.13/kg for HDPE-lined ponds). HDPE-lined ponds (₹355.67/kg) and earthen ponds (₹348.03/kg) generated higher net profits than cage systems (₹202/kg).

Cage culture systems in Karnataka, Goa and Maharashtra

Earthen pond and HDPE lined pond culture in Goa

Innovative assessment of growth and survival of crab in floating barrel-based Culture system

A novel, climate-resilient crab farming system was developed using custom-designed HDPE barrels (50–80 L capacity) to mitigate heat stress in crabs. The system maintains crabs at a depth of 0.8–1.2 meters under water, effectively reducing water temperature by 1–1.5°C. Each barrel unit was equipped with provisions for water exchange, feeding, and waste removal. The model demonstrated economic viability, offering an additional monthly income of ₹800–₹1,000 per barrel for farmers and fishers.

Crab culture system with floating barrels

Demonstration of Asian seabass culture

Demonstration Asian seabass culture was practiced at three sites to promote sustainable aquaculture in a freshwater pond in Pernem, North Goa, a brackishwater pond in Kundapura, Karnataka and an estuarine cage culture system at Curtorim, Goa. At Pernem, 250 seabass fingerlings were stocked and fed pelleted feed (10% of biomass), achieving a 75% survival rate and an average weight of 410 ± 45 g in three months. In Kundapura, 1,000 fingerlings were stocked and fed trash fish at 10% of biomass, with 70% survival and a growth of 755 ± 91 g in seven months. Both sites followed regular water quality monitoring, organic and inorganic fertilization, and proper feeding regimes, ensuring optimal growth.

Asian seabass culture systems

Demonstration of Mussel culture

A refined mussel culture technology was successfully developed and demonstrated at Kerala, Karnataka and Maharashtra, optimizing rack design, rope dimensions, spacing, seed size, seeding density, and culture duration for enhanced productivity. The system used a 5 m × 5 m bamboo rack (bamboo poles of 15–20 cm diameter) supporting 100 nylon/coir ropes (2.8 cm dia) spaced at 25 cm intervals. Each rope was seeded with 1.0 - 1.2 kg of mussel spat (22–35 mm) enclosed in stitched cotton bags (2.5 mm thick, 1 m × 0.35 m). Demonstration over 1000 m² resulted in a net income of ₹27,900 per rack with a Benefit-Cost Ratio of 2.32, compared to ₹12,800 net income under traditional practices-reflecting more than 100% increase in profitability.

Harvest of mussel culture

Research Achievements

Agro Eco-Tourism

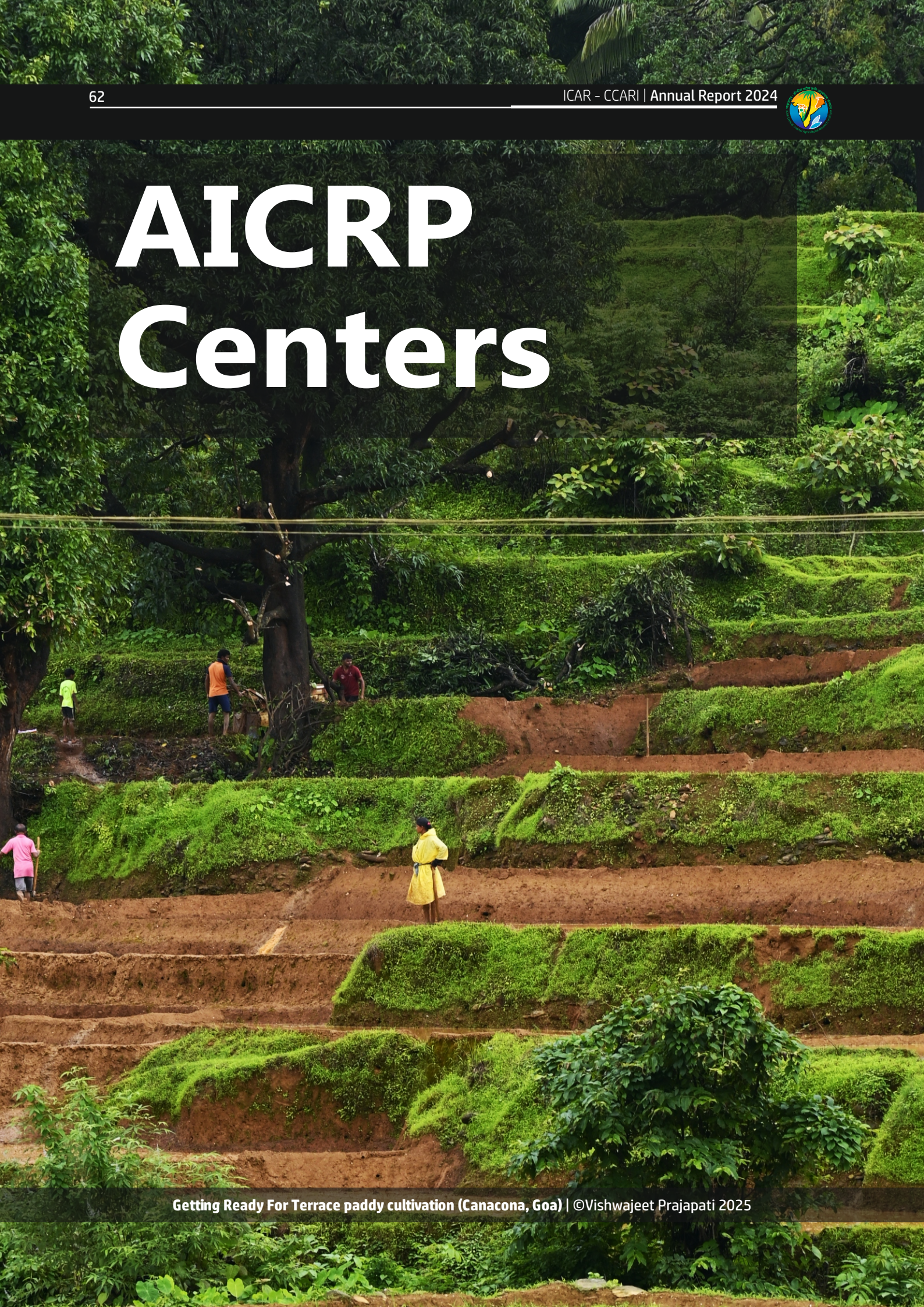
Sahakari Farms (Ponda, Goa) | ©R. Solomon Rajkumar 2025

Evaluation of the feasibility of operation and maintenance of agro-ecotourism center under public- private partnership mode

R Solomon Rajkumar, Vinod Ubarhande, Paramesha V., Shripad Bhat, Uthappa A. R. and Trivesh Mayekar

Agro–ecotourism is the modern concept to boost tourism activity on farms. It offers scope for the integration of farming activities, the tourism industry and the farm business. It is one of the livelihood strategies to link tourism with agricultural services, products, and experiences to satisfy the needs of both farmers and tourists. The technology is being adopted by the stakeholders of the tourism industry (M/S Udbhav Vriksh, Goa) and the institute Agro-eco-tourism centre is being operational in a Public-Private-Partnership (P-P-P) mode and generated a revenue of ₹26 lakhs for five years. ICAR-CCARI initiated establishing a Community-Based Agro-Ecotourism model in Satorlim, Canacona Taluka, Goa as a part of *Viksit Bharat's* 100-day initiative aimed at fostering sustainable agricultural practices. A an educational consultative meeting designed to introduce the benefits of adopting a scientific agro-ecotourism framework. A preliminary layout was developed to outline both primary and secondary agro-ecotourism activities. The program will be launched with financial support from the ICAR-STC fund within the targeted 100 days. The farmers expressed enthusiasm about the innovative agro-ecotourism concept and showed eagerness to transform their village into a 'Model Agro-Ecotourism Village.'

AICRP Centers



Getting Ready For Terrace paddy cultivation (Canacona, Goa) | ©Vishwajeet Prajapati 2025

All India Co-ordinated Research Project on Integrated Farming Systems

Paramesha V., ***Gopal R. Mahajan, Sreekanth G. B., Gokuldas P. P., Manohara K. K., Parveen Kumar, Uthappa A. R., R. Solomon Rajkumar and Trivesh Mayekar***

Development of rice-based lowland integrated farming system

A rice-based Integrated Farming System (IFS) integrating crops, dairy, poultry, and fish has been successfully established on a 0.5-hectare area in Goa, demonstrating significant improvements in productivity, income, and resource-use efficiency. The system generated a net annual return of ₹1.81 lakh, with crops contributing the largest share (66.5%) of the income, followed by dairy (24.9%), highlighting the economic viability of crop-livestock integration. Compared to the conventional rice–fallow system, the IFS recorded a remarkable 241% increase in overall yield and a 114% rise in net income, showcasing its potential to enhance livelihood security in smallholder coastal farming systems. In addition to economic gains, the model emphasized sustainable resource management by recycling approximately 6,650 kg of cow dung, which contributed to the internal nutrient flow. Through effective residue recycling, the system retained and reused an estimated 67.7 kg of nitrogen (N), 41.5 kg of phosphorus (P), and 78.4 kg of potassium (K), thereby reducing the dependency on external fertilizers. Furthermore, the IFS model employed 362 man-days annually, emphasizing its role in rural employment generation and its holistic contribution to agro-economic and ecological sustainability in the region.

Integrated farming system model for lowland situations of Goa

Development of plantation crop-based upland integrated farming system

A Plantation crop-based IFS model was standardized for upland conditions on a 0.79-hectare area. This model incorporated diversified components, including cashew with pineapple; coconut intercropped with pineapple, noni, and tapioca; arecanut with banana; piggery integrated with poultry; a composting unit; and direct catch pits for water harvesting. This diversified approach resulted in significant yield gains compared to monocropping systems, with arecanut and cashew yields increasing by 83.2% and 78.3%, respectively, in terms of arecanut equivalent yield. The implementation of water conservation practices, such as the construction of a farm pond, enabled the storage of approximately 400 cubic meters of water for supplemental irrigation during the summer season. The plantation-based IFS delivered a net annual income of ₹2.01 lakh, achieved a benefit-cost ratio (B:C) of 3.4, and created employment opportunities equivalent to 309 man-days per year, highlighting its potential for economic viability, environmental sustainability, and rural employment generation in the coastal uplands of Goa.

Plantation crop based integrated farming system model

Coconut+turmeric, arecanut+turmeric cropping system

Kuttunad Ducks and Konkan Kanyal goats in the upland IFS model

All India Co-ordinated Research Project on Seed (Crops) & MSP (Horticulture)

Manohara K. K.

Quality seed production (Breeder seed and truthfully labelled seeds) at the Institute farm

Under the Quality Seed Production project, breeder seed and truthfully labelled (TL) seed production of major field crops of Goa was undertaken at the Institute farm during the Kharif and Rabi seasons. Breeder seeds of paddy varieties such as Goa Dhan 1, Goa Dhan 2, Goa Dhan 3, and Goa Dhan 4, along with cowpea variety Goa Cowpea 3, were produced as per the indents received from the Department of Agriculture, Government of Goa, and other stakeholders. In addition, TL seeds were produced in paddy varieties Jaya, Jyothi, Karjat 3, and Sahbhagi Dhan, while small quantities of TL seeds were produced in green gram varieties TM 96-2 and IPM 2-14.

During 2024-25, a total of 15.0 quintals of quality seed was produced at the Institute farm, details of which are as follows.

Crop	Varieties	Class of seed	Qty (Qintal)
Paddy	Goa Dhan 1	Breeder seed	2.0
	Goa Dhan 2	Breeder seed	0.5
	Goa Dhan 3	Breeder seed	3.0
	Goa Dhan 4	Breeder seed	5.0
	Jaya	Truthfully labelled seed	0.5
	Jyothi	Truthfully labelled seed	0.5
	Sahbhagi dhan	Truthfully labelled seed	2.0
Cowpea	Goa Cowpea 3	Breeder seed	1.5
Green gram	TM 96-2	Truthfully labelled seed	0.5
Total quality seed produced at the Institute farm during *Kharif* and *Rabi* season (2024-25)		**15.0 Quintal**	

Breeder Seed production in Rice variety Goa Dhan 3

TL seed production in rice variety Sahbagi Dhan at the Institute farm during *Kharif* 2024

Seed production of the promising new line (Goa Dhan 5) during Kharif 2024 at the Institute farm

Participatory seed production in rice variety Goa Dhan 4 at farmers' field in Kanakumbi village, Karnataka

In addition, during 2024-25, a total of 18,107 planting materials of various horticultural crops, such as arecanut, coconut, mango, cashew, black pepper, nutmeg, chickoo, and others were produced at the Institute farm for distribution to farmers and stakeholders.

Planting Material Production during 2024-25

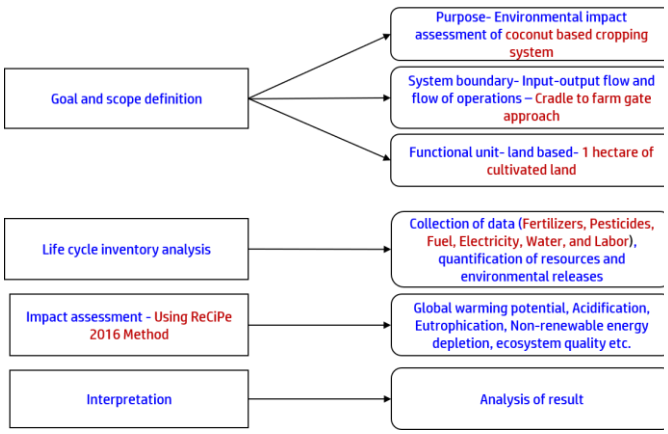
Crops	Numbers
Arecanut	7830
Coconut	1376
Mango	1800
Cashew	2520
Black pepper	765
Bimbli	200
Champa	135
Cinnamon	252
Cocoa	36
Curry leaves	36
Custard apple	61
Drumstick	71
Dragon fruit	90
Guava	274
Jamun	31
Kokum	107
Lemon	282
Mangosteen	27
Nutmeg	676
Ornamental Plants	150
Passion fruit	60
Soursop	244
Tapioca	106
Wax Jamb	202
Chickoo	623
Amla	153
Total	**18107**

View of mango nursery and grafting in Black pepper

All India Co-ordinated Research Project on Palms

Paramesha V.

Under the ICAR-All India Coordinated Research Project on Palms, a detailed study was undertaken to assess the economic viability, energy efficiency, and environmental impact of seven coconut-based intercropping systems suited to coastal agro-ecosystems. The research compared systems such as coconut monocrop, coconut + heliconia, coconut + papaya + drumstick, coconut + pineapple + passion fruit, and others over nine years (2016–2024). Results revealed that the coconut + pineapple + passion fruit combination was the most profitable, delivering the highest average net return of ₹1.3 lakh per hectare per year and a benefit-cost ratio of 1.99. The coconut + heliconia system demonstrated superior energy use efficiency (45.3), while the coconut monocrop had the lowest input-related environmental impact. In contrast, the coconut + papaya + drumstick system exhibited the highest global warming potential due to high input demands, particularly nitrogen fertilizers and fuel-intensive operations. Life cycle assessment using ReCiPe 2016 methodology confirmed that intercropping with shade-adapted, low-input crops enhances resource-use efficiency and reduces environmental burdens. The findings strongly support the promotion of sustainable coconut-based agroforestry systems that balance productivity, profitability, and ecological sustainability in the coastal regions of India.



LCA framework for the environmental impact of coconut-based cropping systems

All India Co-ordinated Research Project on Cashew

Manohara K. K.

During the Year two new Germplasm Srithal-1 (Dasharat) and Bhupar-1 (Subash) were identified

Salient Features: Srital -1(Dasharat)

Canopy	:	Compact
Average yield per tree	:	14-16 kg
Plant height	:	10-12 mts
Number of Nuts per kg	:	90-95
Average nut weight	:	9.2 g
Shelling percentage	:	31.1%
Kernel weight	:	3.51 g
Kernel grade	:	W210
Apple Colour and Shape	:	Yellow and Round
Average wt of apple	:	121.5 g
Average Juice Content of Apple	:	69.32 %
Juice TSS	:	15.80° Brix
Bearing	:	Cluster type

Salient Features: Bhupar-1 (Subash)

Canopy	:	Upright and spreading
Average yield per tree	:	16 kg
Plant height	:	12-14 mts
Number of Nuts per kg	:	100-105
Average nut weight	:	10.5 g
Shelling percentage	:	29.2%
Kernel weight	:	3.12 g
Kernel grade	:	W210
Apple Colour and Shape	:	Orange Yellow and Cylindrical
Average wt of apple	:	144.5 g
Average Juice Content of Apple	:	62.21 %
Juice TSS	:	15.20° Brix
Bearing	:	Cluster type

Hybridization and Selection

During the flowering season (December 2024 to March 2025), 752 crosses involving 22 different parental combinations were effected. Percent nut set of the crosses varied from 6.25 (Local Yellow X Bardez-9) to 84.62 (Tiswadi -3 X Local Bold) and a total of 316 crosses resulted in the development and maturity of crossed seed nuts, which were collected and hybrid seedlings were raised.

Cashew Hybrids

Establishment of Hybrid Cashew Garden

A hybrid Cashew Garden of 204 plants with spacing of 6X6 m was established in an area of 5000 m^2

Hybrid Cashew Garden

All India Co-ordinated Research Project on Vegetable Crops

Ganesh Vasudeo Chaudhari

Details of Total Trials conducted during year 2023-24 under AICRP (VC)

Name of trial	No. of entries received	No. of entries germinated & tested	Trial status
MUSTARD GREEN/ LAIPATTA – AVT I	06	06	vitiated*
OKRA (YVMV) VARIETAL RESISTANT – AVT II	10	10	completed
OKRA (YVMV) VARIETAL RESISTANT – AVT I	09	09	completed
OKRA (YVMV) VARIETAL RESISTANT – IET	11	10**	completed
OKRA (YVMV) HYBRID RESISTANT – IET	08	08	completed
TOMATO (Bacterial wilt) – IET	08	07***	Trials vitiated due to Heavy incidence of bacterial wilt disease
TOMATO Hybrid Det. – AVT II	06	06	
TOMATO (ToLCV) Hybrid Det. – AVT I	07	Heavy incidence of bacterial wilt at nursery stage	
TOMATO (ToLCV) Hybrid Det. – IET	10		
TOMATO (ToLCV) Varietal Det. – AVT I	07		
TOMATO (ToLCV) Varietal Det. – IET	06		
TOMATO (ToLCV) Varietal Indet. – IET	08		
Chilli Hybrid/ Hot Pepper – AVT I	07	07	vitiated****
French bean (Bush) IET	07	07	completed
Cluster bean IET	05	05	completed

* Trial vitiated due to heavy aphid incidence, rotting of leaves coupled with rain showers during the season

** No germination in entry number 2023/OKYVVARRES-3

*** Entry number 2023/TOBWRES-5 was unavailable through nursery stage due to Bacterial Wilt disease

**** No proper crop growth, trial vitiated

Details of trials Successfully conducted under AICRP (VC)

Sr. No.	Name of trial/s	Number of entries received	Number of entries germinated and tested	Best performing entries (Yield q/ha or % YVMV incidence)
1	Okra (YVMV) Varietal Resistant AVT II	10	10	No significant YVMV disease pressure 100 days from sowing of trial
2	Okra (YVMV) Varietal Resistant AVT I	10	10	No significant YVMV disease pressure
3	Okra (YVMV) Varietal Resistant IET	09	09	No significant YVMV disease pressure
4	Okra (YVMV) Hybrid Resistant IET	11	10**	No significant YVMV disease pressure
5.	French bean (Bush) IET	07	07	2023/FBBVAR-4 (30.24) best performing however yield is below average yield for crop
6.	Cluster bean IET	05	05	2023/CLBVAR-2 (130.01) significantly superior pod yield over entries tested

**no germination in entry number 2023/OKYVVARRES-3

Okra Hybrid Resistant IET, Varietal Resistant Trial IET / AVT I/ AVT II: sowing date 15.02.2024 and spacing 60x30 cm
French bean (IET): Sowing date: 20.11.2023, spacing 60x20 cm
Cluster bean (IET): Sowing date: 27.02.2024, spacing 45x30 cm

French bean (Bush) IET trial under AICRP-VC project

Heavy incidence of Bacterial Wilt disease on Tomato trials

All India Co-ordinated Research Project on Pigs

Amiya Ranjan Sahu, Gokuldas P. P. and Nibedita Nayak

Growth performance of crossbred pig variety (Goya) in the sixth generation was 1.125 ± 0.05 kg (n=344) as birth weight, 6.25 ± 0.47 kg (n=269) as weaning weight after 30 days of weaning and 59.76±5.09 kg (n=15) as marketing weight at eight months of age. Mortality rate was 5.23% in pre-weaning and 0.92% in post-weaning period. The pig variety Goya was released during the annual review meeting of AICRP on pig conducted during 19-20 September 2024 at ICAR-Central Coastal Agricultural Research Institute, Goa. Artificial insemination service was provided to the needy farmers at their doorstep and improved germplasms supplied for breeding. The centre provided fundamental knowledge to the farmers and entrepreneurs in scientific practices of pig rearing through different trainings, demonstrations and piggery farmers' field day. Beneficiaries under Tribal Sub Plan and Schedule Caste Sub Plan components were supplied with different inputs for self-sustainable farming and improvement of their livelihood. Total five trainings were conducted under AICRP on Pig covering 93 farmers and farm women

Selection and breeding in pigs

Pig breeds pertaining to four genetic groups viz., indigenous Agonda Goan, exotic Large White Yorkshire and 75% crossbred (75% exotic inheritance) were maintained in the farm. Selection of pigs and breeding was followed as per the technical program of AICRP on Pig. One breeding boar was allotted for mating to three breeding sows in 1:3 ratio. Artificial insemination (AI) was strictly followed for breeding the sows both in farm and field. A total 52 AI was carried out in the year 2024 comprising 25 in the institute herd and 27 in the farmers' field.

Release of Goya Pig Variety

The variety was released in the hand of Hob'le DDG (AS), ICAR, New Delhi in the Annual Review Meeting of AICRP on Pig on 19 September 2024 at ICAR-CCARI, Goa.

Germplasm supply

Total 277 piglets were produced in 38 numbers of farrowings from the sows. In this reporting year, total germplasms supplied were 169 pigs benefiting 103 farmers including beneficiaries under STC and SCSP programme generating Rs. 10,02,163/- (Ten Lakh two thousand one hundred sixty-three only) rupees.

Externally Funded Projects

Paddy transplanting | ©Vinay Gauns 2025

Land shaping methods and integrated farming system approach for improving livelihood security of farmers under *Khazan* lands of Goa (NABARD)

Gopal R. Mahajan, ***Raizada A., Shripad Bhat, Sujeet Desai, Uthappa A. R., Paramesha V. and Parveen Kumar***

The integrated research and revival efforts on coastal salines soils, locally called *Khazan* lands focused on a science-based reclamation approach combining land shaping, salinity zoning & infrastructure empowerment. A land shaping formula was developed to create micro-relief for better drainage and water management, while the concept of a Mini *Khazan* system with custom-designed mini sluice gates was introduced, enabling each plot to function as a self-contained salinity management unit. The land shaping model follows a structured formula: 65% of the area is maintained as original low-lying land, 25% is raised into bunds for salt-sensitive crops, and 10% is allocated for a farm pond to support water harvesting and aquaculture. Land shaping interventions significantly reduced soil salinity by 73.4%, with EC_e decreasing from 15.4 dS/m in 2019 to 4.1 dS/m in 2025. Reclamation of fallow saline lands using well water skimming and controlled irrigation significantly reduced soil salinity from >12 dS/m to <4 dS/m within two seasons, with results demonstrated through comparative EC graphs of reclaimed versus untreated plots. Productivity improved substantially, with Paddy Equivalent Yields (PEY) increasing from 1.8 t/ha (fallow baseline) to 4.6 t/ha in reclaimed fields. Cluster-based development of pond hydrology and water quality management facilitated year-round irrigation and fishery integration. Fodder crops like Co-5 were successfully cultivated, yielding over 38–42 t/ha, while showcasing multi-enterprise models such as Paddy–Coconut–Vegetable, Paddy–Coconut–Banana, and Paddy–Coconut–Fodder, tailored to site-

Rabi paddy cultivation using organic amendments

Fodder cultivation and aquaculture integrated through land shaping in coastal saline soils

specific needs. The initiative also introduced *Khazan* agroecotourism, linking heritage landscape conservation with sustainable livelihood generation. Socio-economic surveys revealed increased farmer confidence, with over 72% expressing willingness to adopt revived models under community-based frameworks. The program demonstrated that strategic reclamation supported by research-led land-use planning can restore productivity, improve incomes, and strengthen climate resilience in degraded *Khazan* systems. These outcomes have laid the foundation for a scalable *Khazan* Revival Plan blending traditional knowledge with modern resource-use efficiency tools.

A satellite view of the experimental site highlighting its components and layout representation

Market Intelligence for Horticultural Crops for Improving Livelihoods of Farmers in Goa (NABARD)

Shripad Bhat* and *Arunachalam V.

This project seeks to provide market intelligence to farmers by utilizing information technology to provide consolidated and farmer-friendly market analyses for major horticultural crops (arecanut, coconut, cashewnut and black pepper) on regular basis, for enhancing farmers' ability to make informed marketing decisions. On daily basis, prices from various markets for these four crops are collected and analyzed. Based on the results of analyzed data, during 2024, a total of 56 market intelligence advisories, summarized in Konkani and English languages, were shared with a total of 1,710 farmers of Goa through four dedicated WhatsApp groups (Arecanut - 636 farmer group members, Coconut - 488 farmers, Cashewnut - 293 farmers & Black pepper - 295 farmers). A common platform was created to bring farmers and buyers of agricultural produce in Goa through a WhatsApp group for "Farmers and Buyers of Goa" (397 members). A total of 77 produce availability posts of farmers were shared in this group leading to around Rs. 2,00,300 worth produces being sold.

A Web App "Marketing Decision Support System" has been developed (https://kvknorthgoa.icar.gov.in/MDSS/indexgraph.php). This web app is mobile-friendly & also be viewed from desktop/computer. This app provides all the marketing related information such as price trends for the major horticultural crops for local, national and international market at one place. A YouTube channel was created for sharing useful information to farmers on market intelligence and other economically important issues (high-yielding varieties, insects, diseases, post-harvest technologies etc.) and this channel has received over 11,000 views so far.

Promotion of improved indigenous backyard poultry through scientific interventions for sustainable poultry production and livelihood security in Goa (NABARD)

Nibedita Nayak, Amiya Ranjan Sahu and Shirish D. Narnaware

A total of 50 farmers were selected under this project and inputs like chicks, waterer and feeder, and chick and grower feed distributed to each beneficiary. A total of 4 trainings and 15 demonstrations were conducted for skill development cum capacity building of the farmer beneficiaries. Data recorded on livability, growth rate, egg production and constraints on rearing of birds in the farmers' field. Project Monitoring Committee meeting was conducted regularly to evaluate the progress of the project.

Visits to different villages in Bardez taluka, Goa was undertaken with the purpose to select beneficiaries interested in poultry farming under this project. A total of 50 farmers were selected and one WhatsApp group was created for better communication, interaction, dissemination of technology and recording of field data. A total of 4 trainings and 15 demonstrations were conducted at the institute as well as farmers' fields as per the objective of the project for capacity building of the farmer-beneficiaries and improving their skill in scientific poultry rearing. Inputs like 25 chicks, one set waterer and feeder, chick and grower feed were distributed to each farmer beneficiary. One technical bulletin in Marathi was prepared as per the terms and released during the Institute Research Advisory Committee meeting and distributed to all the farmers for their reference to maintain the stock in better condition. Throughout the year data was recorded and feedback was collected on livability, growth and egg production performance of birds. Project Monitoring Committee (PMC) meeting were held during 3 January 2024, 8 July 2024 and 24 December 2024 to evaluate the progress of the project.

Input Distribution

Training-cum-Demonstration in Aldona, Bardez taluka, Goa

Entrepreneurship development and Livelihood improvement through demonstration and training of sustainable ornamental fish culture in Goa (NABARD)

Trivesh Mayekar and Sreekanth G. B.

Five training programs on ornamental fish culture were successfully conducted, benefiting 100 trainees from various regions of Goa by providing hands-on knowledge in tank fabrication, breeding techniques, disease management, and entrepreneurship development. In addition, five demonstration units were established at strategic locations—Diwar Island, Assonora, Cumbarjua, the ICAR facility, and Parra—each equipped with suitable tanks, filtration systems, and a variety of ornamental fish species. Two comprehensive extension folders were published: "Fresh Water Ornamental Fishes of Goa: Biology & Commercial Potential Part I & II" and "Promoting Sustainable Entrepreneurship in Ornamental Fish Culture: Best Management Practices for Farmers Welfare." Approximately 40,000 small indigenous fish seeds were produced using pond breeding methods, contributing to conservation efforts and serving as feedstock for other aquaculture research. These initiatives collectively created sustainable livelihood opportunities for 100 community members across Goa, including 20 Scheduled Tribe fishermen and farmers at Diwar Island, 30 women from Assonora, 10 group members at Cumbarjua, and 12 group members at Parra.

Demonstration and training of sustainable ornamental fish culture in Goa

Evaluating the performance of multispecies finfish culture in small low-cost ponds for improving the livelihood of farmers in the salt - affected coastal saline region of Goa (NABARD)

Trivesh Mayekar, Sreekanth G. B., Shripad Bhat and Gopal R. Mahajan

Plankton sampling for analysis

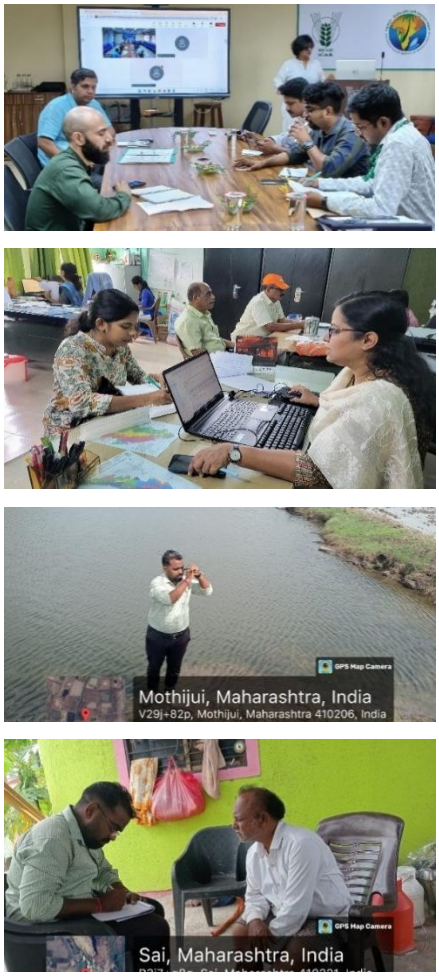
A total of three ponds (300m^2, 300m^2 and 200m^2) were prepared for the experimental fish polyculture in *Khazan* land ecosystem at Merces, Goa. The water quality parameters such as pH, salinity, alkalinity and hardness of the three ponds were regularly monitored and the mean water quality parameters were as follows: pH: 6.27 ± 0.38, 6.00 ± 0.00, 7.40 ± 0.28; salinity (ppt): 0.67 ± 0.47, 1.00 ± 0.82, 0 ± 0; Alkalinity (ppm): 73.33 ± 18.85, 61.67 ± 2.36, 55.00 ± 4.08; Hardness (ppm): 391.67 ± 31.18, 441.67 ± 42.30, 100.00 ± 0.00, respectively. To adjust and enhance pond conditions, pond inputs such as lime (23 kg) and single super phosphate (SSP) (10 kg) were applied as per requirement in each pond. The analysis of water quality parameters and factors is in process after the application of lime and other pond supplements. Seven candidate species were selected for stocking in varying combinations and densities across the three ponds to evaluate polyculture compatibility and performance. These include: Catla, Rohu, *Etropluss uratensis* (Pearlspot), *Pangasius pangasius*, Pacu (*Piaractus brachypomus*), Mola carplet and Red and GIFT tilapia.

Stocking of the ponds with advanced fingerlings

Building capacity for climate change adaptation in smallholder fish farming (Asian Development Bank)

Trivesh Mayekar, Sreekanth G. B., Shripad Bhat and Paramesha V.

A comprehensive climate change adaptation project was successfully designed and launched, targeting smallholder fish farmers across 13 states, with a strong emphasis on climate-resilient aquaculture practices and enhancing functional financial literacy. The cornerstone of the project involves training and capacity building of over 6,000 smallholder fish farmers, with a particular focus on empowering 1,200 women farmers, in climate-resilient aquaculture practices tailored to local contexts and gender-specific needs. As part of the initiative, a climate risk assessment study was conducted for the Phase I states—Maharashtra, Karnataka and Kerala—integrating scientific climate data analysis with extensive farmer consultations. Customized training modules were developed to address climate-resilient fish farming, aquaculture-based livelihood diversification, financial management, and market linkages, tailored specifically to the needs of women and marginal fish farmers. Baseline survey tools and stakeholder mapping frameworks were prepared and deployed to inform strategic implementation. Field recruitment was facilitated, along with stakeholder consultations and site visits for need assessment and farmer identification in the three Phase I states. The project also oversaw the development of structured training content covering key areas such as biosecurity, climate-resilient species selection, budgeting, credit access, savings behavior, marketing and supply chain awareness, and the promotion of both online and offline extension systems to support continuous learning. Project activities were aligned with national fisheries development schemes like PMMSY, DAY-NRLM, and FIDF to ensure policy coherence and effective implementation. Local institutions such as Krishi Vigyan Kendras (KVKs), Self-Help Groups (SHGs), and State Fisheries Departments were actively engaged for training collaboration and implementation support.

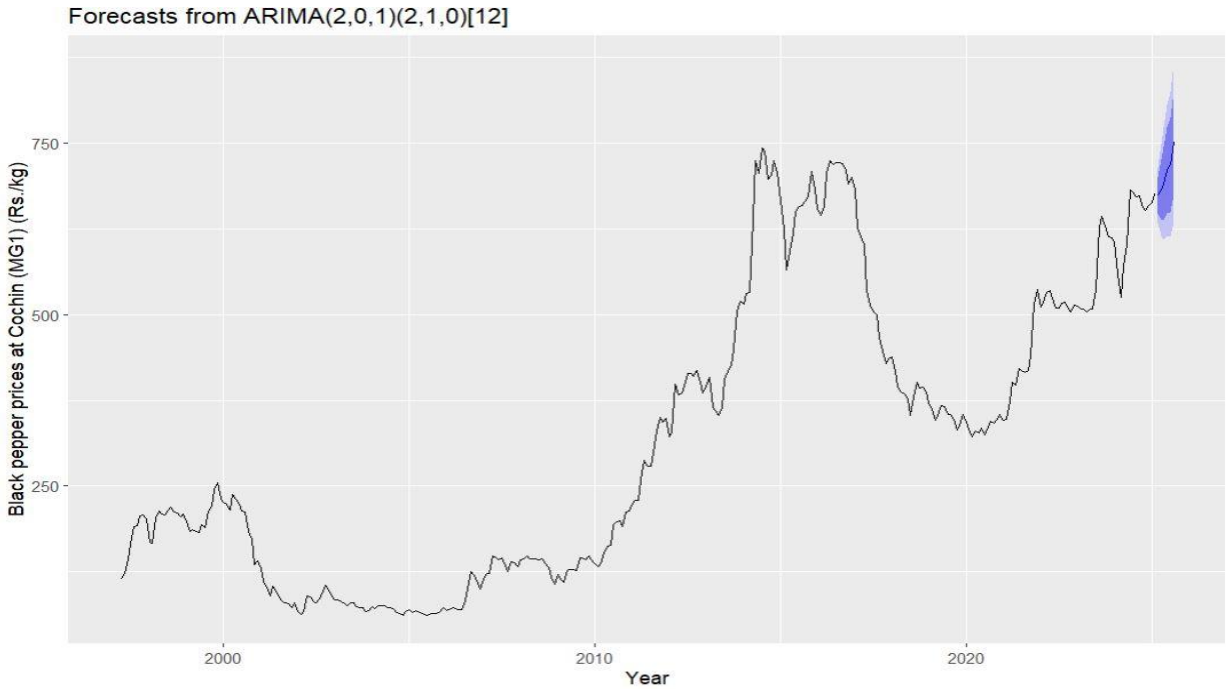


Meetings, interactions with the project team, State Departments & farmers

Empowering Farmers with Machine Learning-Based Price Forecasts for plantation Crops of West Coast of India (DST-SERB)

Shripad Bhat

To provide price forecasts and market intelligence advisories for the farmers of west coast of India, price data were collected for the major plantation crops from multiple sources. Daily prices of arecanut for the major markets (Kumta and Sirsi markets, Karnataka) were collected from 2004 from Directorate of Marketing & Inspection, Ministry of Agriculture and Farmers Welfare, Government of India (https://agmarknet.gov.in/). Prices of coconut and cashewnut for Goa and Kumta markets were collected from 2014 from https://agmarknet.gov.in/. The monthly prices of black pepper for Cochin, the major national market, were collected 1998 from Spices Board, Kochi under Ministry of Commerce & Industry, Govt. of India. International prices of black pepper and white pepper for major producing countries were collected from 2007 from International Pepper Community, Indonesia (https://www.ipcnet.org/). To understand the inherent pattern in black pepper prices at Kochi market (MG1 grade), a time series model (ARIMA (2,0,1) (2,1,0) [12]) was employed for forecasting using the data of monthly average prices of black pepper for the period April-1997 to Feb-2025. The Root Mean Square Error (RMSE) for this model was 19.99. Forecasted prices indicated that prices were likely to increase in the short run. The results were disseminated to black pepper farmers for informed marketing decision making.

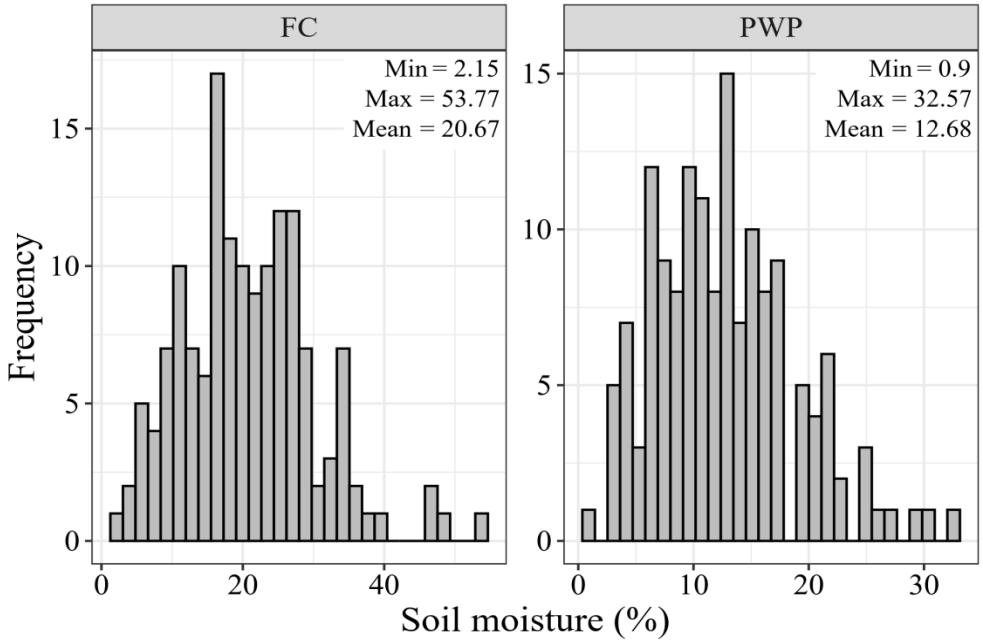


Forecasted prices of black pepper at Kochi market (Rs./kg)

Digital monitoring and mapping soil hydraulic properties using visible to thermal hyperspectral remote sensing of Indian west coastal region (DST-SERB)

***Bappa das** and Gopal R. Mahajan*

Soil sampling points (1,000) were selected using Conditioned Latin Hypercube Sampling (cLHS) based on nine factors: rainfall, aspect, elevation, slope length (LS factor), slope, topographic wetness index (TWI), topographic roughness index (TRI), soil texture, land use land cover (LULC). All the raster data were projected to Lambert Conformal Conic (LCC)and resampled to 250 m spatial resolution. Sampling points were chosen from homogeneous regions based on the nine factors, avoiding permanent water bodies, built-up, mangroves, herbaceous wetland. A 200m buffer around roads (OSM) was created and final locations were within this buffer. Around 260 soil samples were collected from coastal districts of Karnataka and Goa. The soil moisture content at field capacity (FC) and permanent wilting point (PWP) was estimated. The FC and PWP varied from 2.15-53.77% and 0.9-32.57% with mean values of 20.67 and 12.68%, respectively. The results revealed that there were enough variations present in the data for quantitative modelling.

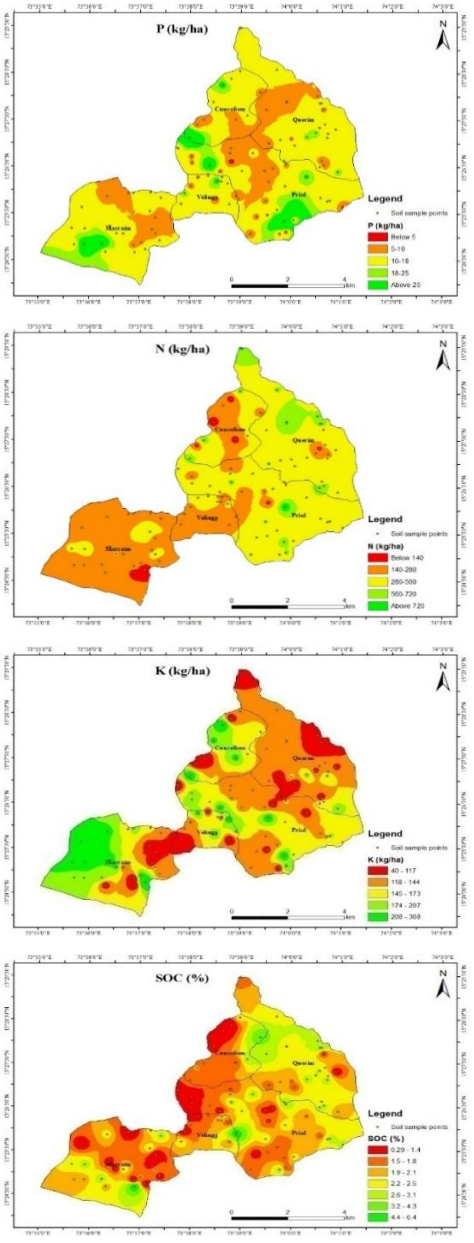


Frequency distribution of soil moisture content at field capacity (FC) and permanent wilting point (PWP)

Sustainable natural resource conservation and livelihood improvement through integrated watershed management in Goa (PMKSY)

***Sujeet Desai,** Raizada A., Gopal R. Mahajan, Uthappa A. R., Bappa Das, Paramesha V., Shripad Bhat and Gokuldas P.P*

Assessing soil properties at watershed scale is important for understanding its spatial variability, as it helps in site-specific nutrient management for sustainable agriculture. A study was carried out in the Ponda watershed in the South Goa district having an area of 5455 ha and covering 5 villages. A total of 105 soil sampling points were strategically optimized across the watershed using the Latin hypercube sampling method to capture the spatial variability of the soil. The samples were analysed for various parameters *viz.* $pH_{1:2.5}$, $EC_{1:2.5}$, soil organic carbon (SOC), soil available nitrogen (N), phosphorus (P) and potassium (K). The soil pH ranged from 4.8-8.6 (mean pH= 6.05) with mostly acidic soils and few samples ranged from neutral to alkaline. The soils were mostly non-saline (mean EC of 0.06 dS/m). The N, P and K ranged from 12.5-928.2 kg/ha, 2.6-173.4 kg/ha and 40.1-369.6 kg/ha respectively, with major area under low to medium for N and P and medium in K. The mean values of N, P and K were 358.6±197.1, 18.9±14.5 and 148.5±60.2 kg/ha. There was a large variability in the SOC content, ranging from 0.29-6.43% with a mean value of 1.95 ± 0.93%. Analysis of the soil samples revealed significant variability in soil properties, influenced by diverse topographical and land use features across the watershed. These findings can aid in precision nutrient management by enabling site-specific fertilizer recommendations.

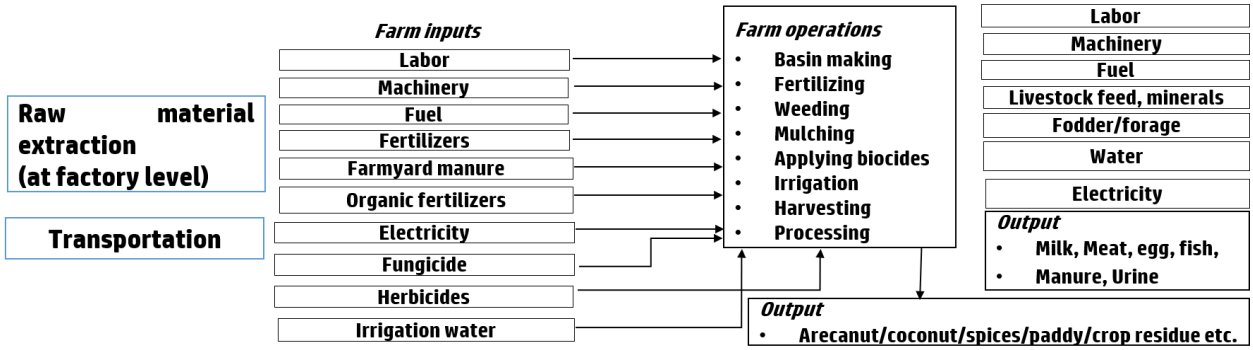


Spatial variability of soil properties in the Ponda watershed

Assessment of carbon footprint in integrated farming system through life cycle assessment for sustainability and climate resilience (ICAR - NICRA)

Paramesha V., Arunachalam V., Trivesh Mayekar, Gokuldas P. P. and Uthappa A. R.

Environmental impacts of traditional and integrated farming systems were assessed using a cradle-to-gate life cycle assessment (LCA) approach, encompassing raw material extraction, input production and distribution, farm-level operations, and on-farm emissions. The analysis revealed that the rice–rice system generated 81% higher greenhouse gas (GHG) emissions compared to the rice–cowpea system, primarily due to increased usage of chemical fertilizers, diesel fuel, and mechanized operations. Across rice-based farming systems, key contributors to environmental impacts included on-farm emissions, livestock rearing, diesel consumption, and fertilizer application. In plantation-based systems, particularly those involving arecanut, multistorey cropping, and livestock integration, on-farm emissions and upstream fertilizer production were the dominant hotspots across several impact categories, including respiratory inorganics, terrestrial nitrate acidification, and aquatic acidification. Arecanut-based systems, in particular, exhibited the highest negative impacts on human health and ecosystem quality, with global warming potentials estimated at 959.87 kg CO_2 eq. per tonne of arecanut and 2,399.25 kg CO_2 eq. per hectare. Furthermore, in plantation-based IFS models, dairy operations and livestock feed production and distribution emerged as major contributors to global warming potential. Major sources of energy consumption in these systems were human labor, irrigation, organic manures, and synthetic fertilizers. The findings underscore the need for targeted interventions to mitigate environmental impacts through precise input management aligned with crop demands, adoption of water-saving irrigation technologies, improved nutrient use efficiency, and optimization of farm mechanization. Reducing the carbon footprint and environmental burden of arecanut and rice-based systems will be critical for advancing sustainable agriculture in coastal and upland ecosystems.

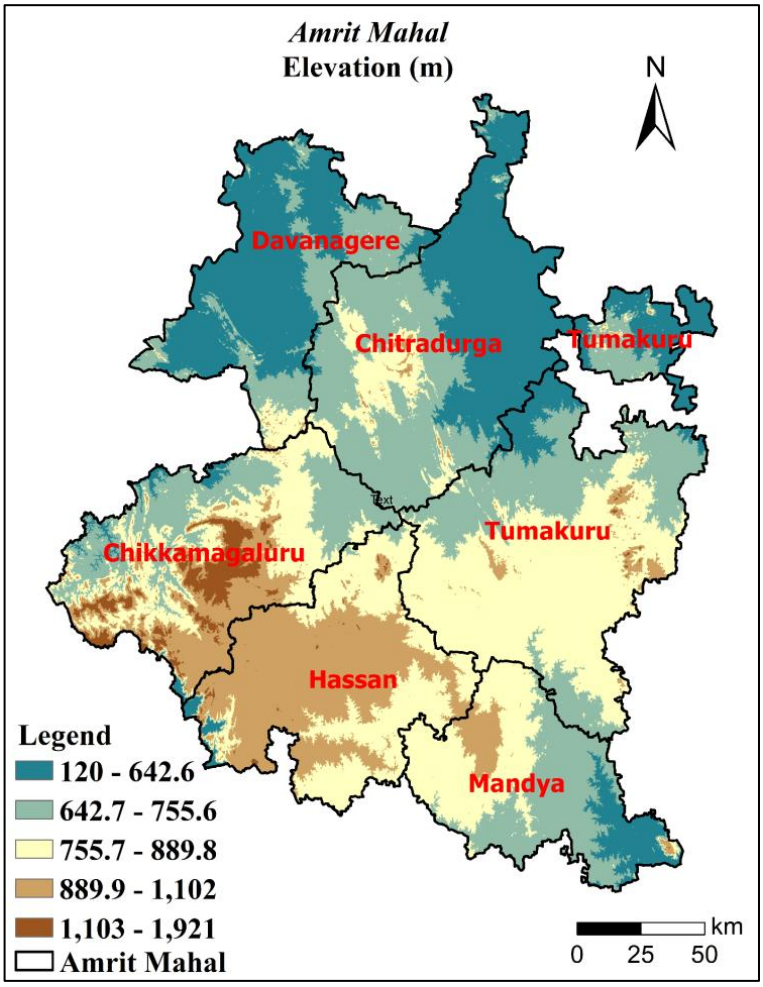


Life cycle assessment framework (system boundary) – Adapted for the study Cradle to gate

Natural grassland ecosystem monitoring system for peninsular and Trans Himalayan India to sustain pastoral communities (ICAR- NASF)

Bappa Das

A grassland survey was conducted in the Amrit Mahal grasslands across six districts of Karnataka namely, Davanagere, Chitradurga, Tumkur, Mandya, Hassan, and Chikmagalur during November 27 to December 10, 2024. Soil samples and vegetation surveys were carried out at 220 locations within these districts. Various biophysical parameters of the Amrit Mahal grasslands were assessed for both 2014 and 2024.Our analysis revealed a significant increase in land surface temperature between 2014 and 2024. Additionally, a significant decline (5–23%) in grassland area was detected over this period. While grassland productivity improved in Mandya, Hassan, and Chikmagalur, it declined in Tumkur and Davanagere. A total of nine machine learning models were used to predict grassland biomass, with Random Forest and XG Boost demonstrating the highest accuracy in predicting grassland productivity. The biomass productivity of the Amrit Mahal grasslands ranged between 1.61 and 4.25 tons per hectare. Soil parameters such as soil organic carbon, nitrogen, and phosphorus had variable impacts on biomass productivity. Additionally, elevation and slope were found to have significant effects on grassland productivity.



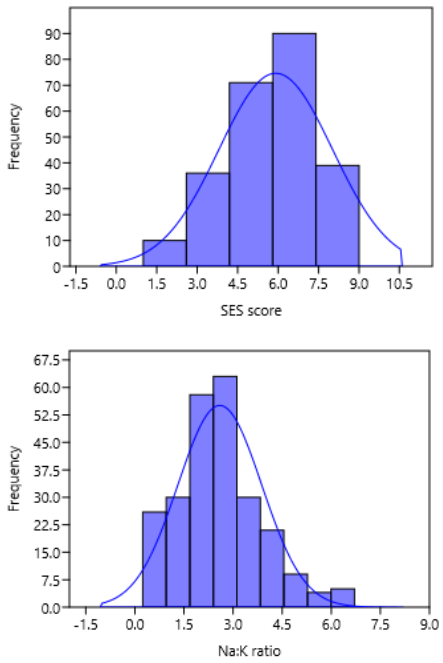
Amrit Mahal grassland in Karnataka

Network Project on Functional Genomics & Genetic Modification in Crops (ICAR - NPFGGM)

Manohara K.K.

Phenotyping of the RIL population developed from *Jaya x Goa Dhan 2* was conducted under a micro plot at the seedling stage

To map QTLs governing salinity tolerance at the seedling stage, phenotyping of the RIL population developed from Jaya x Goa Dhan 2 was carried out in micro plots during *Kharif* 2024 at an induced salt stress of 12 dS/M. Pre-germinated seeds, along with a tolerant check (*FL478*) and a sensitive check (*IR29*), were sown in single rows. From the second leaf stage onwards, seedlings were gradually exposed to salt stress, starting with an initial salinity of 4 dS/m. The salinity of the irrigated water was then increased by 2 dS/m every 2-3 days until it reached 12 dS/m. This level was maintained until the death of sensitive check variety IR29. Salt stress injury was recorded using the 1-9 scale as per the Standard Evaluation System (SES) for rice developed by IRRI. A score of 1 indicated highly tolerant, 3 tolerant, 5 moderately tolerant, 7 sensitive, and 9 highly sensitive genotypes.



Frequency distribution of six physiological parameters among 242 RILs screened in micro plots

Out of the 234 RILs screened, nine RILs exhibited a highly tolerant response to salt injury (SES score ~1), 34 showed a tolerant response (SES score ~3), 69 were moderately tolerant, 89 were sensitive, and 38 were highly sensitive. Among the check varieties, Goa Dhan 2 displayed a highly tolerant response (SES score ~1), while FL478 exhibited a tolerant response (SES score ~3). Physiological parameters like shoot length, fresh and dry shoot weight, sodium (Na) and potassium (K) content in leaves, and the Na/K ratio were measured in the RILs and check varieties. Shoot length ranged from 15.03 cm (RIL 146) to 87.2 cm (Goa Dhan 2), with a mean of 36.46 cm. Fresh shoot weight varied from 0.1 g to 13.78 g, averaging 3.127 g, while dry shoot weight ranged from 0.01 g to 3.97 g, with an average of 0.748 g. Leaf sodium content in RILs ranged from 4,126.28 ppm (RIL 150) to 58,017.37 ppm (RIL 200), with an average of 10,171.15 ppm (Table 2). Potassium content ranged from 3,617.53 ppm (RIL 51) to 35,570.08 ppm (RIL 213), with an average of 4,676.80 ppm. The Na/K ratio ranged from 0.239 (RIL 200) to 6.714 (RIL 51), with an average ratio of 2.593.

Standard Evaluation System (SES) scores for phenotyping for salinity tolerance at the seedling stage among RILs and checks

SES score	No of RILs	RILs
1	9	RIL 231, 233, 235, 237, 238, 240, 241, 242, 243; Goa Dhan 2 (Check)
3	34	RIL 1, 65, 68, 110, 125, 127, 128, 129, 171, 172, 176, 177, 182, 190, 192, 193, 194, 198, 199, 204, 205, 206, 207, 209, 210, 216, 225, 226, 227, 228, 232, 234, 236, 244; FL478 (Check)
5	69	Sixty nine RILs showed moderately tolerant reaction to salt injury
7	86	Eighty six RILs showed sensitive reaction to salt injury
9	38	Thirty eight RILs showed highly sensitive reaction to salt injury

Descriptive statistics for different physiological parameters in the RIL population

Parameters	Min	Max	Mean	Std. error	Std. dev	Skewness	Kurtosis
SES score	1	9	5.91	0.13	2.1	-0.38	-0.45
Shoot length (cm)	15.03	87.2	36.46	0.91	14.28	1.1	1.04
Fresh shoot weight (g)	0.02	1.8	0.34	0.02	0.36	1.76	2.49
Dry shoot weight (g)	0.01	0.47	0.08	0.01	0.09	2	3.53
Na concentration in leaf (ppm)	4126.28	58017.37	28564.14	648.49	10171.15	0.21	-0.14
K concentration in leaf (ppm)	3617.53	35570.08	12654.43	298.18	4676.8	1.01	2.27
Na/K ratio	0.24	6.71	2.59	0.08	1.28	0.68	0.58

Institute Technology Management Unit

NAIF Component I

Shripad Bhat / R. Solomon Rajkumar, Sreekanth G.B., Gopal R. Mahajan and Vinod Ubarhande

Patent granted

The ICAR-Central Coastal Agricultural Research Institute (ICAR-CCARI), Goa, has been granted **two patents** in 2024 for notable innovations led by Dr. A. R. Desai and his team.

1. **"Process for Preparing Nutmeg Taffy and the Resultant Food Product"** – This invention by Dr. A. R. Desai and his team was granted **Patent No. 528119**. The application (No. 201621012414), originally filed on April 8, 2016, was officially granted on **March 15, 2024**.
2. **"Unmanned Remote-Controlled Palm Tree Harvesting Robot"** – Developed collaboratively by Dr. A. R. Desai's team at ICAR-CCARI and Dr. Rajendra S. Gad's team at Goa University, this innovation was awarded **Patent No. 537851**. The application (No. 201721022813), filed on July 29, 2017, was granted on **May 14, 2024**.

पेटेंट कार्यालय,भारत सरकार | The Patent Office, Government Of India
पेटेंट प्रमाण पत्र | Patent Certificate

पेटेंट सं. / Patent No. : 528119
आवेदन सं. / Application No. : 201621012414
फाइल करने की तारीख / Date of Filing : 08/04/2016
पेटेंटी / Patentee : Indian Council of Agricultural Research

प्रमाणित किया जाता है कि पेटेंटी को, उपरोक्त आवेदन में यथाप्रकटित *PROCESS FOR PREPARING NUTMEG TAFFY AND RESULTANT FOOD PRODUCT THEREOF* नामक आविष्कार के लिए, पेटेंट अधिनियम, 1970 के उपबंधों के अनुसार आज तारीख अप्रैल 2016 के आठवें दिन से बीस वर्ष की अवधि के लिए पेटेंट अनुदत्त किया गया है।

It is hereby certified that a patent has been granted to the patentee for an invention entitled *PROCESS FOR PREPARING NUTMEG TAFFY AND RESULTANT FOOD PRODUCT THEREOF* as disclosed in the above mentioned application for the term of 20 years from the 8th day of April 2016 in accordance with the provisions of the Patents Act,1970.

अनुदान की तारीख : 15/03/2024 Date of Grant
पेटेंट नियंत्रक Controller of Patents

टिप्पणी - इस पेटेंट के नवीकरण के लिए शीघ्र, यदि इसे बनाए रखा जाना है, अप्रैल 2018 के आठवें दिन को और उसके पश्चात प्रत्येक वर्ष में उसी दिन देय होगी।
Note. - The fees for renewal of this patent, if it is to be maintained, will fall / has fallen due on 8th day of April 2018 and on the same day in every year thereafter.

Process for Preparing Nutmeg Taffy and the Resultant Food Product

पेटेंट कार्यालय,भारत सरकार | The Patent Office, Government Of India
पेटेंट प्रमाण पत्र | Patent Certificate

पेटेंट सं. / Patent No. : 537851
आवेदन सं. / Application No. : 201721022813
फाइल करने की तारीख / Date of Filing : 29/07/2017
पेटेंटी / Patentee : 1.Goa University 2.The Indian Council of Agricultural Research (ICAR)

प्रमाणित किया जाता है कि पेटेंटी को, उपरोक्त आवेदन में यथाप्रकटित *UNMANNED REMOTE CONTROLLED PALM TREE HARVESTING ROBOT*, नामक आविष्कार के लिए, पेटेंट अधिनियम, 1970 के उपबंधों के अनुसार आज तारीख जुलाई 2017 के उन्तीसवें दिन से बीस वर्ष की अवधि के लिए पेटेंट अनुदत्त किया गया है।

It is hereby certified that a patent has been granted to the patentee for an invention entitled *UNMANNED REMOTE CONTROLLED PALM TREE HARVESTING ROBOT*, as disclosed in the above mentioned application for the term of 20 years from the 29th day of July 2017 in accordance with the provisions of the Patents Act,1970.

अनुदान की तारीख : 14/05/2024 Date of Grant
पेटेंट नियंत्रक Controller of Patents

टिप्पणी - इस पेटेंट के नवीकरण के लिए शीघ्र, यदि इसे बनाए रखा जाना है, जुलाई 2019 के उन्तीसवें दिन को और उसके पश्चात प्रत्येक वर्ष में उसी दिन देय होगी।
Note. - The fees for renewal of this patent, if it is to be maintained, will fall / has fallen due on 29th day of July 2019 and on the same day in every year thereafter.

Unmanned remote controlled palm tree harvesting robot

Registration of Khola Chilli from PPV & FRA - Goa's First Farmer Plant Variety

Protection of Plant Varieties and Farmers' Rights Authority (PPV&FRA), Govt. of India has officially declared Goa's popular Khola Chilli as a Farmer Plant Variety (Reg. No. REG/2017/160) application filled on 07 March, 2017 and was granted on 10 June, 2024.

This is the first Farmer Plant Variety from Goa registered with the Plant Varieties Registry of PPV&FRA. Khola / Canacona Chilli Cultivators Group from Khola village, South Goa, has been officially recognized as the true breeder of this unique variety.

The group now holds exclusive rights to produce, sell, market, distribute, import, and export the variety for an initial period of six years and renewable upto 2039.


GOVERNMENT OF INDIA
पौधा किस्म रजिस्ट्री PLANT VARIETIES REGISTRY
रजिस्ट्रीकरण प्रमाण-पत्र /Certificate of Registration

Submission of crop varieties for release

The Institute's ITMU submitted 11 varieties across six crops to the Central Variety Release Committee (CVRC) for release. These include three varieties each of kokum and nutmeg, two varieties of cashew, and one variety each of mango, arecanut, and cinnamon. Additionally, four cashew varieties have been submitted to the State Variety Release Committee for release.

Design & copyright registration filed

The process is initiated for filing 09 copyrights and one design registration.

Branding of technology

The branding of the institute developed cashew apple crunch was carried out by Kerala startup mission and Agrinnovate to give more visibility to the product.

MoU & MoAs Signed (06)

- The ICAR- Central Coastal Agricultural Research Institute Signed a MoU with Coastal Impact, an NGO working in the field of marine and Aquatic resource conservation based on Aldona, Bardez, Goa on 23 April 2024.
- ICAR- CCARI signed an MoU with KSCSTE- Centre for Water Resources Development and Management (CWRDM), Kozhikode. Kerala for joint research and development on 06 June 2024.
- The Institute signed MoU with The Energy and Resource Institute, Goa for joint research and capacity building programme on 18 June 2024.
- The Institute has signed an umbrella MoU with Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth , Dapoli, Maharastra on 07 October 2024.

- ICAR- CCARI and Goa university jointly signed a tri-partite MoU with I-Hub Foundation for Cobotics of IIT Delhi and Parachute Kalpavriksha Foundation on 23 December 2024 to develop and subsequently commercialize the innovative technology termed as “Device and method for unmanned harvesting of Nut & Fruit”.
- ICAR- CCARI has signed MoU with Goa Forest Department for joint research projects from 20 December 2024 for a period of two years.

ICAR-CCARI, Goa inks MoU with TERI, Goa

MoU with KSCSTE- (CWRDM), Kozhikode

MoU with I-Hub Foundation for Cobotics of IIT Delhi and Parachute Kalpavriksha Foundation

MoU with Coastal Impact, an NGO located at Aldona, Bardez, Goa

Agri-Business Incubator

NAIF Component II

Mathala Juliet Gupta, R. Solomon Rajkumar and Shripad Bhat

A total of 12 new incubatees registered during 2024-25. Seven incubatees graduated during this year and four have registered their business. The areas of businesses were animal & fisheries science, AI in agriculture & food processing. Through its various activities AGNI has generated a revenue of Rs. 13,80,880/-

To identify the best agri start-up ideas from young minds **IGNITE Conclave was held between February 8 – 9, 2024,** An total 15 participants from 5 coastal states participated the Conclave and 5 best ideas were selected and given incubation support at AGNI .One month residential incubation program was organised for these incubates The residential incubation program included different EDP sessions, external visits to nearby tech incubators viz BiTSBiocytiH, FiiRE, Fatorda, Build 3 Organisation and support given by them for early stage startups

Industry Meet & Ideation Contest – October 2024

Industry meet was held on 23 October 2024 to showcase the technologies developed by scientists of ICAR CCARI for interested industries & startups to explore the technologies for their commercial adoption & upscaling. Fourteen entrepreneurs from different fields like agroeco-tourism, agricultural machinery, fishery, food processing, nursery & farmers from Goa participated the event.

Agri-business Incubation Centre (AGNI)of ICAR-Central Coastal Agricultural Research Institute (CCARI) Goa in collaboration with Institution of Engineers of India, Goa State centre organized **Ideation Contest for Engineering Students on "Engineering Solutions to Agricultural Problems"** on 22 October 2024 – A total of 8 participants from Engineering colleges viz NIT, Goa, Don Bosco Engineering College, GEC & Shri Rayeshwar Institute of Engineering & Information Technology, Shiroda were registered. Out of which 7 teams (30 students) presented their ideas – 3 best ideas were selected for incubation.

EDP's organised – 14 sessions

In 2024-25, 14 EDP sessions were organised by different startup ecosystem experts and incubators from Goa state.

PMFME Sponsored trainings

One trainings sponsored by PMFME scheme was conducted by master trainer Dr. Mathala Juliet Gupta. One for district resource persons of PMFME scheme for Goa between 4-5 November 2024.

ICAR Seed Project- Fisheries component

Sreekanth G. B. ***and Trivesh Mayekar***

During this year, a total of 1500 ornamental fish seeds (Guppy, molly, platy, sword tail, gourami, gold fish and barbs), 20 kg of fish feed, 200 kg of freshwater fish brooders, 200 posters on fisheries resources, 500 seedlings of aquatic plants were produced and sold to the farming community. Fish diversity assessment of Nanda Lake, the first Ramsar site in Goa yielded a total of 28 indigenous fish species and four exotic species. The captive breeding and larval rearing protocol were standardized for the two species of ornamental purpose *Pethia setnai*, and *Haludaria pradhani*. Regular natural breeding of other indigenous fishes such as *Rasbora dandia*, *Dawkinsia filamentosa* and *Systomus sarana* and exotic fish species such as Koi carp, Goldfish, Gourami, and Angel fish is being carried out. A total of 50,000 nos. of SIFs seed was produced. A novel aquarium design- bamboo aquarium was conceptualized, prepared and submitted for design registration. Low cost HDPE based ornamental fish tanks (6 × 4 × 1 feet, 8 × 4 × 1 feet) were prepared, popularized and distributed to ornamental fish farmers from Kerala, Goa, Karnataka and Maharashtra

Indigo Barb*, Pethia setnai*

Goan Melon Barb*, Haludaria pradhani*

Poultry Seed Project (ICAR)

Nibedita Nayak

Gramapriya and Shrinidhi birds were reared during this reporting year. Average body weights of Shrinidhi were 37.20 gm of day-old chicks and 840 gm at 8 weeks of age. Average body weights of Gramapriya were 36.80 gm at hatching and 825 gm at 8 weeks of age. Hen housed egg production for a longer period (20-60 weeks) with 350-layer birds was 62.40. Hatchability of eggs were varied from 60-85%. A total of 37561 germplasm were supplied, which include number of chicken, duck and quail including fertile eggs to 829 farmers that earned Rs 6,67,040/- as revenue. All species of poultry were maintained under institute budget head on closure of the Poultry Seed Project as on 30 September 2024.

National Animal Disease Epidemiology Network (ICAR)

Susitha Rajkumar* and *Shirish D. Narnaware

Livestock disease outbreak investigations and monthly disease outbreak reporting were carried out. Important disease outbreaks diagnosed in cattle were *Theileria orientalis* (44 outbreaks) infection, *Babesia bovis* (2), abortion due to Brucellosis (2) and Lumpy Skin Disease (1) and mixed infection and septicaemia with *E coli* and *Streptococcus* (1). There were three suspected outbreaks of African Swine Fever and one outbreak was confirmed by laboratory analysis. There were Fowl pox (1), *E coli* septicaemia (2) and three Avian Leucosis (3) outbreaks in poultry. Phylogenetic analysis of the *Sarcoptes scabiei* parasite isolate from an outbreak in goat farm in Goa based on 16S rRNA and ITS-2 sequences was carried out and the sequences were submitted to NCBI GenBank and obtained accession numbers PP974324 and PP974325 respectively. Phylogenetic tree based on the 16S rRNA gene showed clustering of sequence from Goa along with isolates from humans, dogs and wild animals from Australia, Egypt and Japan, Italy, Spain, Tanzania, Chile and China. The clustering based on the 16s sequence in the present study showed the separation of human isolates from animals, but there was no clustering based on geographical location. The ribosomal ITS gene sequence of the Goan isolate PP974325 showed an identity varying from 98.5 to 100% with various wild animal isolates from Europe, China, Japan, US, New Zealand and Egyptian livestock isolates with an identity varying from to 100%.

Network Project on Animal Genetic Resources (ICAR)

Amiya Ranjan Sahu, ***Shirish D. Narnaware, Gokuldas P.P., Nibedita Nayak and Sanjaykumar Udharwar***

Field survey completed for non-descript buffaloes (Gomanchal) in all the talukas of Goa. Surveyed more than 78 households and data recorded from a total of 1240 buffaloes comprising 74 male calves, 217 female calves, 796 buffalo cows and 180 buffalo bulls. A unique non-descript chicken (Fowl D'Costa) was identified and characters recorded in two talukas (Satari and Bardez) of Goa. An Interface Meet conducted during 7-8 June 2024 on animal genetic resources of Goa and the team also visited farmers' fields in Goa. One technical bulletin entitled "Animal Genetic Resources of Goa" published and released.

Field survey and recording of morphometry

Field survey conducted across 78 households in different talukas of Goa. Data collected from a total of 1,240 buffaloes that included 74 male calves, 217 female calves, 796 adult female buffaloes and 180 adult male buffaloes.

Buffaloes in this region exhibited a variety of physical characteristics. Their coat and skin colour ranged from light black and light grey to deep black, with some individuals displayed intermediate shades. Most buffaloes had black hairy skin. The muzzle colour was primarily black, followed by light black, and few had white markings on their mandible and maxilla. Eyelid colour varied between black, light black, and light grey, with some had white eyelids. The tail switch was mostly black or light black, with occasional occurrences of white hairs.

Performance traits of non-descript buffaloes

Parameters	Male			Female		
	Mean	Range	N	Mean	Range	N
Weight at birth (kg)	21.44±3.18	18-27	29	20±2.78	16-25	45
Weight at 24 months (kg)	184±22.45	140-214	34	175±20.23	137-233	58
Adult weight (kg)	637±35.20	511-762	60	436±33.12	249-611	162
Chest girth (cm)	222±18.20	194-250	60	179.5±16.13	125-210	162
Body length (cm)	139±14.91	132-147	60	144.5±12.39	125-190	162
Height at withers	142±15.12	139-155	60	139.7±11.12	125-160	162

Hoof colour was predominantly black, with a few buffaloes had light black hooves. Horns were mainly light grey, followed by black colour. Horns were typically curved shape, protruding backward then upward in a sickle shape manner. Most buffaloes had a convex forehead, while few had straight foreheads. The ears were generally positioned horizontally, although some buffaloes had drooping ears. Buffaloes were reared only through grazing without any supplementary feed. Age at first calving was quite early at around 40-42 months of age. Average milk yield was 4.7 lit with fat content of 6.9%.

Parameter	First Lactation			Overall		
	Average	Range	N	Average	Range	N
Daily milk yield (kg)	3.0±0.23	2-4	24	4.7±0.43	2-6	162
Peak milk yield (kg)	5.5±0.47	3-6	15	7.08±0.69	4-10	65
Days to reach peak yield	61±7	50-70	24	54.16±8	45-74	162
Lactation length (days)	240±21	230-280	24	230±24	150-300	162
Lactational milk yield (kg)	720±32	550-750	24	1130±41	480-1800	162
Fat %	7±1.2	6-9	24	6.9±1.1	6-10	162
Dry period (days)	70±12	55-70	24	64±14	57-88	162

Field Survey of local buffaloes

All India Network Project on Antimicrobial Resistance (ICAR)

Shirish D. Narnaware* and *Susitha Rajkumar

The project focuses on strengthening surveillance and monitoring of AMR in livestock, with the aim of understanding the extent of the problem and developing strategies to combat it. For the surveillance of AMR in different livestock species various samples such as cattle milk (n=23), cattle rectal swabs (n= 19), goat rectal swabs (n=8), pig rectal swabs (n=15) and poultry cloacal swabs (n=14) were collected from 20 different farms of North Goa district. From cattle milk total 20 isolates of *Staphylococcus* spp. were obtained, whereas from rectal swabs total 51 isolates of *E. coli* were obtained. These isolates were further screened for AMR against different antibiotics.

Sample collection

For the surveillance of AMR in different livestock species various samples such as cattle milk (n=23), cattle rectal swabs (n= 19), goat rectal swabs (n=8), pig rectal swabs (n=15) and poultry cloacal swabs (n=14) were collected from 20 different farms of North Goa district. The details of sample collection and bacteria isolated from livestock of different farms are given.

Detection of bacteria

From cattle milk total 20 isolates of *Staphylococcus* spp were detected by microbial culture on Mannitol Salt Agar (MSA) out of which 14 isolates were detected as coagulase negative *Staphylococci* (CoNS), whereas from rectal swabs total 51 isolates of *E. coli* were obtained of which, 11 isolates were detected as ESBL positive. All these isolates were further screened for AMR against different antibiotics.

Result of Antibiotic Sensitivity Test (AST)

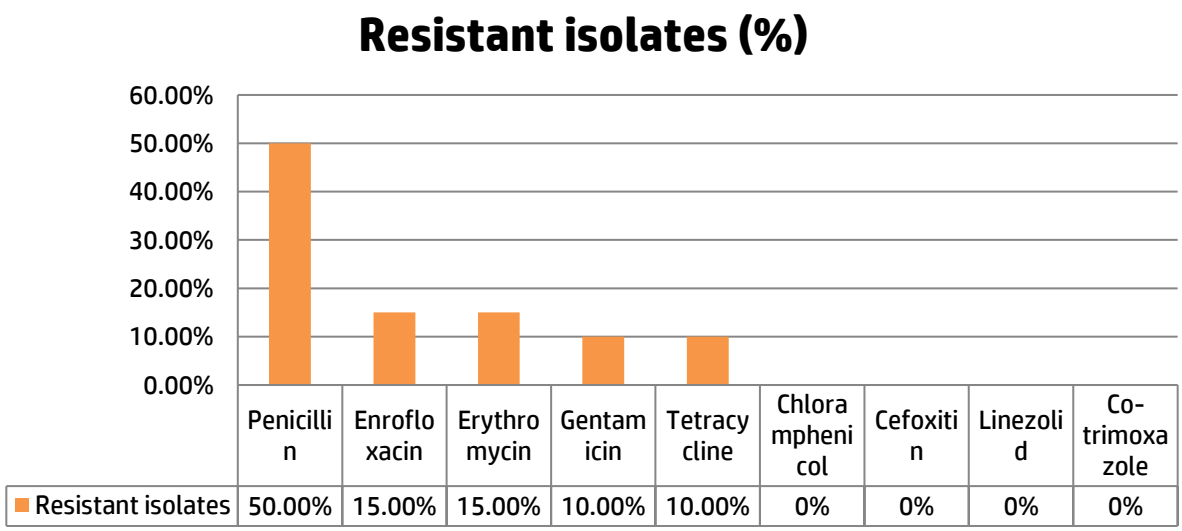
The AST results showed that 50% of the *Staphylococcus* spp. isolates were resistant to penicillins, whereas 41.17% of the *E. coli* isolates were resistant to Tetracycline. These isolates were also confirmed using DNA extraction and PCR for *uidA* gene of *E. coli* and gap gene of *Staphylococcus.*

Antibiotic sensitivity test results of *Staphylococcus* species (n=20) isolated from Cattle milk samples

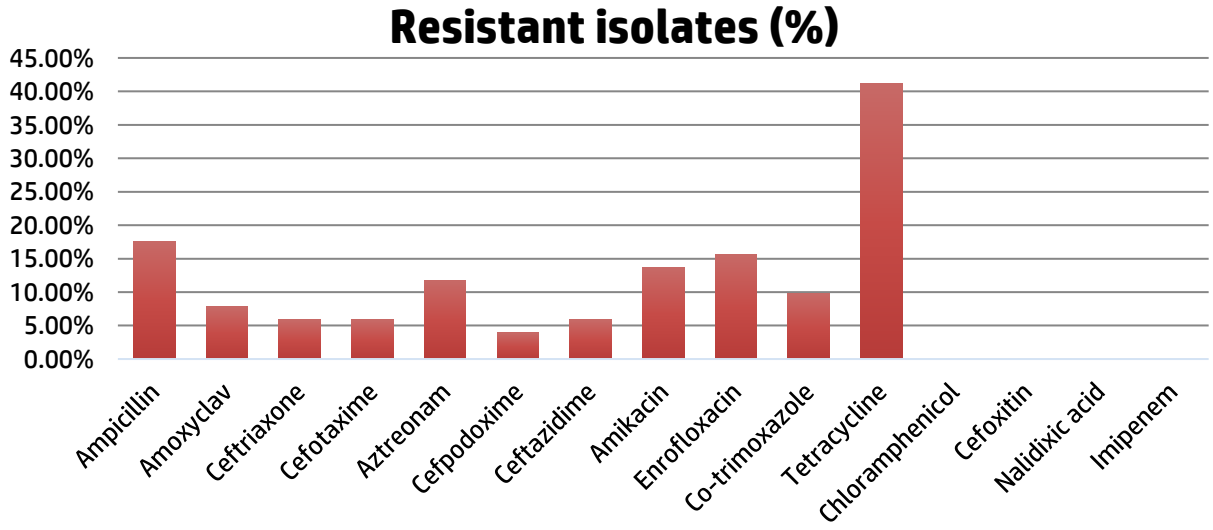
No.	Antibiotic	Resistant isolates (%)
1.	Chloramphenicol-30µg	0
2.	Enrofloxacin- 5µg	3 (15%)
3.	Erythromycin- 15µg	3 (15%)
4.	Gentamicin- 10µg	2 (10%)
5.	Linezolid- 30µg	0
6.	Penicillin-10 units	10 (50%)
7.	Cefoxitin- 30µg	0
8.	Tetracycline- 30µg	2 (10%)
9.	Co-trimoxazole (Trimethoprim / Sulphamethoxazole) - 1.25/23.75µg	0

Antibiotic sensitivity test results of *Escherichia coli* (n=51) isolated from different livestock samples

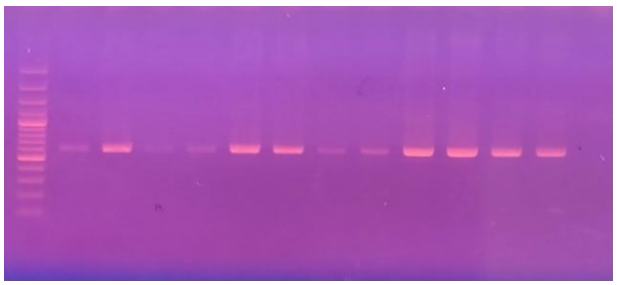
No.	Antibiotic	Resistant isolates (%)
1.	Ampicillin- 10µg	9 (17.64%)
2.	Amoxyclav (Amoxicillin/ Clavulanic acid)- 20/10µg	4 (7.84%)
3.	Ceftriaxone- 30µg	3 (5.88%)
4.	Cefotaxime- 30µg	3 (5.88%)
5.	Aztreonam-30µg	6 (11.76%)
6.	Cefpodoxime - 10µg	2 (3.92%)
7.	Ceftazidime- 30µg	3 (5.88%)
8.	Amikacin- 30µg	7 (13.72%)
9.	Enrofloxacin- 5µg	8 (15.68%)
10.	Tetracycline- 30µg	21 (41.17%)
11.	Chloramphenicol- 30µg	0
12.	Cefoxitin- 30µg	0
13.	Nalidixic acid- 30µg	0
14.	Imipenem- 10µg	0
15.	Co-trimoxazole (Trimethoprim / Sulphamethoxazole) - 1.25/23.75µg	5 (9.80%)



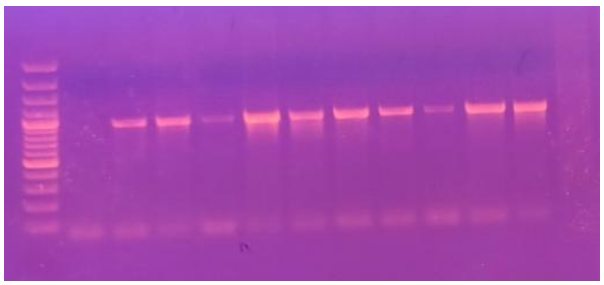
Number (%) of *Staphylococcus* species (n=20) resistant to different antibiotics



Number (%) of *Escherichia coli* (n=51) resistant to different antibiotics



PCR for *uidA* gene of *E. coli* showing bands at 603bp



PCR for *gap* gene of *Staphylococcus* spp. showing bands at 900bp

Significant Achievements

Paddy harvesting | ©Martin G. D. 2025

Awards & Recognitions

The President of India Smt Droupadi Murmu conferred Padma Shri 2024 to Shri Sanjay Anant Patil for his Innovative Kulaghar Farming and Contribution to Natural Farming

Shri Sanjay Anant Patil (59), an innovative farmer from Goa has been conferred with the coveted Padma Shri 2024 by the Government of India for his outstanding contributions to Natural Farming and zero-energy micro-irrigation system. Shri Sanjay Patil is a green revolutionary, known to many as the 'one-man-army' because he single-handedly transformed a barren plot of land measuring ten acres, into a lush green natural farm (Kulaghar) with technical guidance from ICAR-CCARI, Goa. A team constituted by the Director, ICAR-CCARI, Goa visited the farmer, documented his technologies through good quality photographs, and prepared the application for the nomination of Padma Awards 2024 and subsequently nominated through the Hon'ble Chief Minister of Goa.

Two progressive farmers of ICAR-CCARI awarded with prestigious IARI Innovative farmer award for the year 2024

Shri NK Kurian and Smt. Anita Mathew Vallikkappen, two progressive farmers of ICAR-CCARI, Goa have been conferred with the coveted IARI–Innovative Farmer Award for the year 2024 on 6th June 2024 by ICAR-IARI, New Delhi for their outstanding contributions to the development of agro-eco-tourism and fish based integrated farming systems. A team constituted by Dr Parveen Kumar, Director, ICAR-CCARI, Goa documented their technologies through good quality photographs, and prepared the application for the nomination of IARI-Innovative Farmer Award 2024.

Shri NK Kurian

Smt. Anita Mathew Vallikkappen

Hon'ble Governor of Goa honoured ICAR-CCARI cashew farmer Shri Angelo Barreto

An organic cashew grower Shri Angelo Barreto from Curtorim, Salcete, Goa got 'Best Farmer Award -2024' at the hands of the Hon'ble Governor of Goa Shri P. S. Sreedharan Pillai, in presence of the Hon'ble Chief Minister of Goa Shri Pramod Sawant, on 14th June 2024 at the Raj Bhavan, Goa. The award is given by the Directorate of Cashewnut and Cocoa Development, Govt. of India. ICAR CCARI documented the success story and recommended the farmer for said Best Farmer Award -2024 by DCCD, Govt. of India.

Shri Angelo Barreto awarded 'Best Farmer Award -2024'

Best fisheries Start-up Award from the Govt. of Kerala

Shri Arun Das NH from STEM Systems Pvt. Ltd., an incubate of KUFOS, Kochi and ICAR-CCARI, Goa has been conferred with the best fisheries Start-up Award by the Govt. of Kerala on 10th July, 2024 during the National Fish Farmers Day Celebrations at Thiruvananthapuram, Kerala. He received the award for developing a novel crab fattening system to improve the income and livelihood of fishermen and fish farmers.

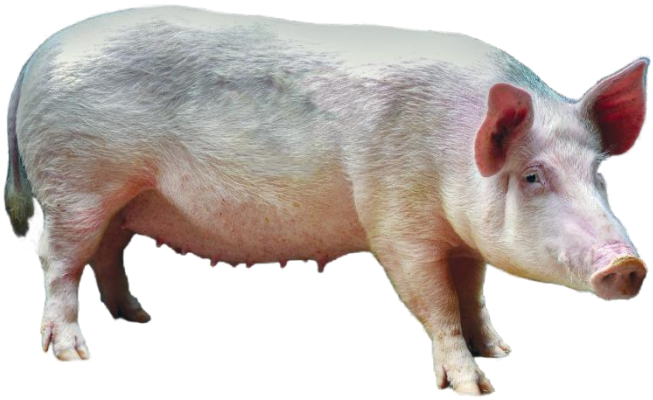
Hon'ble Chief Minister and Hon'ble Speaker of Goa Legislative Assembly congratulated Padma Shri awardee farmer and ICAR-CCARI team

Dr. Pramod Sawant, Hon'ble Chief Minister of Goa invited Padma Shri awardee farmer Shri Sanjay Anant Patil along with the ICAR-CCARI team to the Goa Legislative Assembly complex on 23 July 2024 and congratulated the team for bringing glory to the state of Goa. Hon'ble Chief Minister expressed a great sense of happiness as an innovative farmer of Goa got recognized at the national level. Shri Sanjay Patil was conferred with the prestigious and coveted Padma Shri Award 2024 by the Government of India for his remarkable contributions to Natural Farming and Zero-energy Micro-Irrigation Systems

Padma Shri Sanjay Patil with Dr. Pramod Sawant, CM, Goa & ICAR – CCARI, Team

Release of Goya Pig Variety

The pig variety Goya was developed with inheritance of 75% Large White Yorkshire and 25% Agonda Goan. The variety was released in the hand of Hob'le DDG (AS), ICAR, New Delhi in the Annual Review Meeting of AICRP on Pig on 19th September 2024 at ICAR-Central Coastal Agricultural Research Institute, Goa. This variety was developed by Dr. Eaknath B. Chakurkar, Dr. Amiya Ranjan Sahu, Dr Gokuldas P.P, Dr Chethan Kumar H.B, Dr V. K. Gupta, Dr N. H. Mohan and Dr. S. Banik.



Goya Pig Variety

The pig variety is white in colour with some cases have faint patches of black hairs. It has straight body top line, small snout and average of 14 numbers of well-placed teats. The average birth weight is 1 kg and average weaning weight is 8.25 kg. The weight at marketing (8 months of age) is 75 kg. Litter size at birth is 9. Better growth and reproductive potential, good meat quality, docile nature and strong maternal instincts are main features for which this variety is highly preferred in farmers' field. There is a wider scope of scientific pig rearing and this developed variety can thrive well in prevailing hot humid coastal climate. Thus, it can be suitable both in small and marginal farming as well as in commercial piggery enterprises with the potential for high economic return. Target area includes coastal districts of Goa, Maharashtra, Karnataka, and Kerala.

Release of Goya Pig Variety released by the hand of Dr. Raghavendra Bhatta, Hon. DDG (AS), ICAR, New Delhi, in presence of Dr. G.K. Gaur, ADG (AP&B) and Dr. V.K. Gupta, Director, ICAR-NRC on Pig, Guwahati

Significant Achievements - Awards & Recognitions

No.	Award/Fellowship	Awardee
Fellowship / Awards by Academies		
1.	Associateship of Karnataka Science & Technology Academy 2024	Dr. Paramesha V
2.	Elected as an Associate of the West Bengal Academy of Science & Technology (WAST) 2024	Dr. Bappa Das
Fellowship / Awards by Association / Societies / Institutions		
1.	Mosaic Company Foundation Young Scientist Award for 2022-23 in the field of Plant Nutrition by Mosaic India Ltd, Gurgaon, Haryana, India on 25 October 2024	Dr. Gopal R Mahajan
2.	P.R. Pisharoty Memorial Award-2024, Indian Society of Remote Sensing (ISRS), Dehradun	Dr. Bappa Das
Foreign deputation		
1.	Received the International Travel Grant from the Asia Hub Annual Meeting of Michigan State University on Challenges In Water Energy-food (Wef) Nexus Research In Asia at Chaing Mai, Thailand during 11-13 November, 2024	Dr. Sujeet Desai
2.	Invited Lecture at Sino-French Forum on Agricultural Education and Science & Technology Cooperation at Huazhong Agricultural University, China during 14-17 October 2024	Dr. Bappa Das
Other Awards and Recognitions		
1.	Second prize for the article entitled "विश्व में फैलता रोगाणुरोधी प्रतिरोध (एंटीमायक्रोबिअल रेजिस्टेंस/ एएमआर) का उभरता संकट" published in Hindi Magazine Lahren by ICAR-CCARI, Goa, 2023	Dr. Gopal R Mahajan
2.	Second prize in Hindi Unicode Typing competition organized during Hindi Pakhwara 2024 at ICAR-CCARI	Dr. Shirish D Narnaware
3.	Best Poster Presentation (First Prize) in ISAGBCON 2024 held at Bihar Animal Sciences University, Patna, Bihar during 21-22 November 2024.	Dr. Amiya Ranjan Sahu
4.	Member, Ad-Hoc Board of Studies in Veterinary & Animal Sciences under the Faculty of Agriculture, Veterinary, Fisheries & Allied Sciences, Goa University, Goa	Dr. R Solomon Rajkumar Dr. Gokuldas PP
5.	Member of the Review committee constituted by Goa State Department of Higher Education, Govt. of Goa to review the Ph.D. degree & granting advance increments for the faculty of College of Agriculture, Goa	Dr. R Solomon Rajkumar Dr. Gokuldas PP
6.	Received Letter of Appreciation by NABARD, Panaji RO, for the project entitled "Market Intelligence for Horticultural Crops for Improving Livelihoods of farmers in Goa" on 12-09-2024	Dr. Shripad Bhat

7.	Received Best Research Paper award for the paper Soil water and potassium dynamics simulation under drip fertigated Kinnow mandarin in sandy loam soils. *Indian Journal of Soil Conservation*, 51(3), 219-227	Dr. Sujeet Desai
8.	Expert Member in the Brainstorming session on quality standards for the indigenous equine breeds organized by ICAR-NRC on Equines, Hisar, Haryana	Dr. Gokuldas PP

ICAR- CCARI Institute Awards 2024

1.	Best Scientist Award	Dr. Sreekanth GB, Dr. Bappa Das
1.	Best Worker (Technical)	Shri Suresh Gomes, Shri Omar D'Souza
2.	Best Worker (Administrative)	Smt. Tarika Ussapkar, Shri Vishwas Sharma
3.	Best Worker (Skilled support staff)	Shri Ashok Gadekar, Shri Shanu Velip
4.	Best Worker (Skilled support staff)	Dr. Dinesh Kumar, Shri Naresh U Gawde
5.	Team awards for commendable, outstanding and passionate efforts in making ICAR – CCARI clean and green under the aegis of "Mission Swachhta 365" being celebrated during 2023 and 2024".	• Dr. Gopal R. Mahajan • Dr. Amiya Rajan Sahu • Smt. Madina Sollapuri • Sh. Vinod Ubarhande • Sh. Shashi Vishwakarma • Shri Datta Velip • Sh. Rahul Kulkarni • Smt. Montia Rita D'Silva • Smt. NK Anupama • Smt. Sneha Arlekar • Ms. Sujata Kamble • Sh. Vishwajeet Prajapati • Ms. Pranjali Wadekar • Smt. Kushmala Chalawadi
6.	Director's Appreciation Award	• Dr. Sujeet Desai • Mr. Trivesh Mayekar • Shri Rahul M Kulkarni • Shri Sidharth K Marathe • Smt. Shreya C Barve • Smt. Chitra S Kankonkar • Shri Ravi S Kadam • Shri Prallad H Zambaulikar • Ms. Sulekha Toraskar • Shri Sidhant Haldankar
7.	Best Presentation certificate during nnual Zonal workshop of KVKs held during 4-6 Sept 2024 at JAU, Junagadh by ICAR - ATARI, Pune	• Dr N Bommayasamy
8.	Appreciation Certificate received during International Conference organized by CRDA, Hisar, organized from 13-15 November, 2024	• Dr N Bommayasamy • Dr. Sanjaykumar Udharwar • Shri Rahul Kumar • Shri Rahul Kulkarni • Shri Vishwajeet Prajapati

Publications

International journal

Arunachalam, V., Salgaonkar, D. C., Devidas, S. S., & Das, B. (2024). Estimation of foliar glucose content of areca palm by a smartphone app and Fourier transform infrared spectroscopy based multivariate modeling. *Vibrational Spectroscopy*, *130*(November 2023), 103643. https://doi.org/10.1016/j.vibspec.2023.103643 (NAAS Rating: 8.70)

Arunachalam, V., Toraskar, A. D., Mardolkar, K. R., & Das, B. (2024). Exploring alternative measurement methods and greenness metrics for nitrate levels in coconut water: android application and mid-infrared spectroscopy approaches. *Chemical Papers*, *78*(14), 8031–8044. https://doi.org/10.1007/s11696-024-03653-6 (NAAS Rating: 8.10)

Bhutia R N, Devadas D, Bella K, Sreekanth G B, Landge AT, Jaiswar AK, Deshmukhe G, Mandal UK and Burman D. (2024). Fish assemblage structure and functional guild composition of Matla Estuary, Indian Sundarbans. *Aquatic Sciences*, 87, 12 (2025), doi: https://doi.org/10.1007/s00027-024-01140-4 (NAAS: 8.00)

Bishnoi S, Jyotsana B, Kumar V, Prakash V, Ranjan R, Narnaware SD, Pannu U. (2024). Toll Like Receptor 4 (TLR4) gene polymorphism and its association with somatic cell score and milk production traits in Indian dromedary camels. *Animal Biotechnology*. 23: 35(1):2331642. doi: 10.1080/10495398.2024.2331642. (NAAS Score: 7.70)

Champati, A., Bhanja, S. K., Rokade, J. J., Yadav, A. S., Nayak, N., Saha, S. K., ... and Wadajkar, P. (2024). Dietary concoction of formic acid and thymol and its effects on zoo-technical performance, immunity, jejunal architecture and gut health in Turkey. *Research in Veterinary Science*, 179, 105394. (NAAS Score: 8.20)

Champati, A., Rokade, J. J., Nayak, N.,Yadav, A. S., Biswas, A., Sharma, D., Chakma, J., Sky, Mishra, J. Saha, S.K., Agrawal., R.K. and Singh, M. (2024). Evaluation of in-feed supplementation of formic acid and thymol as non-antibiotic growth promoters and assessing their effect on antimicrobial resistant E. coli isolated in Turkey. *Veterinary Research Communications,* 1-14. https://doi.org/10.1007/s11259-024-10353-9. (NAAS Score: 7.80)

Chavan, SB, Dhillon, RS, Sirohi, C, Saleh, IA, Uthappa, AR, Keerthika, A, Jinger, D, Halli, HM., Pradhan, A., Kakade, V., Morade, A., Chichaghare, AR., Rawale, GB., Okla, MK., Alaraidh, IA., AbdElgawad, H., Fahad, S., Nandgude, S., Singh, R., (2024). Optimizing planting geometries in eucalyptus-based food production systems for enhanced yield and carbon sequestration. *Frontiers in Sustainable Food Syste*m 8. 1386035. https://doi.org/10.3389/fsufs.2024.1386035 (NAAS Rating- 9.70)

Ghosh, T., Das, B., Roy, D., Chakraborty, D., & Sethi, D. (2024). Evaluation of infiltration models based on simple multicriteria decision making across various soil types and land uses in India. *Environmental Earth Sciences*, *83*(19), 1–13. https://doi.org/10.1007/s12665-024-11872-z(NAAS Rating: 8.80)

Jhorar, Pooja; Choudhary, Roshan; Jinger, Dinesh; Samal, Ipsita; Paramesh, V; Kumar, Deepak; Nepali, Anamika; Kumawat, Raveena; Jat, Ram A; Kumar Bhoi, Tanmaya; (2024). Foliar Application of Silicon Influences Crop Productivity, Dry Matter Accumulation, Water Use Efficiency, Lodging Score, and Aphid Density in Wheat (Triticum aestivum L.). *Communications in Soil Science and Plant Analysis*. 5519. 2894-2908. (NAAS rating 7.8)

Jinger, Dinesh; Kakade, Vijaysinha; Bhatnagar, PR; Paramesh, Venkatesh; Dinesh, D; Singh, Gaurav; Kaushal, Rajesh; Singhal, Vibha; Rathore, AC; Tomar, JMS; (2024). Enhancing productivity and sustainability of ravine lands through horti-silviculture and soil moisture conservation: A pathway to land degradation neutrality. *Journal of Environmental Management*. 36. 4121425. (NAAS rating 14)

Karuppaiah, V., Maruthadurai, R., Das, B., Soumia, P. S., Gadge, A., Pote, C., Shirsat, D., Pandit, T., Sawant, S., Ramesh, S. V., & Mahajan, V. (2024). Predicting the potential distribution of stingless bee, Tetragonula iridipennis in India using MaxEnt and CMIP6 climate projections. *Scientific Reports*, *14*(1), 1–17. https://doi.org/10.1038/s41598-024-83419-y (NAAS Rating: 9.80)

Kashyap, G. R., Sridhara, S., Manoj, K. N., Gopakkali, P., Das, B., Jha, P. K., & Prasad, P. V. V. (2024). Machine learning ensembles, neural network, hybrid and sparse regression approaches for weather based rainfed cotton yield forecast. *International Journal of Biometeorology*, *68*(6), 1179–1197. https://doi.org/10.1007/s00484-024-02661-1 (NAAS Rating: 9.00)

Kaushal, R, Kumar, A, Mandal, D, Tomar, JMS, Jinger, D, Islam, S, Panwar, P, Jayaprakash, J, Uthappa, AR, Singhal, V, Barh, A, Madhu, M, (2024). Mulberry based agroforestry system and canopy management practices to combat soil erosion and enhancing carbon sequestration in degraded lands of Himalayan foothills. *Environmental. And Sustainability Indicators* (24):100467.https://doi.org/10.1016/j.indic.2024.100467 (NAAS Rating- 11.6)

Kiranya B, Sahadevan P, Raghavan R, Devadas D and Sreekanth GB*. 2024. Fish community structure and functional guild composition in an anthropogenically impacted, temporarily closed sandbar estuary. *Environmental Monitoring and Assessment*, 196, 221 (2024). https://doi.org/10.1007/s10661-023-12286-3 (NAAS: 8.90).

Korav, Santosh; Ram, Vishram; HT, Sujatha; Paramesh, Venkatesh; Sridhara, Shankarappa; Elansary, Hosam O; Moussa, Ihab Mohamed; (2024). Elucidation of critical period of crop weed competition in groundnut (Arachis hypogaea) under mid-hills of Meghalaya. *Cogent Food & Agriculture*. 10. 12354470. (NAAS rating 8.1)

Kumar Revappa Mohan,; Yamanura, Madival; Venkatesh, Paramesh; Narayanappa, Nagesha; (2024). Bi-cropping of castor bean and nutri-millets optimizes system productivity, energy efficiency, and carbon footprint in rainfed alfisols of semi-arid tropics. *Arid Land Research and Management*. 38(3)464-488. (NAAS Rating 7.9)

Kumar, Revappa Mohan; Madival, Yamanura; Paramesh, Venkatesh; Narayanappa, Nagesha; Ranganath, Gopalaswamy; Jinger, Dinesh; Chillarge, Sangappa; (2024). Optimizing crop nutrition in rainfed castor cultivation for higher productivity, energy efficiency, and reduced carbon footprint. *Environmental and Sustainability Indicators*. 22. 100409 (NAAS rating 11.5)

Mahajan, G. R., Das, B., Kumar, P., Murgaokar, D., Patel, K., Desai, A., Morajkar, S., Kulkarni, R. M., & Gauns, S. (2024). Spectroscopy-based chemometrics combined machine learning modeling predicts cashew foliar macro- and micronutrients. *Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy*, *320*(June), 124639. https://doi.org/10.1016/j.saa.2024.124639 (NAAS Rating: 10.30)

Mallik A, Bhushan S, Sreekanth GB, Chakraborty P, Ramteke KK, Pal P, Jaiswar AK, and Nayak BB. (2024). Diet characteristics of tidal creek-associated fishes of the northeastern Arabian Sea with special reference to microplastic ingestion. *Chemosphere* 363, 142886, doi:

https://doi.org/10.1016/j.chemosphere.2024.142886 (NAAS: 14.10)

Manohara, KK; Shanbhag, Yogini; Paramesha, V; Kumar, Parveen; Rathod, Santosha; Singh, Nagendra Kumar; (2024). Genetic Analysis of a Recombinant Inbred Line Population Derived from Salt-Tolerant Rice Landrace Korgut under Coastal Ecology. *Agricultural Research*.45870. (NAAS rating 7.5)

Maruthadurai, R., Das, B., Ramesh, R., & Kumar, P. (2024). Predicting climate change impacts on potential distribution of cashew stem and root borer Neoplocaederus ferrugineus in India based on CMIP6 projections. *Theoretical and Applied Climatology*, *155*(7), 6737–6748. https://doi.org/10.1007/s00704-024-05017-2 (NAAS Rating: 8.80)

Melbin Lal, Anwar Ali, Trivesh Mayekar, Sreekanth GB, Gokuldas PP and Parveen Kumar (2024). Breeding in captivity for conservation and livelihood: Insights into the early ontogeny of the Indigo barb, *Pethiasetnai* (Chhapgar& Sane, 1992), a threatened endemic species of the Western Ghats of India. *Zoomorphology* 143, 403-413. https://doi.org/10.1007/s00435-024-00658-3 (NAAS: 7.25).

Nandana US, Ranjeet K and Sreekanth GB. 2024. Ecosystem health of Sasthamkotta Lake, a Ramsar site from India based on food web analysis and ecological indicators. Wetlands Ecology and Management, 32: 463-478, (NAAS: 7.60).

Narnaware SD, Jyotsana B, Ranjan R, Dahiya SS, Prakash V. (2024). The first molecular characterization of Sarcocystis cameli in the Indian dromedary camels (Camelus dromedarius). *Veterinary Research Communications*, 2024; 48(3):1929-1933. https://doi.org/10.1007/s11259-024-10348-6.

Nayak, N., Bhanja, S. K., Chakurkar, E. B. and Sahu, A. R. (2024). Adaptive capability of slow-growing chickens evaluated through physio-molecular responses in a hot-humid coastal ecosystem. *Journal of Thermal Biology*, 103985. (NAAS: 8.90).

Raghavendra KJ, TM Kumara, Chikkathimme Gowda, Ankita Kandpal, Shripad Bhat, T Amrutha, GP Shivaswamy, ML Nithyashree, N Ravisankar (2024). A meta-analysis on economic performance of organic vis-à-vis conventional farming in India, *Clean Technologies and Environmental Policy*: 1-12. https://doi.org/10.1007/s10098-024-03053-0 (NAAS Score: 10.20)

Rahil, Amrullah; Umesh, MR; Chittapur, BM; Ananda, N; Kulkarni, Vikas; Hosamani, Arunkumar; Ghante, VN; Paramesha, Venkatesh; Rajanna, GA; Ramesh, K; (2024). Energy budgeting, carbon footprint and economics of sunflower and pigeonpea system under moisture conservation practices in rainfed semi-arid tropics. *Environmental and Sustainability Indicators*. 24100504. (NAAS rating 11.5)

Rani, A., Sehgal, V. K., Dhakar, R., Abhilash, Das, B., & Pragya. (2024). Remote sensing based Multivariate Hierarchical Agricultural Drought Index (MHADI) for India. *Theoretical and Applied Climatology*, *1976*. https://doi.org/10.1007/s00704-024-05204-1 (NAAS Rating: 8.80)

Roshni K, Renjith Kumar CR, and Sreekanth GB. (2024). Finfish harvest patterns in the largest Ramsar wetland - Vembanad estuary along the South-west coast of India. Wetland Ecology and Management, 33, 3 (2025). https://doi.org/10.1007/s11273-024-10022-3(NAAS: 7.60).

Sah, S., Haldar, D., Singh, R., Das, B., & Nain, A. S. (2024). Rice yield prediction through integration of biophysical parameters with SAR and optical remote sensing data using machine learning models. *Scientific Reports*, *14*(1), 21674. https://doi.org/10.1038/s41598-024-72624-4 (NAAS Rating: 9.80)

Saha, N. Das, Kumari, P., Das, B., Sahoo, R. N., Kumar, R., Golui, D., Singh, B., Jain, N., Bhatia, A., Chaudhary, A., Chakrabarti, B., Bhowmik, A., Saha, P., & Islam, S. (2024). Vis-NIR spectroscopy based rapid and non-destructive method to quantitate microplastics: An emerging contaminant in farm soil. *Science of the Total Environment*, *927*(February), 172088. https://doi.org/10.1016/j.scitotenv.2024.172088 (NAAS Rating: 14.20)

Sarkar, A., Biswas, D. R., Saha, M., Kumar, R., Dwivedi, B. S., Bandyopadhyay, K. K., Bhattacharyya, R., Biswas, S. S., Ghosh, A., Roy, T., Das, B., Dey, A., Alam, K., & Mukherjee, S. (2024). Development of Controlled Release Fertilizer from Double-Boiled Linseed and Mustard Oil-Based Formulations: Surface Morphology, Nutrient Release and Performance of Wheat in Sub-tropical Inceptisol. *Journal of Soil Science and Plant Nutrition*, *24*(1), 1096–1111. https://doi.org/10.1007/s42729-024-01613-3(NAAS Rating: 9.40)

Shajahan Shahana, Susanthi Silpa, Murugesan SriHari, Karankumar Ramteke, Annam Pavan Kumar, Sreekanth GB and Shashi Bhushan. (2024). Characterisation of phenotypic stock diversity of the crescent perch Terapon jarbua (Forsskål, 1775) along the Indian coast using morphology and otolith shape Analysis. Regional Studies in Marine Science, doi: https://doi.org/10.1016/j.rsma.2024.103528 (NAAS: 8.10)

Shishira, D., Uthappa, AR., Chavan, SB, Kuberappa, G.C., Jinger, D., Sringeswara, AN, (2024). Pollen diversity in urban honey: implications for bee foraging behaviour and urban green space planning. *Urban Ecosystem*. 27, 2487–2500. https://doi.org/10.1007/s11252-024-01607-0 (NAAS Rating- 8.50)

Singh, R., Sah, S., Das, B., Jaiswal, R., Singh, A. K., Reddy, K. S., & Pathak, H. (2024). Innovative and polygonal trend analysis of temperature in agro climatic zones of India. *Scientific Reports*, *14*(1), 29914. https://doi.org/10.1038/s41598-024-78597-8(NAAS Rating: 9.80)

Singh, Umesh Kumar; Korav, Santosh; Paramesh, V; Banik, B; (2024). Impact of planting systems and nutrient management on growth and yield of maize and soybean in a maize + soybean cropping system. *Plant Science Today*. 1141615-1624. (NAAS rating 6.9)

Swetha KC, Jayalakshmi KJ, Sreekanth GB, Kiranya B, Lal DM, Chandrasekhar V. 2024. Current Status, Potential and Challenges of Estuarine Finfish studies along the Western Coast of India: Review and Scope for Management. Regional Studies in Marine Science, 73 (2024), 103498, doi: https://doi.org/10.1016/j.rsma.2024.103498 (NAAS: 8.10)

Uthappa, A. R., Devakumar, A. S., Das, B., Mahajan, G. R., Chavan, S. B., Jinger, D., Jha, P. K., Kumar, P., Kokila, A., Krishnamurthy, R., Mounesh, N. V., Dhanush, C., Ali, I., Eldin, S. M., Al-Ashkar, I., Elshikh, M. S., & Fahad, S. (2024). Comparative analysis of soil quality indexing techniques for various tree based land use systems in semi-arid India. *Frontiers in Forests and Global Change*, *6*(January), 1–12. https://doi.org/10.3389/ffgc.2023.1322660 (NAAS Rating: 8.70)

Wanjari RN, Ramteke KK, Sreekanth GB, Nayak BB, Deshmukhe G. 2024. Delineating ecosystem structure and trophic organization to evaluate the health status of a tropical coastal region in the neighbourhood of Mumbai megacity. Ocean & Coastal Management, 251 (2024), 107073, doi: https://doi.org/10.1016/j.ocecoaman.2024.107073 (NAAS: 10.80).

National Journal

Ahmed, M., Lotus, S., Das, B., Bhat, F. A., Kichloo, A. H., & Singh, S. (2024). Extreme weather events induced mortalities in Jammu and Kashmir, India during 2010-2022. *MAUSAM*, *75*(2), 395–406. https://doi.org/10.54302/mausam.v75i2.6147 (NAAS Rating: 6.70)

Bhat Shripad, D Kumar, S Kumar, K Kumara, H Rajashekara, (2024), Vulnerability of the Indian cashew market to global price shocks, *Agricultural Economics Research Review*: 37 (1), 79-91. (NAAS Score: 5.15)

Bhat, S., Desai, A. R., Velip, D., Desai, S., Paramesha, V., Kumar, D., & Kumara, K. T. (2024). Transforming Tribal Livelihoods through Agri-Horti Interventions in Barren Lands of Goa. *Economic Affairs*, 69(4), 1683-1688. DOI: 10.46852/0424-2513.5.2024.18 (NAAS Score: 5.45)

Bhutia R N , Abhilashwodeyar K , Devadas D, Mandal U K, Sreekanth G B, Landge A T, Jaiswar A K, Deshmukhe G and Burman D. (2024). Dynamics of phytoplankton community in relation to environmental variables in tropical mangrove estuary, Sundarbans, *India. Journal of Environmental Biology*, 45 (6): 654-665 (NAAS: 6.60).

Bommayasamy, N. and Chinnamuthu, C.R. (2024). Residual rice herbicide effect on weed control, productivity, nutrient uptake and quality succeeding okra. *Plant Archives*, 24(2): 753–760. (NAAS rating:5.59)

Bommayasamy, N. and Chinnamuthu, C.R. (2024). The impact of leftover herbicide residue applied to okra on weeds and crops of subsequent Blackgram. *Journal of Food Legumes*, 37(3): 305–311. (NAAS rating:5.54)

Bommayasamy, N., Ramakrishna, Y. and Pooja Kapoor (2024). Performance of medium duration rice cultivars on growth, productivity and profitability under South Andaman condition of India. *International Journal of Bio-resource and Stress Management*, 15(7): 01–06. (NAAS rating:5.40)

Chavan SB., Rawale GR, Keerthika A, Uthappa AR., Reddy KS. (2024). Financial evaluation of agroforestry-based systems in India: Case studies from research and farmers' fields. *CAB Calling* 48(2):24-41

Chavhan, Kotesh Y., K. S. Jagadish, D. Shishira, G. Eswarappa, and Uthappa. A. R. 2024. Impact of pollination on Pomegranate. *Indian Journal of Entomology*, *86*(2):404-408. https://doi.org/10.55446/IJE.2024.1716 (NAAS Rating- 5.59)

Dedar RK, Kumar N, Narnaware SD, Singh, J, Legha RA, Pal Y. (2024). Management of seasonal dermatitis in horses by using leaf extract of *Aerva javanica*. *Indian Journal of Traditional Knowledge*. 23 (2): 154-161. (NAAS Rating- 6.70)

Kumar, P., Das, B., Majik, S., & Bhattacharjee, S. (2024). Coastal Ecosystem Services: Valuation, Threats, and Sustainable Way Forward. Journal of Agricultural Physics, 24, S123–S134. (NAAS Rating: 5.02)

Maruthadurai, R. and Veershetty, C. (2024) Record of natural enemies of invasive fall armyworm, Spodoptera frugiperda (J. E. Smith) (Lepidoptera: Noctuidae) in fodder maize ecosystem in Goa, *Journal of Biological Control*, 38(2), 186–190. doi: 10.18311/jbc/2024/36549. (NAAS Rating-5.46)

Mishra R K, KBM Tripathi, Sanjay B, Shripad Bhat, Uma Sah & AVM Subbba Rao (2024). Effect of meteorological parameters on the dynamics of wilt and pod borer severity in pigeonpea of Bundelkhand region of Uttar Pradesh. (2024). *Journal of Food Legumes*, 36(2 & 3), 173-177. https://doi.org/10.59797/jfl.v36.i2.149 (NAAS Rating: 5.54).

Narnaware SD, Nath K, Choudhary SS, Ranjan R. (2024). Fatal congenital multiple cephalic malformations in a camel (Camelus dromedarius) calf. *Indian Journal of Veterinary Pathology*. 48(4): 375-378. (NAAS Rating: 4.97)

Nath K, Bishnoi P, Palecha S and Narnaware SD. (2024). Clinico-physiohaemodynamic and haemato-biochemical evaluation of dexmedetomidine in combination with butorphanol and ketamine anaesthesia in camels (Camelus dromedarius). *Journal of Camel Practice and Research*. 31(3): 275-283. (NAAS Rating: 4.00).

Rajkumar S, Anandhi M., Nayakvadi S, Narnaware SD, Rajkumar S, Udharwar SV. (2024). Prevalence of subclinical mastitis, associated risk factors and pathogens in dairy cattle of West Coastal India. *The Indian Journal of Veterinary Sciences and Biotechnology*, 20 (5): 10.48165/ijvsbt.20.5.18. (NAAS Rating: 5.25).

Saha, S., Chakraborty, D., Chawdhury, S., Shakuntala, I., Mishra, V. K., Dayal, V., Das, B., . L., Lalhmachhuana, P., Lalliansanga, S., & Saithantluanga, H. (2024). Usability assessment of district level rainfall forecast in Mizoram. *MAUSAM*, *75*(3), 885–894. https://doi.org/10.54302/mausam.v75i3.3575 (NAAS Rating: 6.70)

Subbanna, ARNS, Paschapur AU, Bhat S, Chaudhari GV, Dev, R., Hedau, NK, Mishra, KK, Kant, L.2024. Effect of insect pollinators on quantitative yield parameters of okra (*Abelmoschusesculentus*) in mid-Himalayan region. *Indian Journal of Agricultural Sciences,* 94(12):1349–1353. https://doi.org/10.56093/ijas.v94i12.149745 (NAAS Rating- 6.30)

Suthar K, Narnaware SD, Ranjan R, Moolchandani A, Rathore NS. (2024). Occurrence of antibiotic resistance genes in Escherichia coli isolated from diarrhoeic and healthy camel calves. *Ruminant Science*. 13 (1): 65-69. (NAAS Rating- 4.45).

Udharwar SV, Ramankutty S, Jennes D, Sajitha IS, Giggin T, Prasanna KS, Narnaware SD, Bommayasamy N and John Martin KD. (2024). Histopathological evaluation of testicles from pin-hole castrated piglets. *International Journal of Veterinary Sciences and Animal Husbandry* 2024; 9(1): 1088-1090. (NAAS Rating- 4.61)

Uthappa, AR, Shishira, D, Chavan, SB, Kumar, P, (2024). Litter Dynamics in Fruit Orchards and Natural Forests in the West Coast Region of India – *A Comparative Analysis. Indian Forester*. 150, 785. https://doi.org/10.36808/if/2024/v150i8/170192 (NAAS Rating: 4.86)

Paper Presented/ Conference / Abstracts

Das Bappa, Sujeet Desai, Nirmal Kumar, G. P. Obi Reddy and Parveen Kumar. (2024). Modelling land degradation vulnerability in a west coast river basin of India using advanced geospatial techniques. National Seminar on "Smart Technologies for Sustainable Agriculture and Environment" at ICAR-CRIDA, Hyderabad during 22–23, February 2024.

Basavareddy, Sujeet Desai, M.S. Ayyanagowdar, Bappa Das and G.V.Srinivasa Reddy. 2024. Comprehensive Morphometric, Hypsometric, and Soil Erosion-based Watershed Prioritization in the Mandovi River Basin of the West Coast of India. Global Soils Conference 2024 Caring Soils Beyond Food Security: Climate Change Mitigation & Ecosystem Service held during 19-22 November, 2024 at NASC Complex, New Delhi.

Desai Sujeet, Yadu Pokhrel, Amar Deep Tiwari and Huy Dang. (2024). Flood susceptibility modelling in the west coast river basins of India using a global hydrodynamic model. CaMa-Flood developer/user international meeting 2024 held from 5th-6th July, 2024 at the Institute of Industrial Science, The University of Tokyo.

Desai Sujeet, Gopal Mahajan, Bappa Das, Basavareddy, Uthappa A.R., Anurag Raizada and Parveen Kumar. (2024). Spatial Variability of the Soil Properties of Ponda Watershed, Goa in the West Coast Region of India. Global Soils Conference 2024 Caring Soils Beyond Food Security: Climate Change Mitigation & Ecosystem Service held during 19-22 November, 2024 at NASC Complex, New Delhi.

Gupta MJ 2024.Performance Characteristics of three Cashew Fruit and nut Separating machines, oral paper presented in 58thAnnual Convention of ISAE on Digital Innovations for Next-Gen Digital Agriculture" and International Symposium on Agricultural Engineering Education for Aspiring Youth in Transforming Agriculture, held at VNMKV, Parbhani, MH, 12-14 November 2024

Gupta M J, Yadav D K, Gopika Mohan., Gaonkar P, Desai S. (2024).Physicochemical Properties, Antioxidant Activity, and Sensory Evaluation of Multicomponent Marmalade from Spent Kokum (Garcinia indica) Rind, oral paper presented in 58th Annual Convention of ISAE on Digital Innovations for Next-Gen Digital Agriculture" and International Symposium on Agricultural Engineering Education for Aspiring Youth in Transforming Agriculture, held at VNMKV, Parbhani, MH, 12-14 November, 2024.

Mahajan GR, Das B, Morajkar S, Gaikwad B, Ubarhande VA, Kumar P (2024) Machine learning modeling of Visible-NIR-MIR spectral data to monitor soil saturation paste extract salinity and ionic contents of coastal salt-affected soils. Global Soils Conference 2024, New Delhi from 19-22 November 2024. (Poster)

Maruthadurai, R., Das, B., Ramesh, R. Parveen Kumar (2024) Predicting climate change impacts on potential distribution of cashew stem and root borer Neoplocaederus ferrugineus in India by MaxEnt modelling. In: International Conference on Plant protection in Horticulture, 25-27th September,2024, ICAR-IIHR, Bengaluru.

Mule SN, Mahajan GR, Kulkarni RM, Ubarhande VA, Kumar P (2024) Reviving Heritage and Promoting Soil Science Education Through Eco-Friendly Soil Art: A Case Study of Kaavi Art. Global Soils Conference 2024, New Delhi from 19-22 November 2024.

Narnaware SD, Nayak N, Vemula P and Sahu AR. 2024. Morphometric and molecular characterization of wing louse (Lipeurus caponis) from backyard chickens of west-coast India. National Conference on Challenges in Animal Health and Production Amidst Climate Change (VIBCON 2024) organized by Madras Veterinary College, Chennai from 26.09.2024 to 28.09.2024. Pp 112.

Narnaware SD, Ranjan R. 2024. Common health problems in dromedary camel calves in India. 24th Indian Veterinary Congress at LUVAS, Hisar, Haryana from 07-08 February 2024. Pp 96.

Narnaware SD, Vemula P, Rajkumar S and Gokuldas PP. 2024. Pathogen profiling of reproductive tract of dairy cattle of west-coast region. 24th Indian Veterinary Congress at LUVAS, Hisar, Haryana from 07-08 February 2024. Pp 159.

Sahu, A.R., Gokuldas P.P. and Naik, V.J. (2024). Genetic analysis of growth performance in crossbred pigs reared under intensive system in coastal climate. In: Compendium of National Symposium on Animal production systems and its role in sustainable use of ANGR & XXI Annual Convention of Society for conservation of Domestic Animal Biodiversity held at NTR College of Veterinary Science, Gannavaram, Andhra Pradesh, India, Pp: 52.

Sahu, A. R., Shivankar, K., Gokuldas P.P., Nayak, N. and Gowda, V. (2024).Genetic variability of HSP90AA1 gene in indigenous cattle adapted to tropical coastal climate. In Compendium of National Conference on New Vistas in Harnessing Genetic Resources for Sustainable Animal Production held at Bihar Veterinary College, BASU, Patna, Pp. 207.

Susitha Rajkumar, R. Solomon Rajkumar, Anandhi, M and Shirish D. Narnaware. (2024). Poultry mortality associated with concurrent infection of Salmonella pullorum, Marek's Disease, and Avian Leucosis virus, 5th Biennial Poultry Health Conference and National Symposium on "Poultry Health: Current Challenges and Future Strategies" organized by ICAR-Directorate of Poultry Research and Association of Avian Health Professionals (AAHP) during 23-24 February 2024 at PJTSAU, Rajendranagar, Hyderabad.

Uthappa, A.R., Devakumar, A.S., and Parveen Kumar. (2024). Tree-based land use systems and soil fauna: Implications for sustaining soil health in arable soils under semiarid conditions in Global Soil Conference-2024organisedby Indian Society of Soil Science (ISSS) in collaboration with the International Union of Soil Sciences (IUSS) November 19-22, 2024.

Popular / Technical Articles/ Review Articles

Bhat Shripad and Arunachalam V. (2024) Empowering Goa's farmers through market intelligence. The Navhind Times, Goa, 18 Aug 2024.

Chavan, S.B., Uthappa, A.R., Chichaghare, A.R., Ramanan, S.S., Kumar, R., Keerthika, A., Arunachalam, A., Hegde, R., Jinger, D., Meena, V.S., Kumar, M., Harisha, C.B., Kakade, V.D., Morade, A.S., Rawale, G.B., Singh, R., Reddy, K.S., 2024. Past, present and future of Indian sandalwood (Santalum album) cultivation and commercial prospects. Discov. Appl. Sci. 6, 627. https://doi.org/10.1007/s42452-024-06337-8

Chavan Sangram B, Uthappa A.R., A. Keerthika. 2024. Sthalavrikshas: Worship of sacred trees symbolises humans' deep &ancient connection with nature. Down to Earthhttps://www.downtoearth.org.in/wildlife-biodiversity/sthalavrikshas-worship-of-sacred-trees-symbolises-humans-deepancient-connection-with-nature

Chavan Sangram and Uthappa A.R. 2024. Timing matters:Why planting trees in April is unwise & thumb rules for successfulplantation drives. Down to Earth.

Chavan, S., Chand, L., Uthappa A.R., Amrut Morade and Reddy, K.S., 2024. Mahua utpadan se badahe Aamdani.(Mahua cultivation for income generation). Phal Phul, November-December, pp. 29-31

Dobhal, S., Kumar, R., Bhardwaj, A.K., Chavan, S.B., Uthappa, A.R., Kumar, M., Singh, A., Jinger, D., Rawat, P., Handa, A.K., Ramawat, N., (2024). Global assessment of production benefits and risk reduction in agroforestry during extreme weather events under climate change scenarios. Front. For. Glob. Chang. 7. https://doi.org/10.3389/ffgc.2024.1379741 [NAAS Rating- 8.70]

Gupta MJ, Mousumi Sabat. (2024). Beyond thr Beaches: Agricultural Endeavours in Goa, in IEI GSC News Magazine, Issue n. 77: 6-7Maruthadurai. R (2024) Management of tea mosquito bugs in cashew.

Krishisewa.https://www.krishisewa.com/disease-management/1634-tea-mosquito-bugs-in-cashew.html.

Maruthadurai. R (2024) Integrated pest management of tea mosquito bugs in cashew. vikaspedia.

Sreekanth GB and Trivesh Mayekar. (2024). Fishing out data on Goa's marine wealth, Times of India, Jun 30, 2024.

श्रीकांत बी.; एम.जे. गुप्ता तथा चाकुरकर ई बी .2024. ज्वारनदमुख परिसतिथिकीय केलिए पारीक्षितिकीय प्रणाली आधारित मात्यकी प्रबंधन, लहरें, अंक 4(1): 8-

17. धीरज कमार यादव एवं एम जे गुप्ता। 2025. कोकम मारमलेड उत्पादन, लहरें, अंक 4(1): 36-39.

Uthappa A.R., Shishira D.,2024. Dev ka van jaivvividhta: Sanrakshan ka ek anutaudharan. LehreinVol:II, pp-18-24. ICAR-CCARI, Goa

Policy & strategy paper:

Kumar, P., Rajkumar, RS., Mahajan, GR., Srinivas, T., Uthappa, A.R., Sreekanth G.B., Srinivas Rao.2024. Viksit Goa 2047- Revitalising agriculture and allied sectors for the self-reliant Goa. Policy paper, ICAR-CCARI, Goa and ICAR-NAARM, Hyderabad.

Kumar, P., Rajkumar, RS., Srinivas T., Bhat, S., Ubarhande V., Rao, C.S.2024. A policy development report on promotion and regulation of Agro-Eco-Tourism. Strategy paper, ICAR-CCARI, Goa and ICAR-NAARM, Hyderabad.

Book Chapters/ Books/Compendia

Chavan S.B., Uthappa AR, Chichaghare A.R., Kumar D, Sirohi C and Kakade V.D. (2024) Agroforestry Systems for Ecosystem Services in India. In: S Chakravarty, V Vineeta, J A Bhat, M Kumar, and G Shukla (Eds). Sustainable Management and Conservation of Environmental Resources in India. CRC Press.Pp:43https://doi.org/10.1201/9781003469278. ISBN :9781003469278

Kumar, P. Arunachalam, V., Paramesha, V., and Uthappa, A.R., (2024) Ecosystem Service Analysis in Multistorey Cropping Systems. Today and Tomorrow's Printers and Publishers, New Delhi, India. ISBN: PP 1-132.. ISBN: 9789391734855

Parveen Kumar, Bappa Das, Sujeet Desai, Paramesha V. and Subhradip Bhattacharjee (2024). Harnessing Ecosystem Services for Sustainable Coastal Agriculture: In Souvenir Global Soils Conference 2024 Caring Soils Beyond Food Security: Climate Change Mitigation & Ecosystem Service held during 19-22 November, 2024 at NASC Complex, New Delhi. pp 100-104.

Sahu, AR, Shivankar, K, Nayak N and Mohapatra, SS.(2024). Artificial Intelligence and Technology-driven Advancements in Poultry Management. In book of Modern trends and advances in poultry farming Hind Publications, Pp: 331-341. (ISBN: 978-93-83397-51-8).

Sonawane Ashish V and Sujeet Desai (2024).Advanced approaches in Irrigation and Drainage. Elite Publishing House. ISBN 978-93-58997-51-4.

Singh R, Chavan S.B., Kakade V.D., Morade A.S., Singh A.K., Rawale G.B., Uthappa A.R., Keerthika A., Chichaghare A.R., Gurav S and Reddy K.S. (2024) Ecosystem Services Provided by Urban and Peri-Urban Forests. In: H Singh (Ed). Urban Forests, Climate Change and Environmental Pollution. Springer, Cham, pp. 417-445. https://doi.org/10.1007/978-3-031-67837-0_20

Nayak, N, Pali S, Sahu AR and Champati, A. (2024). Green nanoparticles in poultry nutrition: The call of the hour. In book of Modern trends and advances in poultry Hind Publications, Pp: 201-208. (ISBN: 978-93-83397-51-8).

Nayak, N., Sahu, AR and Singh, A. (2024). Medicinal Plants as Growth Promoter of Livestock. In book of Veterinary Herbology nipa publication, Pp: 289-302. (ISBN: 9789358875379).

Narnaware SD, Jyotsana B, Ranjan R, Prakash V, Choudhary SS and Sahoo A. 2024. Case Report: Congenital tuberculosis in an aborted dromedary camel fetus. In Current knowledge on camelids infectious and parasitic diseases. Edited by Khalafalla AI, Sazmand A and Dadar M. Lausanne: Published by Frontiers Media SA. doi: 10.3389/978-2-8325-4288-0. Pages 110.

Uthappa, A.R., Shishira, D., Chavan, S.B. 2024. Soil arthropods and their role in soil healthsustenance In Ecosystem Service Analysis in Multistorey Cropping Systems. Today and Tomorrow's Printersand

Publishers, New Delhi, India. ISBN: 9789391734855. Pp.77-90

Bommayasamy, N., Ramakrishna, Y., Singh, L.B., Rahul Kumar, Udharwar, S.V., Rahul Kulkarni and Shishira, D. (2024). Impact of nutrient management on groundnut productivity and profitability in South Andaman. Extended Summary, pp. 100–103.

Udharwar, S.V., Suchita Rajkumar, Gokuldas P.P., Amiya Ranjan Sahu and Shirish Narnaware (2024). Shelyathil Bahy Paropjii Niyantran.

Amiya Ranjan Sahu, Gokuldas P.P., Nibedita Nayak, Satish Kumar, Shirish Narnaware, Udharwar S.V. and Praveen Kumar (2024). Animal Genetic Resources of Goa.

Success story:

Amiya R Sahu, Gokuldas P. P. (2024). Entrepreneurship development through scientific practices in pig farming. ICAR-CCARI. No: CCARI/Success Story/2024-1.

Amiya R Sahu, Gokuldas P. P., N. Nayak. (2024). Success story of a young woman entrepreneur through scientific rearing practices in pig farming. ICAR-CCARI. No: Success Story/2024-2.

Amiya R Sahu, Gokuldas P. P., N Nayak, S.D. Narnaware. (2024). Success story of a piggery entrepreneur through adoption of scientific farming practices. ICAR-CCARI. No: CCARI/Success Story/2024-7.

Bhat Shripad and Paramesha V (2024), Startup for Simplifying Farm Machinery Purchase for Farmers https://ccari.icar.gov.in/Successstory2024-6.pdf

GenBank Accession numbers obtained

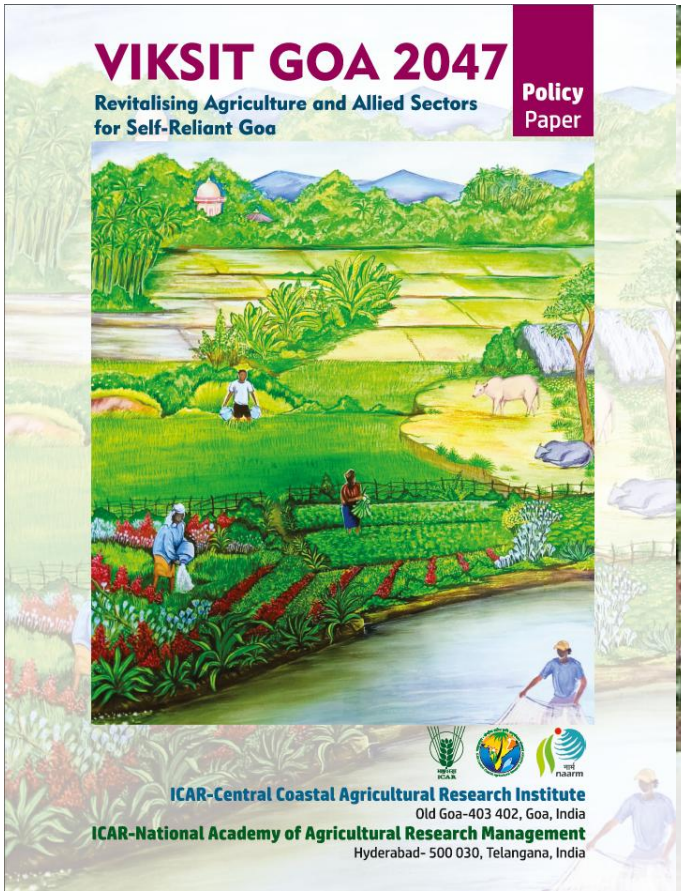
SN	Name of the organism and gene	Accession No.
Submitted by : Narnaware, S.D., Vemula, P.R., Gokuldas, P.P. and Rajkumar, S.		
1.	*Staphylococcus cohnii* strain CCARI_04 gap gene	PP278603
2.	*Mammaliicoccus sciuri* strain CCARI_03 isolate MS1 STA 7 gap gene	PP196554
3.	*Mammaliicoccus sciuri* strain CCARI_03 isolate MS2 STA 11 gap gene	PP196555
4.	*Staphylococcus hominis* strain CCARI_01 type I, gap gene.isolate="SH01, SH02"	PP622808, PP622809
5.	*Staphylococcus epidermidis* strain CCARI_03 type I, gap gene. Isolate-SE01	PP622810
6.	*Staphylococcus chromogenes* CCARI_03 type I, gap gene. Isolate-SC03	PP622811
7.	*Streptococcus pluranimalium* strain CCARI_01 tuf gene. STR1	PP170148
8	*Streptococcus pluranimalium* strain CCARI_01 tuf gene. STR2	PP170149
9	*Streptococcus pluranimalium* strain CCARI_01 tuf gene. STR3	PP170150
10	*Streptococcus pluranimalium* strain CCARI_01 tuf gene. STR4	PP170151
Submitted by: Narnaware, S.D., Vemula, P.R., Nayak, N., Sahu, A.R. and Korgaonkar		
11	*Lipeurus caponis* isolate CCARI_LC 01 cytochrome c oxidase subunit I (COX1) gene	PP709001
12	*Theileria orientalis* isolate CCARI_01 small subunit ribosomal RNA gene.	PP694390
Submitted by: Narnaware, S.D., Vemula, P.R., Gokuldas, P.P., Rajkumar, S and Sahu, A.R.		
13	*Meyerozymaguilliermondii* isolate CCARI_MG01 large subunit ribosomal RNA gene.	PP694540

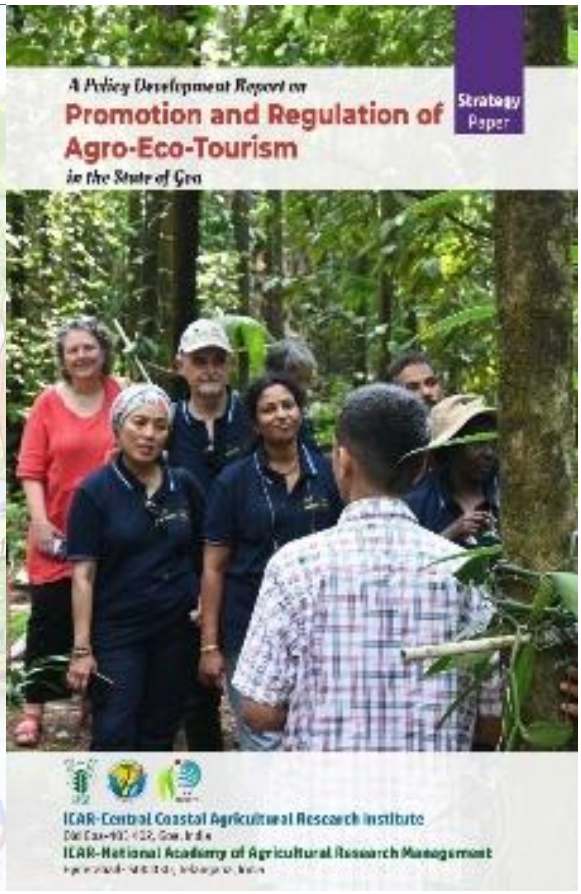
Submitted by: Narnaware, S.D., Vemula, P.R., Gokuldas, P.P. and Rajkumar, S.		
14	*Theileria annulata* isolate CCARI_07 small subunit ribosomal RNA gene.	PP693939
15	*Theileria annulata* isolate CCARI_04 small subunit ribosomal RNA gene.	PP683388
16	*Theileria orientalis* isolate CCARI_02 small subunit ribosomal RNA gene.	PP683141
17	*Theileria orientalis* isolate CCARI_05 small subunit ribosomal RNA gene	PP669999
18	*Theileria orientalis* isolate CCARI_03 small subunit ribosomal RNA gene	PP669812

Institute as Publisher

Publications	Authors/ Editors/ Publishers
Reports	
Annual Report (2023) pp.1-164	Parveen Kumar, R Solomon Rajkumar, R Maruthadurai, Sreekanth G B, Paramesha V, Ganesh V Chaudhari, Sanjay K Udharwar
Leharein (Hindi Magazine) -2024 Part-I pp 1- 64	Parveen Kumar, Mathala J Gupta, Atil Aman, Rahul Kumar and Shreya Barve
Leharein (Hindi Magazine) -2024 Part-II pp 1- 58	Parveen Kumar, Mathala J Gupta, Atil Aman, Rahul Kumar and Shreya Barve
Technical Bulletins	
Forest fire prone areas in Goa and their management Technical Bulletin No 74 pp 1-54	Anurag Raizada and Uthappa AR
गोव्यात शाश्वत कुक्कुट उत्पादन अणि उपजिविकेच्या सुरक्षिततेसाठी वैज्ञानिक हस्ताक्षेपाद्वारे सुधारित स्वदेशी परसातील कुक्कुट पालनाला प्रोत्साहन Technical Bulletin No 75 pp 1-54	Nibedita Nayak, Ameya Ranjan Sahu, Shirish Narnaware and Narayan Gawas
Animal genetic resources of Goa Technical Bulletin No 76 pp 1-54	Amiya Ranjan Sahu, Gokuldas PP, Nibedita Nayak, Satish Kumar, Shirish D Narnaware, Sanjaykumar Udharwar and Parveen Kumar
Redefining package of practices for poultry husbandry in west coastal climate Technical Bulletin No 77 pp 1-90	Nibedita Nayak, Amiya Ranjan Sahu, Gokuldas PP, Susitha Rajkumar, Monica Singh and Parveen Kumar
Extension Folders	
Control of ectoparasites in Goats Extension Folder No: 33/2024	Udharwar SV, Susitha Rajkumar, Gokuldas, PP, Amiya Ranjan Sahu and Shirish D Narnaware
Infectious Causes of Bovine Reproductive Disorders and their Management. Extension Folder No: 105	Shirish D Narnaware, Prasatha Vemula, Gokuldas PP and Susitha R

Ready Reckoner on managemental practices for profitable pig farming Extension Folder No 115	Amiya Ranjan Sahu, Gokuldas PP, Nibedita Nayak, Susitha Rajkumar and Vithal Jagannath Naik
श्रीनिधी: एक दुहेरी उद्देशाकरीता विकसित परसबागेतील कोंबडीची प्रजाति Extension Folder No 116	Nibedita Nayak, Amiya R Sahu, Shirish Narnaware, Narayan Gawas and Siddesh Korgaonkar
Promoting sustainable entrepreneurship in ornamental fish culture: Best management practices for farmers welfare. Extension Folder No 117	Trivesh Mayekar, Sreekanth GB, Melbin Lal and Borges BB
Production and marketing scenarios of major horticultural crops in Goa. Extension Folder No 118	Shripad Bhat, V, Arunachalam and Nina Gaonkar
वैज्ञानिक डुक्कर पालन , Extension Folder No 119	Amiya R Sahu, Shirish Narnaware, Vithal Nayak and Kiran Hangargi
Monograph	
Goya: An improved crossbred pig variety of Goa. Monograph No: 01/2024	Amiya Ranjan Sahu, Chakurkar EB, Gokuldas PP, Chethan Kumar HB, Mohan NH, Gupta VK and Parveen Kumar





Technology Evaluation

A total of 69 machines were evaluated on the farm & performance reports were issued

Company	Machine tested
Ratnagiri Impex Pvt. Ltd., Bangalore, Karnataka	Agrimate water pump (AM WP 20 X)
	Chain saw (Petrol)
	2 Stroke earth auger
	Mini power weder
	Long arm prunner
	Carbon Fibre Telescopic pole prunner (AM- CF- PPT- 60 FT)
	Carbon Fibre Telescopic pole prunner (AM- CF- PPT- 70 FT)
	Carbon Fibre Telescopic pole prunner (AM- CF- PPT- 50 FT)
	Paddy Thresher AM PTMG- 500-3 HPM
Suntec Agro Equipments India Pvt. Ltd., Bangalore	Weed/Brush Cutter (SM-720 Premium)
	Weed/Brush Cutter (Sun Max SMH-270)
	Weed/Brush Cutter (SM-6400 Premium)
	Carbon Fibre telescopic pole pruner (SM-CFP)
	Green King Power sprayer (GKPS- 180)
	Green King Power sprayer (GKPS- 822)
	Carbon Fibre telescopic pole pruner
	Power weeder/ Brush Cutter
Raj Enterprises, Karnataka	Carbon Fibre Telescopic Tree Prunner(M- TECH- 60)
	Carbon Fibre Telescopic Tree Prunner(M- TECH- 70)
	Carbon Fibre Telescopic Tree Prunner(M- TECH- 80)
Rudra Agro Agencies, Karnataka	Brush cutter/power weeder (AG- BC-450 4S)
	Brush cutter/power weeder (AG- BC-520 2S)
	Chain saw/ pruner saw (AG-CS- 5800-2S)
	Earth Auger (AG- EA- 520 2S)
	Engine operated portable power sprayer (Ag- PS 799 H)
	HTP power Sprayer (AG 6.6 HTP 22 P)
	Chaff Cutter (AG- CC- 300)
	Power weeder/ Rotary tiller (AG- PW 750)
	Carbon Fiber Doti/ Telescopic pole prunner
Climber systems, Pune	Cashew Fruit nut separator(engine operated) Atharva -2401
	Alsando(Cowpea)Decorticator CL. ALD-01-10
	Cashew Fruit nut separator(1.5 Hp motor operated) Atharva -2403
	Cashew Fruit nut separator(2 Hp motor operated) Atharva -2402
Fortune Agro Impex, Bangalore	Self propelled load cart (wheel barrow) FAI 150
	Self propelled load cart FAI 550

	Manual Seed Drill (FAI HP S 10)
	Wood chipper/ shredder/ Coconut rfonds chopper
	Aluminium Pole pruner
Green Harvest Enterprise	Carbon Fibre telescopic tree prunner – 60 Ft
	Carbon Fibre telescopic tree prunner – TP 70
	Carbon Fibre telescopic tree prunner – TP 80
Joshi Agro Industries, Valpoi, Goa	Arecanut peeler/dehusker APS 1.5
	Arecanut peeler/dehusker APS 2.0
	Shredder/Pulveriser AVS-5
	Shredder/Pulveriser AVS/ PE
Mabens Engineering Soluions, Shimoga, Karnataka	HTP Sprayer- 505
	Coconut Frond chipper/ shredder CFC-13
	60 Feet Carbon Fiber Telescopic Tree pruner (manual)
	70 Feet Carbon Fiber Telescopic Tree pruner (manual)
	Motocart dumper MES 300/360
	Power weeder 7 Hp
	Power weeder 10 Hp
	Tractor drawn trailer 3 ton
	Tractor drawn trailer 5 ton
	Tractor driven coconut frond chopper/ shredder CFC 40
	Tractor driven rotavator (RTR 636)
V Agro Tech , Bangalore, Karnataka	Carbon Fiber telescopic harvester 40 feet
	Carbon Fiber telescopic harvester 50 feet
ICS Merchandise Pvt. Ltd., Bangalore, Karnataka	Aluminium Pole pruner (ICS 63 ALPP)
Shri Venkateshwara Enterprise, Shimoga, Karnataka	20 feet manual operated pole prunner
	40 feet Carbon fiber Doti (FW- CFD40)
	50 feet Carbon fiber Doti (FW- CFD50)
	Power operated Backpack blower cum duster
	Load cart Gear drive
	Load cart shaft drive 360 Kg
SVR Agro Impex , Shimoga, karnataka	Load Cart Chain Drive -250 Kg
Easy Life Enterprises, Mangalore, Karnataka	Beush Cutter
	Minitruck Dumper 350 Kg
	HTP power Sprayer

Glimpses of a few processing machines

Ongoing Research Projects

Sr. No.	Project Title	PI	Co – PI	Duration
Natural Resource Management				
1.	Evaluation of natural farming practices under plantation crop based system	GR Mahajan	Arunachalam V, R Ramesh, A Raizada, Maruthadurai R, Shripad Bhat, Uthappa AR, Sujeet Desai, Bappa Das, Amiya Ranjan Sahu, Rahul Kulkarni, Shashi Vishwakarma and Parveen Kumar	2023-28
2.	Coastal Agricultural Information System for India: An innovative digital platform for sustainable coastal agricultural research and development	GR Mahajan	Sujeet Desai, Bappa Das, Sreekanth GB and Shripad Bhat	2020-24
3.	Evaluation of potential rice-based cropping systems under salt affected coastal saline soils for enhancing cropping intensity, sustainability and livelihood security.	Paramesha V	Parveen Kumar, Manohara KK, Sukanta K Sarangi, Shripad Bhat and Uthappa AR	2022-26
4.	Impact assessment of extreme weather events on productivity of major crops in coastal region of India	Bappa Das	A Raizada, V Arunachalam and Manohara KK	2022–25
5.	Estimation of crop water requirement of major crops of west coast region under climate change scenarios	Sujeet Desai	Bappa Das, Paramesh V and Jitendra Kumar	2023–25
6.	Assessment and development of agroforestry systems for improved livelihood and climate change mitigation in coastal regions of India	Uthappa AR	A Raizada, Shripad Bhat, Gopal Mahajan, Paramesha V, Sujeet Desai, Bappa Das, RS Rajkumar, Nagaratna B Biradar and Vinod Kumar	2021-25

Horticulture Sciences				
7.	Improvement of Indigenous Mango, Cashew and Jackfruit	V Arunachalam	R Maruthadurai and Maneesha SR	2023-28
8.	Development of value-added products from Kokum, Jackfruit, Cashew Apple and their by products	MJ Gupta	RS Rajkumar, Shripad Bhat, Chaudhari Ganesh Vasudeo and Vinod Ubarhande	2020 -25
9.	Assessment and strengthening of vegetable production in coastal region through utilization of local germplasm and strategic introduction of commercial vegetables.	Chaudhari GV	Maruthadurai R and Shripad Bhat	2021-25
10.	Impact analysis of ICAR-CCARI technologies	Shripad Bhat	Manohara KK, GR Mahajan, Paramesha V, and Amiya Ranjan Sahu	2021-24
Crop Science				
11.	Genetic improvement of rice for coastal agro-ecosystem	Manohara KK	Paramesha V	2020-25
12..	Bio-ecology and integrated management of cashew stem and root borers in coastal region of India	R Maruthadurai	Bappa Das	2020–25
Animal Science and Fishery Science				
13.	Studies on prevalence, etio pathology and management of infectious reproductive disorders in dairy cattle of west coast region	SD Narnaware	Susitha Rajkumar, Gokuldas PP and Udharwar SV	2022-25
14.	Alternative herbal strategies for management of bovine mastitis	Susitha Rajkumar	Shirish Narnaware and Sanjay Udharwar	2023-26
15.	Conservation of major farm animal resources in the coastal region through evaluation of seminal traits, semen processing and preservation.	Gokuldas PP	Amiya Ranjan Sahu	2020-25
16.	Genetic variability of thermo tolerance in selected breeds of livestock under coastal environment.	Amiya Ranjan Sahu	Gokuldas PP	2020–25
17.	Augmenting backyard poultry production through technological interventions in breeding, feeding and management aspects pertaining to Indian West coast.	Nibedita Nayak	Gokuldas PP, Susitha Rajkumar and Amiya Ranjan Sahu	2019–24

18.	Development of ready-to-eat (RTE) animal and fish based traditional of coastal India by retort processing	RS Rajkumar	CO Mohan, MJ Gupta, Susitha Rajkumar & Trivesh Mayekar	2021-25
19.	Assessing status of coastal aquaculture practices and improvement through technology intervention for promoting livelihood of fish farmers in west coast of India. .	Trivesh Mayekar	Sreekanth GB, GR Mahajan, Manohara KK, RS Rajkumar and Paramesha V	2020-25
Agro-Eco-Tourism				
20.	Evaluation of the feasibility of operation and maintenance of agro-ecotourism center under public- private partnership mode	RS Rajkumar,	Vinod Ubarhande, Paramesha V, Shripad Bhat, Uthappa AR and Trivesh Mayekar	2023-28

AICRP CENTRES

Sr. No	Project Title	PI	Co-PI (s)	Duration
1.	All India Co-ordinated Research Project on Integrated Farming Systems	Paramesha V	GR Mahajan, GB Sreekanth, Gokuldas PP, Manohara KK, Parveen Kumar, Uthappa AR, RS Rajkumar and Trivesh Mayekar	2010-26
2.	AICRP on Seed (Crops) & MSP (Horticulture): Seed production in field and horticulture crops	Manohara KK		2006-26
3.	All India Co-ordinated Research Project on Palms	Paramesha V		2015-25
4.	All India Co-ordinated Research Project on Cashew	Manohara KK		2006-26
5.	All India Co-ordinated Research Project on Vegetable Crops	Chaudhari GV		2015-26
6.	All India Co-ordinated Research Project on Pig	Amiya Ranjan Sahu	Gokuldas PP and Nibedita Nayak	2001-26

EXTERNALY FUNDED PROJECTS

Sr. No	Project Title	PI	Co-PI (s)	Duration
NABARD				
1.	Land shaping methods and integrated farming system approach for improving livelihood security of farmers under khazan lands of Goa	GR Mahajan	Shripad Bhat Sujeet Desai, Uthappa AR, Paramesha V, A Raizada and Parveen Kumar	2022-25
2.	Market intelligence for horticultural crops	Shripad Bhat	Arunachalam V	2023-25
3.	Promotion of improved indigenous backyard poultry	Nibedita Nayak	Sahu AR and SD Narnaware	2023-25
4.	Entrepreneurship development and Livelihood improvement through demonstration and training of sustainable ornamental fish culture in Goa	Trivesh Mayekar	Sreekanth GB	2022-24
5.	Evaluating the performance of multispecies finfish culture in small low-cost ponds for improving the livelihood of farmers in the salt-affected coastal saline region of Goa	Trivesh Mayekar	Sreekanth GB, Shripad Bhat and GR Mahajan	2024-26
Asian Development Bank				
6.	Building capacity for climate change adaptation in smallholder fish farming	Trivesh Mayekar	Sreekanth GB, Sripad Bhat and Paramesha V	2024-26
DST-SERB				
7.	Empowering Farmers with Machine Learning Based Price Forecasts for Plantation Crops of West Coast of India.	Shripad Bhat		2024-27
8.	Digital monitoring and mapping soil hydraulic properties using visible to thermal hyperspectral remote sensing of Indian West Coastal Region	Bappa Das	GR Mahajan	2024-27

PMKSY, DOLR, Govt. of India				
9.	Sustainable natural resource conservation and livelihood improvement through integrated watershed management in Goa	Sujeet Desai	A Raizada GR Mahajan Uthappa AR, Paramesha V, Shripad Bhat and Gokuldas PP	2022-28
ICAR				
10.	Assessment of carbon footprint in integrated farming system through life cycle assessment for sustainability and climate resilience	Paramesha V	Arunachalam V, Trivesh Mayekar, Gokuldas PP and Uthappa AR	2021-24
11.	Network Project on Functional Genomics & Genetically Modified crops	Manohara KK	-	2015-26
12.	Natural grassland ecosystem monitoring system for peninsular and Trans Himalayan India to sustain pastoral communities	Bappa Das	-	2024-27
13.	National Agriculture Innovation Fund (NAIF), Component - I (ITMU)	Shripad Bhat RS Rajkumar	Sreekanth GB, GR Mahajan and Vinod Ubarhande	2008-26
14.	National Agriculture Innovation Fund (NAIF), Component - II Agri-Business Incubator	MJ Gupta	RS Rajkumar and Shripad Bhat	2019-26
15.	ICAR Seed Project – Fisheries Component	Sreekanth GB	Trivesh Mayekar	2018-26
16.	Poultry seed project	Nibedita Nayak		2014-26
17.	National Animal Disease Epidemiology Network	Susitha Rajkumar	SD Narnaware	2015-26
18.	Network Project on Animal Genetic Resources	Amiya Ranjan Sahu	SD Narnaware, Gokuldas PP, Nibedita Nayak and Udharwar SV	2023-26
19.	All India network project on antimicrobial resistance	SD Narnaware	Susitha Rajkumar	2024-26

Transfer of Technology

Spraying of nano fertilizers using agri drone | © Rahul Kumar 2025

ICAR-KRISHI VIGYAN KENDRA, NORTH GOA

ICAR-Krishi Vigyan Kendra, North Goa was established at the Institute in 1983 for carrying out technology assessment, demonstration for its application and capacity development in agriculture and allied sector at local agroclimatic condition. The major activities carried out are given below:

Trainings

ICAR-KVK annually organizes and implements a capacity-building program. This program aims to educate farmers, farm women, and extension functionaries on the most recent technical know-how and innovative agricultural technologies. There was a total of 59 training programs were carried out in 2024, with **1852 (989 Male & 863 Female)** participants. The most important training programs focused on resource conservation technology viz, natural farming, vermicomposting, organic input production, advanced crop, and animal production and management technology, biotic and abiotic stress management, entrepreneurship development technologies viz value addition of major fruit crops, beekeeping, design and development of low or minimum cost diet, women empowerment, and other related topics for the benefit of practicing farmers/ farmwomen, rural youths and extension functionaries.

Training on Crop Diversification through Vegetable Farming

Five Day Training on Scientific Management on Backyard Poultry

Hands on training on beekeeping

Hands on training on Agri Drone

On Farm Trials

Three OFTs on selected technologies *viz*., salt tolerant paddy varieties (var. **Goa Dhan-4** & **Goa Dhan-5**), Feeding of probiotics/yeast bolus and cooking soda to enhance the quality (fat and SNF) and quantity of milk in crossbred cows, and Nutri Hormonal therapy to improve the conception rate in repeat-breeding cows, were conducted in **16** farmers' fields.

Salt tolerant paddy varieties (var. Goa Dhan-4 & Goa Dhan-5)

Nutri Hormonal Therapy

Supplementation of cooking soda and probiotic bolus

Frontline demonstrations

In **56** farmers' fields, **8** FLD were demonstrated, including Proso millet (var. DHPM-2769), Barnyard millet (var. DHBM-93-3), Foxtail millet (var. DHFT-109-3), Finger millet (var. KMR-301), Little millet (var. DHLM-36-3), Fodder (var. Super Napier), Goat (var. Black Bengal), Pig (var. Goya).

Proso millet (*var.* DHPM-2769)

Finger millet (*var.* KMR-301)

Barnyard millet (*var.* DHBM-93-3)

Foxtail millet (*var.* DHFT-109-3) & Little millet (var. DHLM-36-3)

Popularization of Black Bengal goats

Demo on high yielding Super Napier fodder

Popularization of Goya pigs

Frontline Technology demonstration on Cashew

The Mission for Integrated Development of Horticulture: Technology dissemination through Frontline Technology demonstration on Cashew, with financial assistance from the Directorate of Cashew and Cocoa Development, Kochi, aims to establish and evaluate the performance of elite cashew varieties under normal plant density in Goan conditions. ICAR-KVK, CCARI, North Goa, demonstrated eight cashew varieties distributed to 28 farmers.

Extension Activities: Participation of KVK in different forums

To promote technologies, KVK organized **496** extension activities for **24580 (**farmers, including field days, exposure visits, exhibitions, sammelans, agro-advisories, webinars, soil health camps, farmer visits, TV shows, campaigns, diagnostic visits, scientist-farmer interaction, radio talks, important days, and Kisan Melas and promoted natural farming, organic farming, millet production, and agriculture drones.

Field Day

Webcasting of PM-Kisan Samman Nidhi 17th instalment

Celebration of Krishak Swarna Samrudhi Week

Field Visit of Director ATARI to fodder demonstration unit

National Innovations in Climate Resilient Agriculture (NICRA)

The NICRA project boosted agricultural productivity using innovative technologies. In Mayem, NICRA farmers harvested 11.8 quintals of cowpea/ha (₹247,800) compared to 7.9 quintals (₹165,900) for other farmers. Drought-tolerant paddy (Sahabhagi Dhan) yielded 27.7 quintals/ha (₹63,710) under NICRA. Nano urea raised yields for Jyoti (33.5 quintals, ₹77,050) and Jaya (39.0 quintals, ₹89,700). Hybrid Napier fodder yielded 343.4 t/year (₹171,700) under NICRA. Alternate furrow irrigation in chilli gave 5.3 quintals/ha (₹424,000) for NICRA farmers. IPM in chilli showed yields of 4.75 quintals/ha (₹212,000) vs. 3.8 quintals (₹135,150) for other farmers. Pond lining supported two farmers; seven received bee boxes. NICRA farmers produced 1386 liters of milk/year (₹64,589) vs. 1245 liters (₹54,780) for other farmers. Goat farming with Konkan Kanyal showed higher weights (males: 21.76 kg, females: 19.02 kg). A village climate resilient management committee raised ₹1305 by renting equipment.

Crop	Technology Demonstrated	Variety	No. of farmers	Area (ha)
-	Pond lining	-	2	0.1
-	Beekeeping	Apis caerana	7	-
Cowpea	Seed hardening for utilization of residual soil moisture	Goa Cowpea 3	16	5
Rice	Drought tolerant paddy cultivation	Sahabhagi dhan	1	0.1
Rice	Foliar application of Nano urea through drone	Jyoti	10	4
Rice	Foliar application of Nano urea through drone (var., Jaya)	Jaya	10	4
Fodder	Hybrid Napier fodder (*Var.*CO-5)	CO 5	2	0.5
Chilli	Alternate furrow irrigation in Chilli	Harmal chilli	5	2
Chilli	IPM in Chilli	Harmal chilli	5	8
Cattles	Clean milk production technology (Dry cow therapy and post milking teat dipping technology)	-	10	-
Goats	Climate resilient goat farming (Konkan kanyal goat)	Konkan kanyal	3	-

Cashew+ Ragi intercropping system

Proso millets (var. TNAU 202)

IPM in Chilli

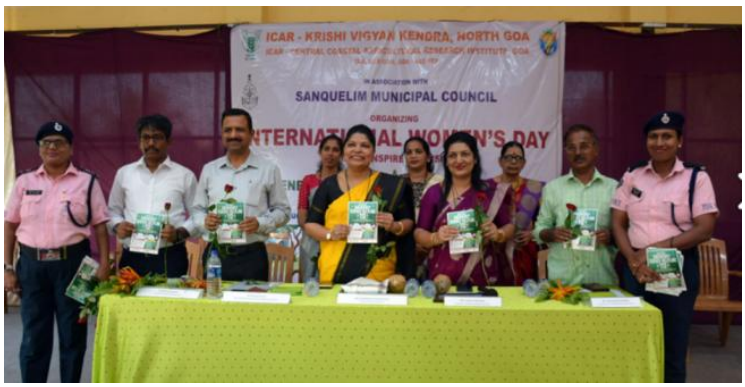
Animal health camp under TDC-NICRA

Pond lining at NICRA village (2023- 24)

Clean milk production technology in mitigating microbial stress

Activities under Out scaling of Natural farming through KVK

The Out scaling of Natural Farming through KVKs project conducted 15 training programs across villages in North Goa, teaching participants how to prepare and use Jeevamrut, Ghana Jeevamrut, and natural methods for pest control. A total of 575 people, including 352 farmers and 223 farm women, attended the sessions and received natural farming materials along with vegetable seeds. Additionally, 29 awareness programs reached 1,522 individuals (809 farmers and 713 farm women). Twelve natural farming demonstrations were carried out in six villages with the involvement of nine farmers and three farm women, who were provided with plastic drums, jaggery, and gram flour to support their efforts. However, the results showed a decline in crop yields—okra by 40%, chilli by 38.8%, and brinjal by 42.5% highlighting the challenges faced when shifting to natural farming practices.



Activities under Agri Drone under sub -mission on agricultural mechanization

A drone spraying demonstration using Nano Urea was held in Salcete, Old Goa, Nuvem, Khareband, and Mayem, involving 194 farmers (153 male, 41 female) highlighting an innovative and sustainable approach to agriculture. Additionally, a separate training session trained 102 farmers (43 male, 59 female) in drone operation, encouraging the adoption of this modern technique to boost yields and reduce costs, thereby promoting sustainable farming practices.

Training and Distribution of inputs under Sub Tribal Component (STC)

A total of four on- and off-campus training programs were held for Scheduled Tribe (ST) farmers in Old Goa, Cumbharjua, and Diwar, with 104 farmers participating (26 men and 78 women) under STC. The training covered dairy farming, backyard poultry (Kadaknath), and making organic farming inputs, helping farmers learn better and more sustainable farming methods. In addition, three input distribution programs were conducted, benefiting 116 farmers (45 men and 71 women), who received poultry birds, seeds, fertilizers, and tools. These efforts helped ST farmers improve their farming skills, increase their income, and lead better lives.

Training & Capacity Building

Training programmes organized

Period	Title	Location	No. of Participants	Co-Ordinators
12-02-2024 to 13-02-2024	Skill Development and Poultry Entrepreneurship training	ICAR-CCARI, Goa	29	Nibedita Nayak, Shirish Narnaware and Amiya Ranjan Sahu
13-02-2024	Training programme on ornamental fish culture by NABARD	ICAR-CCARI, Goa	15	Trivesh Mayekar, Sreekanth GB and Melbin Lal
21-02-2024 to 22-02-2024	Scientific Management of poultry	Thrissur, Kerala	15	Udharwar SV
21-02-2024 to 22-02-2024	Training-cum-Demonstration under AICRP on Pig	ICAR-CCARI, Goa	27	Amiya Ranjan Sahu and Gokuldas PP
01-03-2024	Scientific management of poultry	Puducherry	20	Udharwar SV, RS Rajkumar, K Natchimuthu and Svenugopal (RIVER, Puducherry)
01-03-2024	Training cum Demonstration on sustainable backyard poultry production by NABARD	Carona, Goa	21	Nibedita Nayak and Shirish Narnaware
07-03-2024	Training cum distribution under SCSP	Khordha, Odisha	62	Shirish Narnaware, Amiya Ranjan Sahu, SK Singh and BK Banja (KVK, ICAR-CIFA)
27-03-2024	Scientific poultry farming	KVK, North Goa	10	Udharwar SV
09-05-2024	One-day training program on “Scientific Goat Farming” and goat distribution under STC	ICAR-CCARI, Goa	17	Susitha Rajkumar, Shirish Narnaware and Gokuldas PP
6-06-2024	Training on rice farming under TDC-NICRA in Khazan lands of Goa	Mayem, Goa	10	N Bommayasamy, Rahul Kumar and Shirshira D
10-07-2024	Training programme on Production and Marketing of Major Horticultural crops of Goa by NABARD	Sankhalim, Goa	60	Shripad Bhat, Omar de Souza and Nitin Gaonkar
16-07-2024	Training on Clean Milk Production	Pernem, Goa	19	Udharwar SV

18-07-2024	Training on Natural farming	Pernem, Goa	20	Rahul Kumar, N Bommayasamy and Rahul Kulkarni
19-07-2024	one-day training on Virgin Coconut Oil Production Technology	KVK, North Goa	27	Rahul Kulkarni and N Bommayasamy
02-08-2024	Training cum demonstration on Feed and feeding management of dairy cattle	Bicholim, Goa	35	N Bommayasamy, Shirish Narnaware and Udharwar SV
22-08-2024	Scientific pig farming	ICAR-CCARI, Goa	5	Amiya Ranjan Sahu and Laximan Sawant (KVK, South Goa)
26-08-2024 to 30-08-2024	Skill development training on Scientific Management of Backyard Poultry Farming	Ajuna, Goa	59	Udharwar SV, N Bommayasamy, Shirish Narnaware, RS Rajkumar, Susitha Rajkumar, Amiya Ranjan Sahu, Shripad Bhat, Rahul Kumar, Vishwajeet Prajapati and Prasastha V
03-09-2024 to 04-09-2024	Scientific pig farming	ICAR-CCARI, Goa	19	Amiya Ranjan Sahu, Gokuldas PP and Sanjay Udharwar
18-09-2024	Training cum Demonstration on Drone	ICAR-CCARI, Goa	10	GR Mahajan, N Bommayasamy, Vinod Ubarhande and Vishwajeet Prajapati
25-09-2024	Scientific Management of backyard poultry	KVK, North Goa	96	Udharwar SV, N Bommayyasamy, Rahul Kumar and Rahul KUlkarni
26-09-2024	Sustainable Soil Health Management and Input Distribution	Tiswadi, Goa	52	N Bommayasamy, Udharwar SV, Rahul Kumar, Rahul Kulkarni and Vishwajeet Prajapati.
27-09-2024	Backyard Poultry Farming for Household Nutritional Security	KVK, North Goa	96	N Bommayasamy, Udharwar SV, Rahul Kumar, Rahul Kulkarni, Vishwajeet Prajapati and Shishira D
28-09-2024	Training on Vermicompost Production Technology	Karmali, Goa	35	Rahul Kumar, N Bommayasamy, Udharwar SV and Vishwajeet Prajapati
07-10-2024	GSBB sponsored one day training in Bio-resources like Jackfruit, Nutmeg, Kokum & Coconut	ICAR-CCARI, Goa	17	MJ Gupta

07-10-2024 To 11-10-2024	Five days Organic Inputs Production Vocational Training	Tiswadi, Goa	61	Rahul Kumar, N Bommayasamy, Paramesha V, GR Mahajan and Rahul Kulkarni
14-10-2024 to 18-10-2024	ICAR HRM training programme on Ecosystem Modelling and Ecosystem Service analysis in coastal ecology	Online	46	Sreekanth GB, Sujeet Desai and Trivesh Mayekar
15-10-2024	Reproductive Management of dairy animals	Chorao, Goa	20	Udharwar SV, N Bommayasamy and Rahul Kumar
16-10-2024 to 18-10-2024	Sustainable rural livelihood through pig farming	KVK, North Goa	12	Udharwar SV, N Bommayasamy, Amiya Ranjan Sahu, Solomon Rajkumar, Gokuldas PP, Susitha Rajkumar, Prasastha V, Rahul Kumar, Rahul Kulkarni and Vishwajeet Prajapati
19-10-2024	Hands on training on beekeeping	KVK, North Goa	40	N Bommayasamy and Rahul Kumar
23-10-2024 to 25-10-2024	Training cum distribution under AICRP-Pig	West Tripura	28	Amiya Ranjan Sahu, Jowel Debnath, BC Debnath, BK, Sarkar (C.V.Sc & A.H., R. K. Nagar, West Tripura)
04-11-2024 to 05-11-2024	PMFME Sponsored Training Program for District Resource Persons	ICAR-CCARI, Goa	5	MJ Gupta
18-11-2024	Training-cum-interaction and distribution program for farmers of Bardez taluka, Goa under NABARD funded poultry project	Aldona, Goa	34	Amiya Ranjan Sahu and Shirish Narnaware
25-11-2024	Scientific management of backyard poultry	KVK, North Goa	11	Udharwar SV, N Bommayasamy, Rahul Kumar and Vishwajeet Prajapati
26-11-2024	Training on Backyard Poultry Farming in Collaboration with ZAO Ponda	KVK, North Goa	35	Udharwar SV, Rahul Kumar, Nivya KR, Rahul Kulkarni and Vishwajeet Prajapati.
27-11-2024	Training on Crop Diversification through Vegetable Farming	Chorao, Goa	43	Rahul Kumar, Udharwar SV, Nivya KR, Rahul Kulkarni and Vishwajeet P.
29-11-2024	Training on Nursery management under TDC-NICRA in Khazan lands of Goa	Mayem, Goa	59	Rahul Kumar, Udharwar SV, Shishira D and Vishwajeet Prajapati

18-12-2024	Training Program on Integrated Crop Management in Collaboration with ZAO Pernem, Goa	Pernem, Goa	36	Rahul Kumar, Udharwar SV, Rahul Kulkarni and Vishwajeet Prajapati

Lectures delivered by the Scientist

Date	Lecture Topic/Programme	Participants	Venue
R Maruthadurai			
09-10-2024	Mass production and use of organic pest management methods	Farmers	Cumbharjua, Goa
12-11-2024	Important Pests of agriculture crops in Coastal regions of India	RAWE Students	ICAR-CCARI, Goa
Shirish Narnaware			
23-01-2024	Vaccinations, biosecurity measures, disease prevention and health management in backyard poultry	Trainees	Aldona Goa
12-02-2024	Importance of vaccination, deworming and bio-security measures in poultry farming Trainees	Trainees	ICAR-CCARI, Goa
21-02-2024	Disease prevention and management of pig farms	Trainees	ICAR-CCARI, Goa
01-03-2024	Vaccinations, bio-security measures, disease prevention and health management in backyard poultry	Trainees	Carona, Goa
09-07-2024	Major diseases in goats	Trainees	ICAR-CCARI, Goa
02-08-2024	Metabolic diseases in dairy cattle and their management	Trainees	Ravindra Bhavan, Sankhalim, Goa
26-08-2024	Major disease management in backyard poultry	Trainees	St. Michaels Church Hall, Bardez, Goa
03-09-2024	Management, control and prevention of diseases in pig farms	Trainees	ICAR-CCARI, Goa
05-09-2024	Goat diseases and healthcare management	Trainees	ICAR- CCARI, Goa
11-11-2024	Research and development in animal science and fisheries sector at ICAR-CCARI, Goa	Students	ICAR- CCARI, Goa
22-11-2024	Detection of *Listeria monocytogenes, E. coli* and *Salmonella* species in food samples	Students	ICAR- CCARI, Goa
20-12-2024	Use of antibiotics in livestock and the impact of metabolic diseases on milk production in cattle	Trainees	Ibrahmpur, Pernem, Goa
GR Mahajan			

11-04-2024	Fertiliser Use Under Climate Smart Agriculture	Senior & middle management level officials	Nagaon, North Goa.
RS Rajkumar			
18-10-2024	Three-day vocational training for Rural Youth on Sustainable rural livelihood through pig farming	Rural Youths	ICAR-CCARI, Goa
20-08-2024 to 21-08-2024	Collaborative workshop with the delegation of Cornell CALS USA	CCARI, Officials	ICAR-CCARI, Goa
22-10-2024	Agri-Business Incubation Centre (AGNI) in collaboration with the Institution of Engineers, Goa, hosted an "Ideation Contest	Engineering students	ICAR-CCARI, Goa
22-10-2024	ICAR-CCARI Industry Meet – 2024	Engineering students	ICAR-CCARI, Goa
Susitha Rajkumar			
22-02-2024	Common pig diseases and healthcare management of pigs	Farmers	ICAR-CCARI, Goa
11-07-2024	Vaccination and deworming Schedule in goats	Farmers	ICAR-KVK, North Goa
11-08-2024	Major viral diseases of poultry, their diagnosis and management	Farmers	ICAR-CCARI, Goa
18-10-2024	Management of major diseases in pigs	Farmers	ICAR-KVK, North Goa
12-11-2024	Preventive care and management of diseases in livestock population of coastal regions of India	Students	ICAR-CCARI, Goa
Sreekanth GB			
09-11-2024	Ecosystem services of estuarine ecosystems: classification, identification and evaluation	Delegates	ICAR-CIFT, Kochi
Gokuldas PP			
13-02-2024	Artificial Insemination in poultry farming	Farmers	ICAR-CCARI, Goa
30-05-2024	Scope and importance of AI and reproductive management in native goats of coastal region	Farmers	ICAR-KVK, North Goa
14-07-2024	Reproductive management in goats of coastal region	Farmers	ICAR-KVK, North Goa
03-09-2024	Scientific management of reproduction in pigs	Farmers	ICAR-CCARI, Goa
05-09-2024	Reproductive management in Goats: Strategies and recent trends	Agri-entrepreneurs	ICAR-CCARI, Goa
17-10-2024	Scientific Reproductive management in pigs	Rural youth	ICAR-CCARI, Goa
18-11-2024	Reproductive health care and AI in dairy animals	BSc. Scholars	ICAR-CCARI, Goa

10-12-2024	Scientific reproductive management of dairy cattle	Farmers	ICAR-KVK, North Goa
Ganesh Chaudhari			
16-05-2024	Vegetable grafting	Farmers	ICAR-CCARI, Goa
13-11-2024	Vegetable cultivation in Goa *vis-à-vis* Vegetable research in ICAR-CCARI	Students	ICAR-CCARI, Goa
Shripad Bhat			
14-03-2024	Market intelligence for horticultural crops	Scientists, Assistant Professors	ICAR – National Institute of Agricultural Economics and Policy Research (NIAP), New Delhi.
30-04-2024	IP and the Sustainable Development Goals (SDGs) Building our common future with innovation and creativity	Scientists	ICAR-CCARI, Goa
28-06-2024	Market Intelligence for Horticultural Crops of Goa	Board of directors of FPCs of Goa	Panaji, Goa
15-07-2024	Importance of record keeping and economics of goat farming	Farmers	ICAR-CCARI, Goa
22-10-2024	ICAR-CCARI, Goa Technologies	Entrepreneurs	ICAR-CCARI, Goa
Bappa Das			
12-03-2024	Assessment and monitoring of land degradation by Remote sensing and GIS	Students	Virtual platform by SR University, Warangal
11-04-2024	Fertiliser Use Under Climate Smart Agriculture	Delegates	Hotel Regenta Central, Nagaon, Goa
09-07-2024	Introduction to R: Statistical computing	Trainees	Virtual platform by CIMMYT Academy
10-07-2024	R for spatial analysis	Trainees	Virtual platform by CIMMYT Academy
Sujeet Desai			
30-01-2024	Soil and water conservation measures suitable for western ghat region	Farmers	Amonen, Canancona, Goa
13-03-2024	Sustainable Agriculture Water Management in Coastal Region under Climatic Change Scenario	Officials and students	National Institute of Technology (NIT), Goa
05-06-2024	Sustainable land and water management in coastal region	Students	CWRDM, Kozhikode
28-06-2024	Rainwater management practices for high rainfall areas of coastal ecosystem	Scientists	Virtual platform by ICAR-IIWM, Bhubaneswar
17-10-2024	Modelling the features of river basins along the Indian Coast	Scientists	ICAR-CCARI, Goa
Amiya Ranjan Sahu			
21-02-2024	Introduction to scientific pig farming, breeds and breeding management in pigs	Trainees	ICAR-CCARI, Goa
09-07-2024	Breeding management of goats	Trainees	KVK, North Goa
26-08-2024	Hatchery management practices	Trainees	Bardez, North Goa

03-09-2024	Introduction to scientific pig farming, breeds and breeding strategies for pigs	Trainees	ICAR-CCARI, Goa
16-10-2024	Breeding management of pigs.	Trainees	KVK, North Goa
24-10-2024	Introduction to scientific pig farming, breeds & breeding management in pigs	Trainees	Agartala, Tripura
11-11-2024	Scope of pig farming in coastal areas of India	Trainees	ICAR-CCARI, Goa
Uthappa AR			
12-05-2024	Coastal agroforestry- a sustainable practice for biodiversity conservation, livelihood security and sustainable development	Trainees	ICAR- IGFRI, RRS, Srinagar
12-11-2024	Agroforestry practices of coastal regions of India	Students	ICAR-CCARI, Goa
15-10-2024	Ecosystem service analysis in agroforestry systems	Trainees	Online by ICAR CCARI, Goa
Nibedita Nayak			
12-02-2024	Importance of backyard poultry farming: Science and Practice and Poultry feed preparation, unconventional feed in poultry feeding	Trainees	ICAR-CCARI, Goa
13-02-2024	Scientific housing of poultry birds and breeding practices, production practices for quality chick production and hatchery management	Trainees	ICAR-CCARI, Goa
21-02-2024	Newborn piglet care and management, Housing and Feeding of Pigs	Trainees	ICAR-CCARI, Goa
Trivesh Mayekar			
16-01-2024	Marine Awareness Programme	Staff, &Trainees	ICAR-CCARI, Goa
26-07-2024	Rural Fisheries Work Experience programme	Students	ICAR-CCARI, Goa
17-10-2024	Ecosystem Service analysis in coastal ecology	Participants	ICAR-CCARI, Goa

Technology Dissemination

Adoption and dissemination of Artificial Insemination of farm animals

Artificial insemination (AI) in small farm animals is an important reproductive technology which holds great potential for rapid genetic improvement and productivity enhancement. Institute has standardized the AI technology in indigenous pigs and goats reared under hot and humid coastal climatic conditions and has been persistently making efforts for popularization and adoption in farmer's field. AI using liquid semen in pigs and goats and controlled breeding involving standardized technique of estrus induction and synchronization are being performed in the Institute farm and farmers' field. A total of 428 piglets were born through 91 numbers of AI and 59 numbers of farrowings with success rate of 66% in the Institute and farmers' field during the period. Average litter size at birth was 7.25 while litter size at weaning was 6.82. Adoption of this technology has boosted pig production in farmers' field as a result of higher number of viable piglets and improved piglet growth rate. Around 34 numbers of farmers were benefitted generating overall employment of 8,436 man-days with income generation of 33.96 lakhs rupees. Controlled breeding technology employing double prostaglandin $F_2\alpha$ regimen combined with AI using liquid boar semen has yielded good results with enhanced submission rate of 75% and overall conception rate of 73.33% in in farmers' field.

Field day on cashew stem and root borer management

The Institute organised a field day on cashew stem and root borer management at Sanguem on 14 March, 2024. A total of 15 farmers were benefitted by the programme.

Training cum demonstration and workshop on Drone for nutrient management by ICAR-CCARI, Goa

A training cum demonstration on the use of a drone for spraying of nano-fertilizers in the paddy field was organized by ICAR-CCARI at Mayem village, Tiswadi Block, North Goa on 18 September 2024. Around 20 farmers attended this training cum demonstration on use of a drone for spraying of nano-fertilizers.

Goat Distribution cum demonstration Program under STC

The ICAR-CCARI organized a one-day training program on "Scientific Goat Farming" and goat distribution for 17 ST farmers from Palghar district of Maharashtra on 5 September 2024 at the Institute. A total of10 farmers were provided with 1 male and 2 female goats each and 100 Kg goat feed pellet. Also, hybrid Napier fodder cuttings were distributed to the farmers.

Training cum Demonstration on sustainable backyard poultry production

The Institute organized a training cum demonstration programme on sustainable backyard poultry production at Lilwyn Eco Agri Farm, Carona Goa on 1 March, 2024. The training program was attended by total 21 poultry farmers.

Capacity building cum training programme on Aquaculture

The Institute organized a one-day Aquaculture training and demonstration program on aquaculture at Old Goa on 3 April, 2024. The training was attended by 32 participants.

Vocational training on scientific management of goat

The Institute organized a week-long vocational training on scientific management of Goats at Old Goa during 9-15 July 2024. A total of 29 participants from different talukas in North and South Goa attended the training programme.

Training cum demonstration on Feeding management of dairy cattle

ICAR–CCARI, Goa organized a training cum demonstration on feed and feeding management of dairy cattle at Bicholom Goa on 2 August 2024 for dairy farmers of Sankhali and Bicholim talukas. Thirty-five dairy farmers attended the training,

Skill development training on Scientific Management of Backyard Poultry Farming

ICAR – CCARI, Goa conducted five days skill development training on scientific management of backyard poultry farming at St. Michael Church Hall, Anjuna from 26 – 30 August 2024. Fifty-nine farmers and farm women participated in the program.

Vocational Training on Pig Farming

Three days vocational training for rural youth on 'Sustainable rural livelihood through pig farming' organized by ICAR-KVK, North Goa during 16-18 October 2024. Twenty-five farmers attended the programme.

Rural Awareness Work Experience Training on Coastal Agricultural Research and Development

Seven days Rural Awareness Work Experience Training on 'Coastal Agricultural Research and Development' organized for final year students of BSc. (Hons.) Agriculture, Goa College of Agriculture, Old Goa, and held during 11-19 November 2024. Twenty-one students successfully completed the training.

Distribution programme of planting materials under SCSP at Karnataka

The Institute distributed planting materials, including 1,000 silver oak plants and 1,500 black pepper plants of the Panniyur-1 variety, to eight SC farmers (4 male, 4 female) from Muroor and Handigon in Kumta, and Heblekoppa in Honnavar taluk, Uttara Kannada district, under the SCSP Programme on 5 November 2024.

A small-scale demonstration unit of ornamental fish culture established in Sanquelim, Goa

A small-scale ornamental fish culture unit for the skill development of SHGs at Sanquelim village in North Goa was established under the NABARD funded ornamental fisheries project on 14 August 2024. Around 20 women farmers benefitted from this unit.

ICAR – STC

Scheduled Tribe Component

Institute has undertaken various activities to benefit farmers under ICAR STC programme. These includes providing regular training sessions that focus on enhancing agricultural practices for field and horticultural crops, livestock and poultry farming, fish production and processing techniques. Additionally, the program involves the distribution of essential inputs such as poultry, piglets, feed, seeds, fertilizers, organic materials, minor equipment, coconut harvesting machine, etc. to the farmers of Goa, Kerala, and Andhra Pradesh. Furthermore, the institute organized frontline demonstrations and farmers' field days to showcase and popularize innovative agricultural technologies among farmers. Overall, about 830 farmers have directly benefited from the ICAR gaining access to valuable trainings and inputs that contribute to their employment generation and livelihood improvement.

Distribution of pig feed under STC in Goa

Distribution of Poultry under STC In Vizianagaram, Andhra Pradesh

Distribution of paddy seeds under STC in Goa

ICAR – SCSP

Scheduled Caste Sub Plan

SCSP activities in the coastal region of India

ICAR–Central Coastal Agricultural Research Institute (ICAR-CCARI), Old Goa, Goa is involved in farmers Welfare projects under Scheduled Caste Sub Plan (SCSP) funded by Indian Council of Agricultural Research (ICAR), from Govt. of India, to make a change in the livelihood of coastal farmers/fishermen. The institute has also organized different activities such as field days, awareness programmes, health camps, field demonstrations, and distribution of inputs under the SCSP covering during 2024-2025 that benefitted about 400 farmers/fishermen from the coastal region.

Particulars	Qty	Number of beneficiaries
Trainings (capacity building/skill Develop etc.) (1-10 days)	10	150
Front Line Demonstrations (FLDS) and other demonstrations	2	40
Awareness-Heath camps visits etc./vet. Services/ testing samples/ field visits	9	150
Inputs- Seeds (Field crop/horti. crops)	100 kg	20
Nursery plants	2800	20
Cutting slips, suckers etc.	20	5
Animals small (pig, sheep, goat etc.)	10	5
Poultry chicks/duckling etc.	360	30
Fish	5500	25
Equipment (small, medium, and large)	85	60
Fertilizer NPK/Secondary Fertilizer/micronutrients/vermi-compost/plant growth promoter	500 kg	10
Animal feed/fodder	4000 kg	20
Animal medicates	30	30
Promotion of agri-entrepreneurships / market linkage / water sample analysis	50	200

Education & Human Resource Development

Students involved in paddy transplantation | © Vigneshwaran Thillai 2025

Education

Mathala J. Gupta

Guided the following four M.Sc. Food Technology students as a chairperson, date of degree completion: 13-04-2024.

S.No.	Student Name	Thesis Title
1	Mariya Susan Lal	Development of Cookies From Cashew Apple Flour and Its Quality & Sensorial Parameters
2	Ajin Kuriakose	Quality Evaluation of Formulated Ready To Serve Beverages From Cashew Apple Pulp blended with Pineapple Jelly
3	Nevin Lijo	Value Addition of Noodle Using Cashew Apple Flour and Its Quality Parameters
4	Sivarenjini V	Study on Quality Evaluation of Sweet and Sour Sauce Developed from Kokum Rind
5	Gopika Mohan	Development of Marmalade From Kokum Rind and Its Quality Evaluation

Sujeet Desai

Guided Dikshita A. Shetkar, M.Sc. Geoinformatics student for her thesis entitled "Landslide Susceptibility Mapping for Western Coastal Districts of India Using Machine Learning and Advanced Geospatial Techniques" as a chairperson, date of degree completion: 31-03-2024.

Gokuldas P P

- Faculty for Post-graduate Programme of ICAR-IVRI (Deemed to be University), Izatnagar, Bareilly, U.P
- Member, Ad-Hoc Board of Studies in Veterinary and Animal Sciences under the Faculty of Agriculture, Veterinary, Fisheries and Allied Sciences, Goa University, Goa
- Course Director, Rural Awareness Work Experience training for B.Sc. (Hons.) Agriculture students of Goa College of Agriculture, Old Goa
- Member of the committee constituted by the Directorate of Higher Education, Govt. of Goa for granting advanced increments for the faculty of Goa College of Agriculture

Shripad Bhat

- Advisory Committee Member of Ms. Phadte Puja Vishnudas (ADPD/22/0388), Ph.D. student of Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli.
- Acted as the External Examiner to evaluate doctoral degree student of UAS, GKVK, Bengaluru entitled "Impact of factor and product prices on profitability of crops: implications for strategic minimum support prices (MSP) determination" during July 2024.
- Acted as the External Examiner to evaluate thesis of post graduate student of UAS, GKVK, Bengaluru entitled "An economic analysis of cold pressed edible oil units in Ananthapur district of Andhra Pradesh" during May 2024.

Human Resource Development

Training and Capacity Development of Institute Staff

Date	Name	Programme	Venue
01-03-2024 to 31-03-2024	Gokuldas PP	One-month Massive Open Online Course (MOOC) on Artificial Intelligence in Agriculture	ICAR-NAARM, Hyderabad
03-03-2024	Shirirsh Narnaware	Training Workshop on Marine Megafauna Veterinary	Pamjim, Goa
12-03-2024 to 16-03-2024	Sujeet Desai	Workshop on Sustainable Future on Water Resources and Climate Challenges	National Institute of Technology (NIT), Goa
05-06-2024 to 11-06-2024	Shirish Narnaware	IP Awareness Week	Online platform by IP&TM Unit, New Delhi
22-07-2024 to 26-07-2024	Susitha Rajkumar	Training programme on Multivariate Data Analysis using "R"	Virtual platform by ICAR-NAARM, Hyderabad
14-09-2024 to 18-09-2024	Gokuldas PP	ICAR-sponsored training on 'Ecosystem Modelling and Ecosystem Service Analysis in Coastal Ecology'	ICAR-CCARI, Goa
24-09-2024 to 27-09-2024	Shripad Bhat	National Level ToT Training on Scope and Relevance of Convergence of Central and State Schemes with Watershed Activities for Maximizing Investments under DC-PMKSY 2.0	NIRDPR, Hyderabad
04-11-2024 to 08-11-2024	Amiya R Sahu	Building Competencies for Personal Excellence	Art of Living Institute, Bengaluru
27.11.2024 to 11.12. 2024.	N Bommayasmy	Ist Phase of the 10th Management Development Program for newly recruited Senior Scientists and Heads of KVKs	ICAR-NAARM, Hyderabad
14.12.2024 to 23.12.2024	N Bommayasmy	IInd Phase of the 10th Management Development Program for newly recruited Senior Scientists and Heads of KVKs	ICAR-KVK, MYRADA, Erode, Tamil Nadu,
27.12.2024 to 31.12.2024	N Bommayasmy	IIIrd Phase of the 10th Management Development Program for newly recruited Senior Scientists and Heads of KVKs	ICAR-ATARI, Pune

Participation in Conference / Seminar / Symposia / Workshops / Meetings

Date	Name	Programme	Venue
4-01-2024	Maruthadurai R	International Webinar on Functional Phenomics for Improved Climate Resilience in Tropical Agriculture	Virtual platform by ICAR-CTCRI, Kerala
19-01-2024	Shirish Narnaware	Expert on screening cum evaluation committee for promotion of Assistant professors	Maharashtra Animal & Fishery Sciences University, Nagpur
29-01-2024 and 12-02-2024	Shripad Bhat	Agricultural Policy Committee Meeting	Mantralaya, Secretariat Porvorim, Goa
07-02-2024 to 08-02-202	Shirish Narnaware	24th Indian Veterinary Congress 2024 & 31st Annual Conference of IAAVR	LUVAS, Hisar
08-02-2024 to 10-02-2024	Bappa Das	International Conference on Climate Change and Agroecosystem: Threats, Opportunities and Solutions	Banaras Hindu University, Varanasi
12-02-2024 to 15-02-2024	Sreekanth GB	14th Asian Fisheries and Aquaculture Forum	NAAS Complex, New Delhi
15-02-2024 to 16-02-2024	Amiya R Sahu	National Symposium on Animal production systems and its role in sustainable use of ANGR	NTR College of Veterinary Science, Gannavaram, Andhra Pradesh
22-02-2024 to 23-02-2024	Bappa Das and Sujeet Desai	National Seminar on SmartTechnologies for Sustainable Agriculture and Environment	ICAR-CRIDA, Hyderabad
23-02-2024 to 24-02-2024	Susitha Rajkumar	5th Biennial Poultry Health Conference and National Symposium on Poultry Health: Current Challenges and Future Strategies	PJTSAU, Rajendranagar, Hyderabad
18-04-2024	Gokuldas PP	Brainstorming session on semen quality standards for native equine breeds	ICAR-NRC on Equines, Hisar
19-04-2024	Amiya R Sahu	National-level Workshop on Understanding Opportunities in Climate Finance & Budgetary Analysis Perspective for the State of Goa	Taj Vivanta, Panjim, Goa
26-04-2024	Gokuldas PP	National Workshop on Pre-requisites for sustainable innovations in Dairy and Animal Science	Virtual platform by ICAR-NDRI, Karnal
25-04-2024 to 26-04-2024	Amiya R Sahu	Annual Review Meeting of AICRP on Pig	ICAR-NRC on Pig, Guwahati
02-05-2024 to 03-05-2024	Shirish Narnaware	Annual Review Meeting of Poultry Seed Project	ICAR-NRC on Mithun, Nagaland
27-05-2024	Gokuldas PP	Coastal Stakeholders Meet	ICAR-CCARI, Goa
05-06-2024 to 11-06-2024	Shripad Bhat	IP Awareness Week	Virtual mode by IP&TM Unit, New Delhi

07-06-2024	Shirirsh Narnaware and Gokuldas PP	Interface Meet on Characterization and Documentation of Animal Genetic Resources of Goa	ICAR-CCARI, Goa
10-06-2024 to 11-06-2024	Maruthadurai R	National Conference on Expanding the horizons of microbial research on Agriculture	ICAR-NBAIM, Mau
14-06-2024 to 15-06-2024	Shripad Bhat	National Conference on Cashew Sustainable Cashew Production: Challenges and Opportunities	Raj Bhavan Panjim, Goa
05-07-2024 to 06-07-2024	Sujeet Desai	CaMa-Flood developer/user international meeting 2024	Virtual platform by Institute of Industrial Science, The University of Tokyo
18-07-2024 to 21-07-2024	Paramesha V	Review of Research Activities and Strengthening Future Research Program under NICRA Program	ICAR-CRIDA, Hyderabad
08-07-2024	Susitha Rajkumar	Annual Review Meeting of National Animal Disease Epidemiology Network (NADEN) 2024	ICAR-NIVEDI, Bengaluru
02-08-2024	Gokuldas PP	Meeting of the Ad-hoc Board of Studies under the Faculty of Agriculture, Veterinary and Fisheries Sciences, Goa University	Goa College of Agriculture, Ela
03-09-2024	GR Mahajan	Field visit cum consultation on natural farming	Gurukul, Kurukshetra, Haryana
19-09-2024	Shrirsh Narnaware and Gokuldas PP	Annual Review Meeting of AICRP on Pig	ICAR-CCARI, Goa
25-09-2024 to 27-09-2024	Maruthadurai R	International Conference on Plant protection in Horticulture	ICAR-IIHR, Bengaluru
26-09-2024 to 28-09-2024	Shrirsh Narnaware	XXIX Annual Convention of ISVIB & National Conference on Challenges in Animal Health and Production Amidst Climate Change	Madras Veterinary College, Chennai
04-11-2024	Gokuldas PP	Review Meeting of Nodal Officers of Data Management Portal	Virtual platform by ICAR-IASRI, New Delhi
07-11-2024 to 09-1-2024	Sreekanth GB	31st Swadeshi Science Congress	ICAR-CIFT, Kochi
11-11-2024 to 13-11-2024	Sujeet Desai	Annual meeting of the Asia-Hub of Michigan State University	Chiang Mai, Thailand
12-11-2024 to 14-11-2024	Mathala Gupta	58thAnnual Convention of ISAE and International Symposium on Agricultural Engineering Education for Aspiring Youth in Transforming Agriculture	VNMKV, Parbhani, Maharshtra
13-11-2024 to 15-11-2024	Maruthadurai R	International Conference on Innovative Technologies for Research and Development for Sustainable Production of Cotton, Oilseeds and Fibre Crops	ICAR-KVK, North Goa

19-11-2024 to 22-11-2024	Uthappa AR	Global Soils Conference 2024	NASC, New Delhi
21-11-2024 to 22-11-2024	Amiya R Sahu	XVIII National Conference on New vistas in harnessing genetic resources for sustainable animal production	Bihar Veterinary College, BASU, Patna
27-11-2024	Trivesh Mayekar	Stock assessment of lesser sardines along the coast of Maharashtra & Goa	Panaji, Goa
12-01-2024	Udharwar SV	Awareness program on National Horticulture Board schemes	NHB Pune and the Dir of Agriculture, Govt. of Goa
08-02- 2024 to 09-02-2024	Udharwar SV	IGNITE-Young Ari Entrepreneurs conclave	ICAR-CCARI, Goa
03-05-2024	Udharwar SV	Micro Observer training	Panaji, Goa
07-06-2024	Udharwar SV	Interface Meet on "An GR of Goa State: A Mission towards Zero Non-Descript An GR of India"	ICAR-NBAGR Karnal
20-08-2024	Udharwar SV	Meeting with Cornell CALS University, USA	ICAR-CCARI, Goa
02-09-2024	Udharwar SV	Meeting of Institute Animal Ethics Committee	ICAR-CCARI, Goa
28-11-2024	Udharwar SV	Awareness on soil health cards via Gram Sabha	Gram Panchayat of Curca, Tiswadi, Goa
07-12-2024	Udharwar SV Rahul Kumar Rahul Kulkarni Vishwajeet Prajapati	Workshop on Pradhan Mantri Kisan Urja Suraksha Evam Utthan Mahabhiyan (PM-KUSUM)	Panaji, Goa

Students visit to Institute

A total of 7000 students and faculties from various universities, schools and other academic institutions from 14 States / UTs have visited ICAR – CCARI, Goa on educational and exposure tours during the reporting period.

Glimpses of Institute Activities

Independence Day celebration 2024

Events Organized

'IGNITE' Young Agri-Entrepreneur's Conclave 2024

ICAR-CCARI, Goa organized two days 'IGNITE' Young Agri-entrepreneurs Conclave 2024at Old Goa during 8-9 February 2024. This Young Agri-entrepreneurs' conclave was conceptualized to identify the best agri start-up ideas from the ignited young minds (below 35 years of age) to further nurture them through incubation support from AGNI. A total of 15 young entrepreneurs and students from 5 states (Goa, Maharashtra, Kerala, Jammu & Kashmir, and Tamil Nadu) registered for this program. The ideas presented were from varied domains like cosmetics from fish waste, Artificial intelligence in Animal husbandry, Vegan Meat, Sericulture, and Organic farming.

Coastal Stakeholder Meet

ICAR-CCARI, Goa organized a Stakeholder Meet at Old Goa on 27 May 2024. The event was chaired by Prof. (Dr.) M. B. Chetti, Vice Chancellor of Sanskriti University, Mathura, Uttar Pradesh, and Chairperson of the Quinquennial Review Team (QRT) of the Institute. Prof. Chetti commended ICAR-CCARI, Goa, for its extensive outreach and activities across all coastal states of India despite having limited staff and resources. The primary agenda of the Stakeholder Meet was to facilitate interaction between various stakeholders and the QRT members, fostering dialogue to better understand the institute's technological interventions and gather feedback to streamline research in coastal agriculture. Around 50 people representing all 9 coastal states participated in this stakeholder meet.

Interface Meet on "AnGR of Goa State: A Mission towards Zero Non-Descript AnGR of India"

The ICAR-National Bureau of Animal Genetic Resources, Karnal, Haryana organized an Interface Meet on "Animal Genetic Resources (AnGR) of Goa State" in collaboration with the ICAR-CCARI, Goa on 7 June 2024. The meet was organized under the "Mission towards Zero Non-Descript AnGR of India". About 50 participants from ICAR, Dept. of Animal Husbandry and Veterinary Services, Govt. of Goa, Goa State Biodiversity Board and progressive farmers participated in the Meet.

Workshop on recent advances and digital tools in scientific and research communications

ICAR-CCARI, Goa organized a workshop on recent advances and digital tools in research communication for scientists, technical staff and research scholars on 11 June 2024. Mr. KP Madhu, Science Writing Consultant of Current Science delivered a lecture on the content writing, document editing, literature search, data management, plagiarism check, and recent digital tools in science writing and research communication. A total of 20 participants attended the programme.

Workshop on *Kaavi*: A Heritage Soil Art

The Institute organized a unique 'Workshop on *Kaavi*: A Heritage Soil Art' on 7 November 2024 to highlight the importance of this ancient art form, deeply rooted in the soil and connecting people to the earth through a rich cultural heritage. Renowned young *Kaavi* artist, Shri Sagar Naik Mule, who has played a vital role in rejuvenating this traditional art, served as the resource person for the workshop. A total of 25 participants were present during the workshop.

National Horticulture Board Schemes' awareness programme

The Institute organized a one-day awareness program on 'National Horticulture Board Schemes' in collaboration with the National Horticulture Board (NHB), Pune, and the Dept. of Agriculture, Govt. of Goa on 12 January 2024 with main aims to help farmers for sustainable horticultural crop production and processing in this region. A total of 97 progressive Goan farmers and farm women participated in the programme.

Workshop on Disaster Management in Agriculture with Special Reference to Coastal India

The ICAR–CCARI, Goa, organized a workshop on disaster management in agriculture, with special reference to coastal India, on 11 October 2024. Prof. (Dr.) J.S. Bhatia, Senior Consultant (Disaster Management) and Director of Training, MGSIPA, Government of Punjab, and former Assistant Commandant, ITBP/NDRF, MHA, Government of India, served as the resource person and delivered a detailed lecture, sharing practical experiences and case studies.

Awareness programme on marine conservation

In collaboration with the Coastal Impact-NGO, ICAR- CCARI, Goa organized "Marine Awareness" program on 16 January 2024. The primary goal of the initiative was to enhance awareness about marine conservation, education, and research focusing on the significance of coral reefs to fish biodiversity and humanity.

ICAR-CCARI team organises farmer-scientist interface in coastal Karnataka

Scientific team of ICAR-CCARI lead by Dr Parveen Kumar, Director organised farmer-scientist interface programmes at five locations in Uttara Kannada (Kumta and Honnavar) and Udupi (Maravanthe, Kundapura, and Brahmavara) coastal districts of Karnataka during 5-6 October 2024. The interface covered a total of 80 farmers/fishermen including 20 SC and 20 women farmers in the region involved in agriculture and allied farming activities.

International Day of Action for Rivers

To mark the International Day of Action for Rivers on 14 March 2024 ICAR-CCARI organized a field day and ranching program at Valvanti River, Keri, Goa, to promote conservation of Small Indigenous Fishes (SIFs) and riverine habitats. Around 1,000 hatchery-bred individuals of seven indigenous fish species were released to enhance riverine fish stocks. The event saw participation from 40 stakeholders, including residents, students, fishermen, and officials. The programme concluded with student activities, awareness material distribution, and a strong message on sustaining freshwater biodiversity through community engagement.

Fish Biodiversity Assessment of Ramsar Site Nanda Lake, Goa

ICAR-CCARI documented the fish faunal diversity of Nanda Lake, Goa's only Ramsar site, identifying 17 fish species across five sampling sites. The survey revealed a decline in fish diversity, with *Pethia setnai* and *Haludaria pradhani* both IUCN-listed threatened species found at only one site, indicating habitat degradation. Nanda Lake, situated in Quepem Taluka, plays a vital ecological role and supports migratory birds and diverse aquatic life. The institute emphasized the need for urgent conservation efforts, including captive breeding of threatened species and collaborative management strategies. These findings underscore the ecological significance of Nanda Lake and the necessity for long-term preservation of its biodiversity.


Conservation of Marine habitat at St. George Island, Goa

ICAR-CCARI and Coastal Impact jointly organized a marine cleanup at St. George Island, Goa, involving 40 participants including students, volunteers, and divers on 28 April 2024. The team collected 50 jute bags of debris, including submerged waste like nets and plastic bags, significantly reducing the threat of ghost fishing. The event fostered environmental awareness and demonstrated strong community commitment to protecting marine ecosystems.


Kisan Diwas

Agricultural Education Day

World Food Day

International Women's Day

Mahila Kisan Divas

World Coconut day

Maritime Day

World Water Day

35th Foundation Day

International Labour Day as a "Shramik Samman Diwas"

World Environment Day

World Blood Donor Day

International Day of Yoga

National Fish Farmers Day

World Anti-microbial Resistance (AMR) Awareness Week

Indian Organ Donation Day

78th Independence Day celebrations

75th Republic Day celebrations

Participations in exhibitions / programmes

Visit of Hon'ble Prime Minister Shri Narendra Modi ji at the ICAR-CCARI Goa stall

Shri Narendra Modi, Hon'ble Prime Minister of India visited ICAR- CCARI, Goa stall showcasing innovative climate-smart agriculture technologies under the theme "Viksit Bharat, Viksit Krishi, Viksit Kisan" programmes on 6 February 2024. During the visit, Hon'ble Shri P.S. Sreedharan Pillai, Governor of Goa and Dr Pramod Sawant, Hon'ble Chief Minister of Goa, were also present. Dignitaries were apprised about the institute focus of increasing the production and productivity of field and horticultural crops, livestock, and fisheries relevant to India's coastal natural resource base in a sustainable manner beside institute also serves as a centre of agro-ecotourism to strengthen rural economy.

The Aqua Goa Mega Fish Festival 2024

ICAR – CCARI, Goa, actively participated and showcased fisheries technologies in "The Aqua Goa Mega Fish Festival 2024," held at the SAG Open Field Ground, Campal, Panjim, Goa during 2-4 February 2024. Shri. Nilkanth Halarnkar, Hon. Fisheries Minister, Goa visited the stall and appreciated innovative technologies of the institute and endeavors aimed at enhancing the fisheries sector of Goa. The exhibition attracted approximately 5000 visitors over the three-day event, with around 300 stakeholders and farmers actively engaging in discussions and seeking information on fish culture, Crab culture, seaweed culture, Biofloc, RAS and Cage culture.

State Level Science Exhibition, Maharashtra

The Institute participated and presented a session on Millets at the 51st State Level Student Scientist Science Exhibition on 12 February 2024.

Workshop on the Use of Drones for Nutrient Management

A workshop on the use of drones for nutrient management in paddy in coastal regions was organized by ICAR-CCARI at the paddy research field on 18 September 2024. Dr. Raghavendra Bhatta, Hon'ble DDG (Animal Science), ICAR, New Delhi, Dr. V. K. Gupta, Director, NRC on Pig, Guwahati, Dr. N. H. Mohan, Scientist I/c AICRP Pig, with other delegates graced the occasion. Also, seven Junior Scale Officers of Goa Civil Service of the rank of Deputy Collector/Deputy Director attended this workshop. Dr. Parveen Kumar, Director, ICAR CCARI briefed the delegates and participants about the passionate efforts of the Institute and KVK for popularising the use of drones in the coastal farmer's field as a part of 'Viksit Bharat', a dream program of Hon'ble Prime Minister Shri Narendra Modi ji. All delegates appreciated the developments being undertaken by ICAR-CCARI in this sector.

Demonstration of the drone based nutrient spraying at Institute

Distinguished Visitors

Hon'ble Prime Minister, Shri Narendra Modi ji visited the ICAR-CCARI Goa exhibition on 6 February, 2024

Dr. Pramod Sawant, Hon. Chief Minister of Goa visited the ICAR-CCARI Goa exhibition on 6 February, 2024

Dr. D.C. Verma, Hon'ble MLA, Meerganj (Bareilly), Govt. of UP visited ICAR CCARI on 17 September, 2024

Dr. K. S. Risam, ICAR GB member and Ex-VC SKUAST-Jammu visited ICAR-CCARI, Goa on 03 September 2024

Dr. Gurbachan Singh Former Chairman, ASRB, New Delhi visitied ICAR – CCARI, Goa on 01 April 2024

Dr. Raghavendra Bhatta, Hon'ble Deputy Director General (Animal Science) and Dr GK Gaur, Asst. Director General (Animal Production and Breeding), ICAR, New Delhi

Dr. Raghavendra Bhatta, Hon'ble Deputy Director General (Animal Science), Dr. G.K. Gaur, Asst. Director General (Animal Production and Breeding) and the delegates of Annual Review Meeting of AICRP on Pig visited livestock and allied units of ICAR-Central Coastal Agricultural Research Institute on 20 September 2024.

Dr. A. Velmurugan, ADG (Soil and Water Management), NRM Division, ICAR New Delhi

Dr. A. Velmurugan, ADG (Soil and Water Management), NRM Division, ICAR New Delhi visited ICAR-CCARI, Goa and ICAR-KVK, North Goa on 04 March 2024. He interacted with all the staff and appreciated contribution of the Institute to coastal agriculture in last one year.

Dr. Grinson George, Director, ICAR-CMFRI and Member Research Advisory Committee

Dr. Grinson George, Director ICAR-CMFRI, Kochi and Member of the Research Advisory Committee (RAC) visited different farms, units and facilities at ICAR-CCARI, Goa on 30 December 2024 and had an active interaction with the scientists of the institute.

Delegation from Michigan State University, USA to ICAR-CCARI, Goa

A team of delegates from Michigan State University (MSU) visited ICAR-CCARI, Goa as a part of United States Department of Agriculture-Scientific Exchange Program Fellowship (USDA-SEP) on 14 May 2024. The team of delegates included Dr. Yadu Pokhrel (Mentor), Associate Professor, Civil and Environmental Engineering, College of Engineering, MSU, Dr. Jiaguo Qi, Professor, Department of Geography, Environment and Spatial Sciences, College of Social Sciences, MSU and Dr. Steven G. Pueppke, Adjunct Professor, Department of Plant, Soil and Microbial Sciences, College of Social Sciences, MSU.

Dr. Sujay Rakshit, Director, ICAR-Indian Institute of Agricultural Biotechnology, Ranchi

Dr. Sujay Rakshit, Director, ICAR-Indian Institute of Agricultural Biotechnology, Ranchi, visited ICAR-CCARI on December 26, 2024.

Padma Shri Manoj Joshi, Veteran Actor

Padma Shri awardee and veteran actor Mr. Manoj Joshi visited the ICAR-Central Coastal Agricultural Research Institute (CCARI), Goa on 12-09-2024, where he spent half day interacting with staff and exploring various aspects of coastal agriculture.

Prof. Arthur Riedacker, Co-Nobel Peace Prize Laureate (2007)

ICAR-CCARI hosted an Interaction Meeting with Prof. Arthur Riedacker, an eminent climate expert, Honorary Research Director at INRA, France, and co-recipient of the 2007 Nobel Peace Prize on behalf of the IPCC O. The meeting brought together scientists and staff of the Institute to discuss climate change effects on the coastal region of India and adaptation strategies.

Visit of delegates from College of Engineering, Michigan State University on 14-05-2024

Date	Name of Visitor	Designation/ Institute/ Place
08-01-2024 27-05-2024	Prof. (Dr.) M. B. Chetti	Vice Chancellor of Sanskriti University, Mathura, Uttar Pradesh
08-01-2024 27-05-2024	Dr. M. R. Dinesh	Former Director, ICAR-IIHR, Bengaluru
08-01-2024 27-05-2024	Dr. K. K. Singh	Dean, Sankskriti University, Mathura
08-01-2024 27-05-2024	Dr. P. Pravin	Former ADG (Marine Fisheries), ICAR, New Delhi
08-01-2024 27-05-2024	Dr. Ashalatha K.V.	Professor & Head Department of Agricultural Statistics, UAS, Dharwad, Karnataka
01-04-2024	Dr Gurbachan Singh	Former Chairman, ASRB, New Delhi
01-04-2024	Shri Govindaraju N.S., IAS	Controller, Human Space Flight Center, Bengaluru
01-04-2024	Prof. M.K. Janarthanam	Chairperson, Goa State Research Foundation, Goa
01-04-2024	Dr N. P. Singh	Former Director, ICAR-NIASM, Baramati
15-04-2024	Dr. A. Velmurugan	ADG (SWM), ICAR, New Delhi
15-04-2024	Dr. S. D. Sawant	Former Vice-Chancellor, Dr. BSKKV, Dapoli, Maharashtra
15-04-2024	Dr. Manoj P. Samuel	Executive Director, Centre for Water Resources Development and Management, Kerala,
15-04-2024	Dr. Raj Kumar Gautam	Principal Scientist & Head, ICAR-NBPGR, New Delhi
15-04-2024	Dr. V. Sejian	Dean, Rajiv Gandhi Institute of Veterinary Education & Research, Puducherry
15-04-2024	Dr. Sengottaiyan Vennila	Ex-Principal Scientist, ICAR- NCIPM, New Delhi
01-05-2024	Shri Subhash Chandra, IAS	Secretary (Social Welfare), Govt. of Goa
14-05-2024	Dr. Yadu Pokhrel	Associate Professor, Civil and Environmental Engineering, College of Engineering, MSU
14-05-2024	Dr. Jiaguo Qi	Professor, Civil and Environmental Engineering, College of Engineering, MSU
14-05-2024	Dr. Steven G. Pueppke	Adjunct Professor, Civil and Environmental Engineering, College of Engineering, MSU
05-06-2024	Smt. Tejaswini P. IFS	Deputy Conservator of Forests, Research and Utilization Division, Margao Goa
07-06-2024	Dr. Pradip V. Sarmokadam	Member Secretary, GSBB, Goa
21-06-2024	Ms. Reetu Chauhan	Sr. Yoga and Meditation coach
06-08-2024	Dr. Sanjay Arora	Principal Scientist (Soil Chemistry / Fertility / Microbiology), ICAR-CSSRI, RRS, Lucknow
03-09-2024	Dr. K. S. Risam	ICAR GB member and Ex-VC SKUAST-Jammu
20-09-2024	Dr. Raghavendra Bhatta	Hon'ble DDG (Animal Science), ICAR, New Delhi
20-09-2024	Dr. G. K. Gaur	ADG (Animal Production and Breeding), ICAR, New Delhi
07-12-2024	Dr. S. K. Roy	Director, ICAR – ATARI, Zone VIII, Pune
26-12-2024	Dr. Sujay Rakshit	Director, ICAR-IIAB, Ranchi

Committees and Meetings

Quinquennial Review Team (QRT)

The Quinquennial Review Team (QRT) for ICAR- Central Coastal Agricultural Research Institute was constituted to review the work done for the period from 01/01/2018 to 31/12/2022. The composition of QRT is given below

Prof (Dr.) M. B. Chetti Former Vice Chancellor, UAS, Dharwad & Vice Chancellor, Sanskriti University, Mathura	Chairman
Dr. Kanchan Kumar Singh Former ADG (Farm Engg), ICAR, New Delhi & Dean, Sanskriti University, Mathura.	Member
Dr. Dr. P. Pravin Former ADG (Marine Fisheries), ICAR, New Delhi	Member
Dr. M. R. Dinesh Former Director, ICAR-IIHR, Bengaluru	Member
Dr. Ashalatha K.V. Professor & Head Department of Agricultural Statistics College of Agriculture, UAS Dharwad	Member
Dr. Gopal R. Mahajan, Senior Scientist (Soil Science), ICAR- CCARI, Goa	Member Secretary

The first meeting of the 5th Quinquennial Review Team (QRT) of ICAR-CCARI, Goa, was held during 8-9 January 2024. The meeting was chaired by Dr. M. B. Chetti, Vice Chancellor, Sanskriti University, Mathura, Uttar Pradesh and attended by the QRT members, Dr. M. R. Dinesh, Former Director, ICAR-IIHR, Bengaluru, Dr. K. K. Singh, Dean, Sankskriti University, Mathura, Dr. P. Pravin, Former ADG (Marine Fisheries), ICAR, Dr. Ashalatha K.V., Professor & Head Department of Agricultural Statistics, CoA, UAS, Dharwad, Karnataka. Dr. A. R. Desai, Retired Pr. Scientist (Horticulture), ICAR-CCARI was the special invitee for the meeting. Dr. Parveen Kumar, Director, ICAR-CCARI, Goa and Dr. Gopal Mahajan, Member Secretary, QRT and the team of ICAR-CCARI staff organized the meeting as per the guidance of Hon'ble QRT.

The QRT reviewed the activities presented and suggested documentation of the achievements through publications and videos, copyrighting and patenting of products & processes, linking biodiversity to livelihood, enhancing collaborations and networking with other organizations and SAUs, impact assessment of technologies and extensions, etc. The review of Institute will be continued in subsequent meetings of QRT and the recommendations for next five years will be compiled in a form of report.

The second meeting of 5th QRT (2018-23) was held on 27-28 May 2024 at ICAR-CCARI, Goa which also featured the coastal stakeholders meet. The meeting started with a brief presentation on the salient research achievements of Institute followed by an Action Taken Report on the comments of previous meeting. During the meeting, different laboratories of the Institute were visited by the QRT, wherein the brief achievements were showcased. Chairman and Members of QRT visited the outreach activity sites in Saturlim and Zintawdi Goa. During the concluding session, the QRT drafted recommendations on future research areas and strengthening the Institute to achieve its research and development endeavours.

Research Advisory Committee

The X Research Advisory Committee (RAC) for ICAR- Central Coastal Agricultural Research Institute was constituted for a period of three years from 14/11/2023 to 13/11/2026. The composition of RAC is given below.

Dr. S.D. Sawant, Ex-Vice Chancellor, Dr. DBSKKV, Dapoli, Maharashtra	Chairman
Dr. P. Manoj Samuel, Executive Director, Centre for Water Resources Development and Management (CWRDM), Kozhikode, Kerala	Member
Dr. Raj Kumar Gautam, Head. Division of Germplasm Evaluation, ICAR-NBPGR, New Delhi	Member
Dr. V. Sejjan, Dean, Rajiv Gandhi Institute of Veterinary, Education and Research, Puducherry	Member
Dr. Grinson George, Principal Scientist and Head, Division of Marine Biodiversity and Environment Management, ICARCMFRI, Kochi, Kerala	Member
Dr. Sengottaiyan Vennila, Ex-Principal Scientist, ICAR-National Centre for Integrated Pest Management (NCIPM), Mehrauli, New Delhi	Member
Dr. A. Velumurugan, ADG (S&WM), ICAR, New Delhi	Member
Dr. Parveen Kumar, Director, ICAR-CCARI, Goa	Member
Dr. Shrish D. Narnaware, Senior Scientist (Veterinary Pathology), ICAR-CCARI, Goa.	Member Secretary

The first meeting of X RAC was held during 15-16 April 2024, in hybrid mode. The meeting was chaired by The meeting was chaired by Dr. S. D. Sawant, Former Vice-Chancellor, Dr. BSKKV, Dapoli, Maharashtra and attended by the RAC members Dr. Manoj P. Samuel, Executive Director, Centre for Water Resources Development and Management, Kerala, Dr. Raj Kumar Gautam, Principal Scientist & Head, ICAR-NBPGR, New Delhi, Dr. V. Sejian Dean, Rajiv Gandhi Institute of Veterinary Education & Research, Puducherry, Dr. Grinson George Principal Scientist and Head, ICAR-CMFRI, Kerala, Dr. Sengottaiyan Vennila (Ex-Principal Scientist, ICAR- NCIPM, New Delhi), Dr. Venkatesh Ganesh Prabhu Desai, Progressive farmer, Goa, Dr. A. Velmurugan ADG (SWM), NRM Division, ICAR, New Delhi, Dr. Parveen Kumar Director, ICAR-CCARI, Goa and Member Secretary Dr. Shirish D. Narnaware Senior Scientist, ICAR-CCARI, Goa. along with Scientists of the Institute and Programme Co-ordinator and Subject Matter Specialists, KVK, North Goa.

At the outset Dr. Parveen Kumar, Director of the Institute welcomed the dignitaries and outlined the ICAR-CCARI's major achievements during the last year. The Member Secretary, RAC presented the action taken report on the recommendations of the third meeting of IX RAC which was followed by the presentation of the research achievements along with detailed action taken report by Section In-Charges. The Committee chairman and members appreciated the work done and have given their valuable feedbacks about the on-going projects and provided suggestions to have visible impacts.

The approved RAC recommendations are as follows:

1. Initiate work on artificial intelligence (AI)/ machine learning (ML)/ sensor-based irrigation scheduling for nutrient management in important crops of the coastal region.
2. Prepare climate action plans for various agro-ecological-climatic regions (inclusive of GHG assessment, carbon neutral/offsetting strategies and integrated management plans for wetlands and estuaries) with focus on agro-eco-tourism and coastal agriculture.
3. Prepare a comprehensive guide and rating system for agro-eco-tourism and eco-system services in coastal areas.
4. Efforts should be made to screen/upgrade salt tolerant rice varieties for other traits like bacterial blight and blast resistance and grain quality parameters through marker assisted breeding and speed breeding in collaboration with other Institutes.
5. Production technology of Mud crabs and Mussels should be perfected and popularized in areas where brackish water is available besides small scale seed production and dissemination.

Institute Research Council Meeting

The 35th Annual Institute Research Council meeting of the Institute was held during 6-8 August 2024. The meeting was chaired by Dr. Parveen Kumar, Director of the Institute along with Dr. Sanjay Arora, Principal Scientist (Soil Chemistry/Fertility/Microbiology), ICAR-CSSRI, RRS, Lucknow who was invited as an external expert to review the projects in Natural Resource Management, Horticultural Science and Crop Science Section. Director welcomed the external expert and invitee and all the scientists. he emphasized the importance of aligning research with QRT, RAC recommendations, and stakeholder needs. He provided an overview of the previous IRC meeting, highlighting the Institute's achievements and urged scientists to focus on commercializing promising technologies. In his remarks, external expert Dr. Sanjay Arora expressed his sincere appreciation to the Director for the opportunity to participate in IRC. He highlighted the critical need for commercialization of developed technologies and the protection of intellectual property rights.

The scientists made their deliberations on the actions taken on recommendations of last IRC meeting and research activities carried out during last one year. The chairman reviewed all the projects thoroughly and made critical comments for the further improvement of projects.

The IRC reviewed the progress made under various research projects for the year 2023-24 and finalized the technical programmes of the ongoing research projects for the year 202-25. The details of IRC are as follows:

Dr. Parveen Kumar	Director, ICAR - CCARI, Old Goa	Chairman
All Project Leaders	ICAR - CCARI, Old Goa	Members
Dr. Uthappa A.R.	Scientist (Agro-forestry), ICAR – CCARI, Old Goa	Member Secretary

Institute Management Committee

The Institute Management Committee is constituted for financial and administrative guidance of Institute by the council for a period of three years from 03/06/2024 to 02/06/2027. Following is the composition of the IMC

Dr. Parveen Kumar	Director, ICAR –CCARI, GOA	Chairman
Shri Sandeep Foldessai	Director , Directorate of Agriculture, Govt. of Goa, Panaji, Goa	Member
Dr. Kailas Mote	Mission Director Maharashtra State Horticulture and Medicinal Plant Board, Sakhar Sankul, Shivaji Nagar,Pune	Member
Dr. Sanjay G. Bhave	Vice- Chancellor Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth Dapoli, Ratnagiri	Member
Dr. Venkatesh Ganesh Prabhu Desai	G-7, Gulmohar, Vasant Nagar, Math Road, Gogol, Post Fatorda, Margao	Member
Shri A. Shiva Kumar	Om Shanthi, H.No.2-45, Near Sri Vitoba Bhajana Mandir Ambalapady, Udupi	Member
Dr. Dinesh Kumar	Principal Scientist ICAR-Indian Institute of Wheat & Barley Research Karnal	Member
Dr. N.R. Kumar	Principal Scientist (Agri. Economics), ICAR-National Institute of Agricultural Economics & Policy Research, Dev Prakash Shatri Marg., Pusa	Member
Dr. Mathala Juliet Gupta	Principal Scientist (AS&PE), ICAR-CCARI, Goa	Member
Dr. G. Ravindra Chary	Principal Scientist ICAR-Central Research Institute for Dryland Agriculture, Santoshnagar, Saidabad, Hyderabad	Member
Dr. A. Velmurugan	Assistant Director General (S&WM) NRM Division ICAR, New Delhi.	Member
Shri Amitabh Singh	Chief Finance & Accounts Officer ICAR-Central Soil Salinity Research Institute, Karnal	Member
Shri Ankur B. Macwana	Administrative Officer, ICAR –CCARI, Goa.	Member Secretary

संस्थान के राजभाषा प्रकोष्ठ की गतिविधियां

'ग' क्षेत्र में स्थित हमारे संस्थान की राजभाषा गतिविधियां सराहनीय हैं। संस्थान ने 14 से 30 सितंबर के दौरान उत्साहपूर्वक हिंदी पखवाड़ा मनाया। इस वर्ष कुल 4 बैठके एवं 4 कार्यशालाओं का आयोजन किया गया।

हिंदी पखवाड़ा -2024

हिंदी पखवाड़ा उद्घाटन समारोह

संस्थान में हिंदी पखवाड़े का उद्घाटन 13 सितंबर 2024 को संपन्न हुआ। संस्थान के माननीय निदेशक महोदय डॉ प्रवीण कुमार एवं डॉ मतला गुप्ता, राजभाषा अधिकारी द्वारा कार्यक्रम का उद्घाटन दीप प्रज्वलन से किया गया। सभा को संबोधित करते हुए निदेशक महोदय ने हिंदी पखवाड़ा एवं हिंदी के महत्व पर प्रकाश डालते हुए कहा की आज हिंदी हर क्षेत्र में अपना प्रभाव बढ़ाती जा रही है। अत: जितना अधिक से अधिक सरकारी कामकाज जनता की भाषा में होगा, उसकी उपयोगिता और सार्थकता भी उतनी ही अधिक होगी और हमें राजभाषा हिंदी को सरकारी कामकाज में निरंतर बढ़ावा देना है। तथा संस्थान के सभी कर्मचारियों को पखवाड़े में होने वाली गतिविधियों में बड़-चढ़ कर भाग लेने के लिए प्रोत्साहित किया। इस संस्थान की राजभाषा अधिकारी डॉ॰ मतला जूलियट गुप्ता ने सभा में उपस्थित सभी को हिंदी पखवाड़े के कार्यक्रम का विवरण देते हुए आयोजित की जाने वाले विविध प्रतियोगिताओं के बारे में अवगत कराया। उन्होंने सबको प्रतियोगिताओं में उत्साह से भाग लेने के लिए आग्रह किया।

पखवाड़े में आयोजित विभिन्न कार्यक्रम निम्न प्रकार से हैं:

क्रंसं.	प्रतियोगिता/कार्यक्रम	दिनांक
1	हिंदी पखवाड़ें का उद्घाटन समारोह सुलेख प्रतियोगिता -सभी कर्मचारियों तथा संविदा कर्मचारियों के लिए।	13.09.2024
2	हिंदी अनुवाद प्रतियोगिता - सभी कर्मचरियों तथा संविदा कर्मचारियों के लिए	17.09.2024
3	हिंदी अंताक्षरी प्रतियोगिता (प्रथम चरण) - सभी कर्मचरियों तथा संविदा कर्मचारियों के लिए	18.09.2024
4	कंप्यूटर पर युनिकोड में टंकण –सभी कर्मचरियों तथा संविदा कर्मचारियों के लिए	19.09.2024
5	कर्मचारियों के बच्चों के लिए प्रतियोगिताए: 1. प्रतिभा दर्शन 2. चित्रकला	23.09.2024

6	उत्तर गोवा नगर राजभाषा कार्यान्वयन समिति के सदस्यों एवं भाकृअनुप के सभी कर्मचरियों तथा संविदा कर्मचारियों के लिए कार्यशाला एवं अशुभषण प्रतियोगिता का आयोजन	25.09.2024
7	हिंदी अंताक्षरी का अंतिम चरण	27.09.2024
8	काव्यपाठ प्रतियोगिता - सभी कर्मचरियों तथा संविदा कर्मचारियों के लिएएवं हिंदी पखवाड़ें का समापन समारोह एवं पुरस्कार वितरण	30.09.2024

तदुपरांत संस्थान के कर्मचारियों के लिए हिंदी सुलेख प्रतियोगिता का आयोजन किया गया। संस्थान के सभी वर्ग के कर्मचारियों ने इस प्रतियोगिता में उत्साहपूर्वक भाग लिया।श्री राहुल कुलकर्णी, सहायक मुख्य तकनीकी अधिकारी (मृदा विज्ञान) एवं सह राजभाषा अधिकारी ने कार्यक्रम का संचालन एवं आभार प्रस्ताव प्रस्तुत किया।

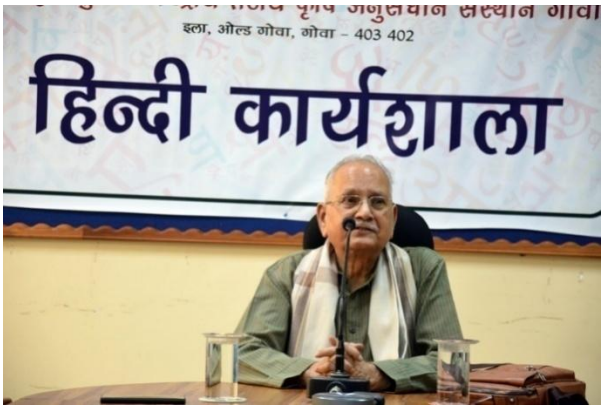
हिंदी पखवाड़े का समापन समारोह

भा॰कृ॰अनु॰प॰ – केंद्रीय तटीय कृषि अनुसंधान संस्थान, गोवा में 13 सितंबर से 30 सितंबर 2024 के दौरान हिंदी पखवाड़े का आयोजन उत्साहपूर्वक किया गया। इसके दौरान विभिन्न प्रतियोगिताओं का आयोजन किया गया जैसे सुलेख प्रतियोगिता, कम्प्यूटर पर यूनिकोड में टंकण, हिंदी अनुवाद प्रतियोगिता, अंताक्षरी प्रतियोगिता और हिंदी काव्य पाठ प्रतियोगिता। इसके अतिरिक्त बच्चों के लिए भी विभिन्न प्रतियोगिताओं का आयोजन किया गया था। सभी वर्ग के कर्मचारियों ने इन प्रतिस्पर्धाओं में उत्साहपूर्वक भाग लिया। पखवाड़े के समापन समारोह में डॉ एच के गुप्ता और श्री राजेश तिवारी जी सम्माननीय अतिथि एवं काव्य पाठ प्रतियोगिता के लिए निर्णायक के रूप में मंच पर उपस्थित रहे। कार्यक्रम की शुरुआत काव्य पाठ प्रतियोगिता से की गई तत्पश्चात मान्यवरों के हाथो दीप प्रज्वलन किया गया। संस्थान के माननीय निदेशक डॉ॰ प्रवीण कुमार ने अतिथियों का पुष्पगुच्छ एवं मानचिन्ह देकर स्वागत किया। संस्थान की राजभाषा अधिकारी श्रीमती मतला गुप्ता ने हिन्दी पखवाड़े के दौरान आयोजित विभिन्न प्रतियोगिताओं एवं कार्यक्रमों का संक्षिप्त में विवरण प्रस्तुत किया। प्रतियोगिताओं के विजेताओं को मान्यवरों के हाथो पुरस्कृत किया गया। निदेशक महोदय ने राजभाषा प्रकोष्ठ को बधाई देते हुए सभी को राजभाषा का कार्यान्वयन में वर्षभर सतत बढ़ोत्तरी करने के लिए प्रोत्साहित किया। सम्माननीय अथिति –श्री राजेश तिवारी जी ने कार्यालय में हिंदी का अधिकतम उपयोग करने हेतु नोटिंग, ड्राफ्टिंग, आवेदन पत्र इत्यादि हिंदी में करने के लिए जागरुक्त और प्रेरित किया ताकि हिंदी भाषा का कार्यालय में अधिक से अधिक उपयोग हो सके।

सहराजभाषा अधिकारी-, श्री राहुल कुमार, विषय वस्तु विशेषज्ञ, ने आभार ज्ञापन प्रस्तुत किया। राष्ट्रगीत के साथ कार्यक्रम का समापान हुआ।

भाकृअनुप - केंद्रीय तटीय कृषि अनुसंधान संस्थान,गोवा में राजभाषा कार्यशाला

कार्यशाला I "राजभाषा की दशा एवं दिशा"



भाकृअनुप - केंद्रीय तटीय कृषि अनुसंधान संस्थान गोवा के प्रशासनिक कार्यों में राजभाषा के उपयोग को बढ़ावा देने के लिए एवं कर्मचारियों को राजभाषा के प्रति संवेदनशील बनाने हेतु संस्थान में दिनांक 05.03.2024 को बैठक कक्ष में कार्यशाला का आयोजन किया गया। इस कार्यशाला में मुख्य वक्ता के रूप में डॉ शिवनंदन लाल उपस्थित थे, उन्होने "राजभाषा की दशा और दिशा" विषय पर सभी को मार्गदर्शन प्रदान किया।

उन्होंने हिंदी भाषा को राजभाषा बनने तक के संघर्ष के बारे में बताया एवं हिंदी को राजभाषा से राष्ट्रभाषा बनाने के लिए आवश्यक कार्य एवं लाभों के बारे में प्रकाश डाला। हिंदी भारत संघ की राजभाषा होने के साथ ही ग्यारह राज्यों और तीन संघ शासित क्षेत्रों की प्रमुख भाषा है। संविधान की आठवी अनुसूचि में शामिल अन्य इक्कीस भाषाओं के साथ हिंदी का एक विशेष स्थान है।

महात्मा गांधी ने वर्ष 1917 में गुजरात के भरूच में हुए गुजरात शैक्षिक सम्मेलन में हिंदी भाषा को राष्ट्रभाषा बनाए जाने की वकालत की थी दृ "भारतीय भाषाओं में केवल हिंदी ही एक ऐसी भाषा है जिसे राष्ट्रभाषा के रूप में अपनाया जा सकता है क्योंकि यह अधिकांश भारतीयों द्वारा बोली जाती है। यह समस्त भारत में आर्थिक धार्मिक और राजनीतिक सम्पर्क माध्यम के रूप में प्रयोग के लिए सक्षम है तथा इसे सारे देश को सीखना आवश्यक है"।

इस कार्यशाला में संस्थान के 40 अधिकारियों एवं कर्मचारियों ने भाग लिया।

कार्यशाला II "कार्यालय में हिंदी का प्रयोग एवं हिंदी वर्तनी, उच्चारण और सामान्य व्याकरण"

भाकृअनुप - केंद्रीय तटीय कृषि अनुसंधान संस्थान गोवा के प्रशासनिक कार्यों में राजभाषा के उपयोग को बढ़ावा देने एवं कर्मचारियों को राजभाषा के प्रति संवेदनशील बनाने के लिए दिनांक 17.05.2024 अपरान्ह 4.00 बजे संस्थान के बैठक कक्ष में "कार्यालय में हिंदी का प्रयोग एवं हिंदी वर्तनी, उच्चारण और सामान्य व्याकरण" विषय पर कार्यशाला का आयोजन किया गया। इस कार्यशाला के मुख्य वक्ता श्री आदित्य भांगी, सहायक प्राध्यापक, गोवा विश्वविद्यालय, तालिगाँव, गोवा थे।

श्री आदित्य भांगीजी ने मानक हिंदी वर्तनी एवं राजभाषा के लिखित रूप में प्रयोग हेतु ध्वनि, शब्द, रूप, वाक्य आदि का राष्ट्रीय स्तर पर एकरूपता लाने के प्रयासों पर प्रकाश डाला। उन्होंने कहा कि मानक हिंदी की ध्वनियों को दो वर्गों (स्वर एवं व्यंजन) में बाँटा गया है और हिंदी व्यंजन को स्वर के साथ ही लिखा व बोला जाता है। इसके अतिरिक्त उन्होंने कहा कि भारतीय संख्या सूचक चिन्हों का सामान्य अंतर्राष्ट्रीय रूप में प्रयोग करना चाहिए। उन्होने हिंदी भाषा का प्रयोग करते समय होने वाली गलतियों के बारे में विस्तार से बताया जैसे की शब्दों में बिंदी का उपयोग, एक वचन और बहुवचन का उपयोग, वाक्यों की गलतियाँ आदि। कुछ उदाहरण नीचे दिए गए हैं।

सामान्य शब्दों की गलतियाँ		सामान्य उच्चारण की गलतियाँ	
गलत	सही	शब्द	उच्चारण
हिंदी	हिंदी	फल	Phal not fal
केन्द्रीय	केंद्रीय	ज़्यादा	Zyada not jyada

इस कार्यशाला में संस्थान के 20 अधिकारियों एवं कर्मचारियों ने भाग लिया। उप राजभाषा अधिकारी श्रीमति श्रेया बर्वे निजी सहायक ने सभी को आभार एवं धन्यवाद प्रकट किया।

कार्यशाला III "कार्यालय में हिंदी का प्रयोग एवं हिंदी वर्तनी, उच्चारण और सामान्य व्याकरण"

भाकृअनुप - केंद्रीय तटीय कृषि अनुसंधान संस्थान गोवा में हिन्दी पखवाड़े के दौरान दिनांक 25.09.2024 को नगर राजभाषा कार्यान्वयन समिति संस्थानो के लिए हिंदी कार्यशाला का आयोजन किया गया। "कार्यालय में हिंदी का प्रयोग एवं हिंदी वर्तनी, उच्चारण और सामान्य व्याकरण" विषय पर कार्यशाला का आयोजन किया गया। इस कार्यशाला के मुख्य वक्ता श्री आदित्य भांगी, सहायक प्राध्यापक, गोवा विश्वविद्यालय, तालिगाँव, गोवा थे। श्री आदित्य भांगीजी ने मानक हिंदी वर्तनी एवं राजभाषा का लिखित रूप में प्रयोग हेतु ध्वनि, शब्द, रूप, वाक्य आदि का राष्ट्रीय स्तर पर एकरूपता लाने के प्रयासों पर प्रकाश डाला। उन्होने हिंदी भाषा का प्रयोग करते समय होने वाली सामान्य गलतियों और उनके निवारण के उपाय भी बताए। इस कार्यशाला में संस्थान के 20 अधिकारियों एवं कर्मचारियों ने भाग लिया। उप राजभाषा अधिकारी श्रीमति श्रेया बर्वे निजी सहायक ने सभी का आभार एवं धन्यवाद प्रकट किया।

कार्यशाला IV "हिंदी राजभाषा का प्रचार एवं प्रसार कैसे किया जा सकता है"

भाकृअनुप – केंद्रीय तटीय कृषि अनुसंधान संस्थान गोवा के प्रशासनिक कार्यों में राजभाषा के उपयोग को सरल करने एवं कार्यालय में राजभाषा को बढ़ावा देने के लिए दिनांक 28.11.2024 को सायं 4.00 बजे बैठक कक्ष में "हिंदी राजभाषा का प्रचार एवं प्रसार कैसे किया जा सकता है " इस विषय पर कार्यशाला का आयोजन किया गया। कार्यशाला में संस्थान के निदेशक डॉ प्रवीण कुमार जी ने सबका मार्गदर्शन किया।

कार्यशाला में निदेशक महोदय ने कहा की सरकार के विभिन्न कार्यालयों एवं विभागों आदि मे सरकार की राजभाषा नीति का अनुपालन तथा सरकारी कार्यों में हिंदी के प्रयोग को बढ़ावा देने के लिए हिंदी पखवाड़ा, कार्यशाला, हिंदी फिल्म आदि कार्यक्रमों का आयोजन करें ताकि हिंदी भाषा के प्रति लोगों की रुचि बढ़े। सोशल मीडिया, वेबसाइट्स, और अन्य ऑनलाइन प्लेटफ़ॉर्म्स पर हिंदी में सामग्री प्रस्तुत करे ताकि भाषा का प्रचार-प्रसार हो सके। विभागों द्वारा अपनी वेबसाइट द्विभाषी बनाए ताकि सभी लोग उसका लाभ उठा सखें। इस कार्यशाला में संस्थान के 33 तकनीकी एवं प्रशासनिक कर्मचारियों ने भाग लेकर लाभ उठाया।

Mission Swachhta -365

Mission Swachhta - 365 was lunched in the institute to keep the campus and surroundings clean and green throughout the year including the regular Swachh Bharat Abhiyan activities like ' Swachh ta Hi a Sewa', Special Campaign 4.0 and Swachhta Pakhwada. The activities planned in this mission were cleaning the office premises, rooms, laboratories and all other units of the institute free from all obsolete/ unserviceable items and repair of the broken structures proper reuse.

- During the reporting period, a total of 55 Swachhta campaign were conducted. Campaigns included a variety of activities such as pledge-taking, rallies, competitions, cleanliness drives, awareness programmes, preventive health camps, weeding of files, scrap identification and disposal drives, tree plantation drives, landscaping efforts, vermicompost and biomass recycling unit establishment, virtual events, and social media outreach.
- Notably, approximately 7 quintals of old iron and wood materials from existing works, valued at over Rs. 2.5 lakhs, were repurposed and reused in ongoing projects, resulting in cost savings exceeding Rs. 4.0 lakhs.
- Moreover, over 900 kg of old and unusable items were disposed of as scrap, contributing to the overall cleanliness drive. Additionally, these initiatives generated revenue amounting to Rs. 20,000/-. Further, there was a significant reallocation of IT resources, totalling over Rs. 3.5 lakhs, involving computers, printers, and other IT equipment.

Scrap identification for reuse and disposal

Cleaning of drainage channel

Workshop on vermicompost preparation

Vigilance Awareness

In accordance to the Council's Letter No.104-1/2024-Vig.I dated 9 October 2024, the 'Vigilance Awareness Week' was celebrated at ICAR-Central Coastal Agricultural Research Institute from 28 October 2024 to 3 November 2024. This year the theme of Vigilance Awareness Week was "Culture of Integrity for Nation's Prosperity". Accordingly, the following activities were carried out.

Integrity Pledge

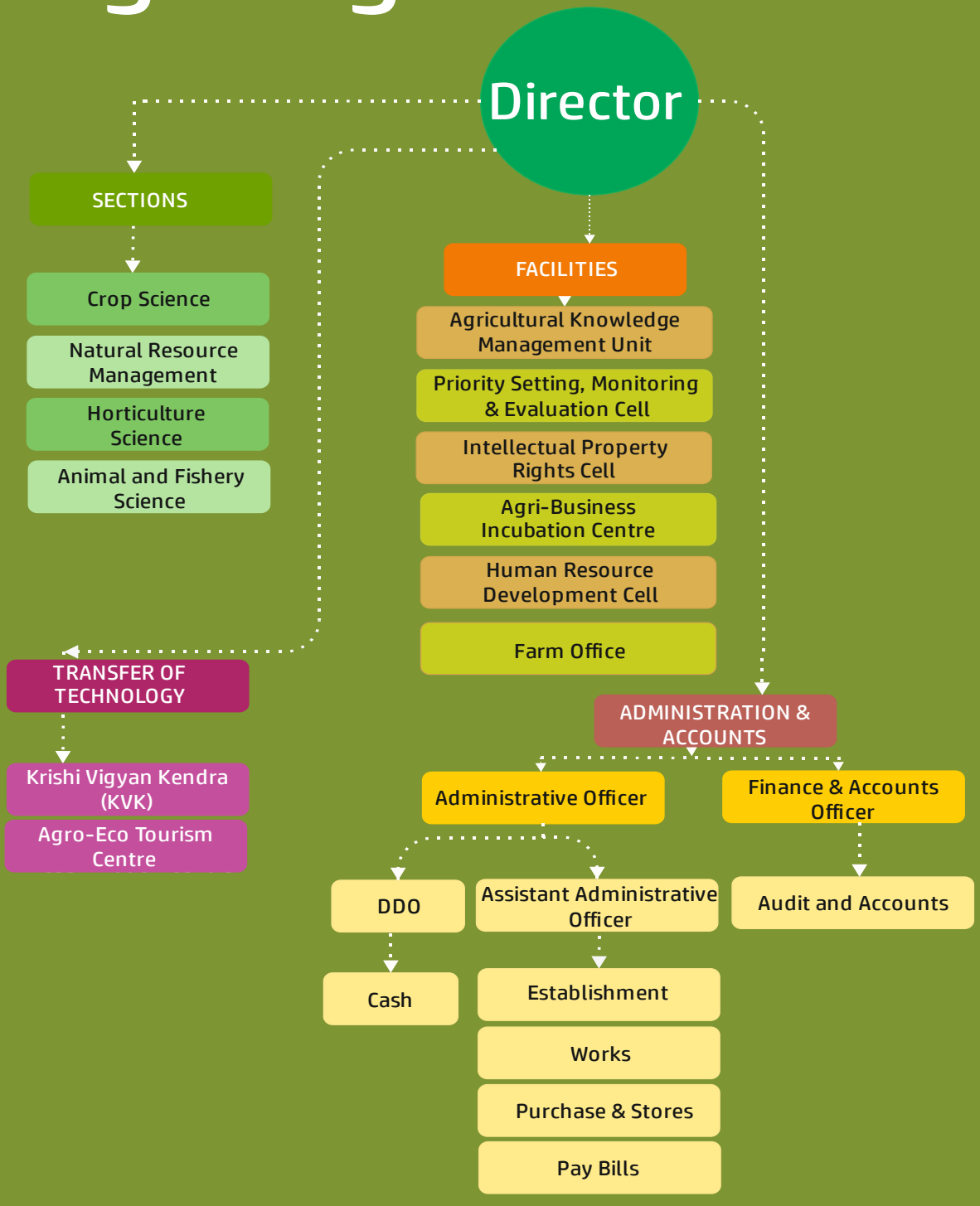
Distribution Pamphlets/Banners

Conduct of Workshop / Sensitization programmes

Internal Complaint Committee

The Institute has an Internal Complaint Committee in place including 4 lady staff of the Institute and one third-party representative from outside. The Internal Complaints Committee has conducted several meetings at the Institute in order to address complaints received from employees. Also committee has organized a workshop as part of the "Sexual harassment of women at workplace Prevention week" at the Institute. The committee conducted a sensitization program for the women employees including contractual and research project staff of the institute on 09 December 2024. A total of 69 women staff attended the program. The external member of the women's complaint committee Mrs. Sendra Fernandez, Dr. Mathala Juliet Gupta, Principal Scientist, ICAR-CCARI, Mrs. Pratibha Sawant, AO, ICAR-CCARI delivered lectures to lady staff on awareness regarding sexual harassment to women at work place, various forms of harassment and methods to address these issues and put up their grievances at the appropriate platform.

Organogram


Director
SECTIONS
Crop Science
Natural Resource Management
Horticulture Science
Animal and Fishery Science
FACILITIES
Agricultural Knowledge Management Unit
Priority Setting, Monitoring & Evaluation Cell
Intellectual Property Rights Cell
Agri-Business Incubation Centre
Human Resource Development Cell
Farm Office
TRANSFER OF TECHNOLOGY
Krishi Vigyan Kendra (KVK)
Agro-Eco Tourism Centre
ADMINISTRATION & ACCOUNTS
Administrative Officer
Finance & Accounts Officer
DDO
Assistant Administrative Officer
Audit and Accounts
Cash
Establishment
Works
Purchase & Stores
Pay Bills

Personnel

Institute

No.	Name	Designation	Additional Charge
Research Management			
1.	Dr. Parveen Kumar	Director	
Scientific Staff			
2.	Dr. Anurag Raizada	Principal Scientist (Agroforestry)	Section I/C (NRM)
3.	Dr. V. Arunachalam	Principal Scientist (Horticulture)	Section I/C (Horticulture Science) till 23-10-2024
4.	Dr. Mathala Juliet Gupta	Principal Scientist (Agricultural Structures and Environmental Management)	AGNI-ABI Raj Bhasha Officer Vigilance Officer
5.	Dr. Manohara K.K.	Senior Scientist (Genetics & Plant Breeding)	Section I/C (Crop Science) Farm Coordinator
6.	Dr. Shirish D. Narnaware	Senior Scientist (Veterinary Pathology)	Section I/C (Animal and Fishery Science) Member Secretary (RAC)
7.	Dr. R. Solomon Rajkumar	Senior Scientist (Livestock Products Technology)	Nodal Officer (Liasoning / RKVY/ ITMU / AKMU / CSR
8.	Dr. Gokuldas P.P.	Senior Scientist (Animal Reproduction & Gynecology)	Nodal Officer (Krishi Portal / ICP Cell)
9.	Dr. Mahajan Gopal Ramdas	Senior Scientist (Soil Science)	Nodal Officer (AKMU / PME) Member Secretary (QRT)
10.	Dr. Shripad Bhat	Senior Scientist (Agricultural Economics)	Coordinator (PME / IPR / PIMS / STC)
11.	Dr. Susitha Rajkumar	Senior Scientist (Veterinary Pathology)	Nodal Officer (Seminars) & Member Secretary (IAEC & IBSC)
12.	Dr. Sreekanth G.B.	Senior Scientist (Fisheries Resource Management)	Nodal Officer (SCSP)
13.	Shri Trivesh S. Mayekar	Scientist (Fish Genetic & Breeding)	I/C Fisheries Unit
14.	Dr. Uthappa A. R.	Scientist (Agroforestry)	Nodal Officer (HRD Education) & Member Secretary, IRC
15.	Dr. Chaudhari Ganesh V.	Scientist (Vegetable Science)	Nodal Officer (ISO)
16.	Dr. Raghunandan K.	Scientist (Genetics & Plant Breeding)	
17.	Dr. Paramesha V.	Scientist (Agronomy)	Library Coordinator, Nodal Officer (STC)

18.	Dr. Bappa Das	Scientist (Agricultural Meteorology)	I/C Agromet Unit
19.	Dr. Sujeet Desai	Scientist (Land and Water Management Engg.)	Nodal Officer (HRD & Estate)
20.	Dr. Nibedita Nayak	Scientist (Poultry Science)	I/C Poultry Unit
21.	Dr. Amiya R Sahu	Scientist (Animal Genetics & Breeding)	Nodal Officer (Mission Swachhata 365)

Technical Staff

1.	Shri Vinod A. Ubarhande	Farm Superintendent	PRO / HRD
2.	Smt. Madina S. Sollapuri	Assistant Chief Technical Officer (Estate)	Estate
3.	Shri Rahul Kulkarni	Assistant Chief Technical Officer (Agronomy)	PRO
4.	Shri Sidharath Marathe	Assistant Chief Technical Officer (PME Cell)	PRO
5.	Smt. Pranjali Wadekar	Senior Technical Officer (AKMU)	Library
6.	Shri Suresh M Gomes	Technical Officer (Tractor Driver)	
7.	Shri Omar Desouza	Senior Technical Assistant	Horticulture Lab
8.	Shri Ashish Pitre	Senior Technical Assistant	Farm Manager
9.	Shri Prakash Parwar	Senior Technician	
10.	Shri Gokuldas Gawas	Senior Technician	
11.	Shri Datta Velip	Senior Technician	
12.	Shri Laxman A Naik	Senior Technician	
13.	Shri Mohd Sadiq M. Mulla	Senior Technician	Electricity
14.	Shri Payak J Padkar	Technician	Agromet
15.	Shri Manish Patel	Technical Trainee	

Administrative & Accounts Staff

1.	Smt. Anupama N.K	Finance & Accounts Officer	
2.	Smt. Lizette Noronha	Private Secretary	I/C Guest House
3.	Smt. Tarika Ussapkar	Private Secretary	
4.	Smt. Pratibha Sawant	AAO	DDO
5.	Smt. Sohini Sawant	AAO	Establishment / Bills
6.	Shri Vishwas Sharma	AAO	Stores & Purchase / Works/ Vehicle
7.	Smt. Bushra Sayed	Personal Assistant	
8.	Smt. Shreya C. Barve	Personal Assistant	
9.	Mr. Vinod Pagi	Assistant	
10.	Shri Deepak Kumar	Assistant	
11.	Shri Aatil Aman	Assistant	
12.	Smt. Chitra S. Kankonkar	UDC	
13.	Shri Vyas Hiren Kumar	UDC	
14.	Smt. Sujata Kamble	LDC	

15.	Smt. Swati R. Kahandeparkar	LDC
16.	Smt. Kushmala S. Andrade	LDC
17.	Smt. Sarita Shelko	LDC

Skilled Support Staff

1.	Shri Ashok Gadekar	8.	Shri Prabhakar B Goankar
2.	Smt. Maria Suxilla Dias	9.	Shri Sitaram G Kuncolikar
3.	Smt. Prafulla Khandeparkar	10.	Smt. Janika S Shirodkar
4.	Smt. Lalita Naik	11.	Shri Shanu G Velip
5.	Smt. Pratibha Folkar	12.	Shri Nitin Naik
6.	Shri Ravi S Kadam	13.	Shri Prallad Zambaulikar
7.	Shri Vilas P Gaonkar	14.	Shri Jayesh Umesh Marshelkar

Krishi Vigyan Kendra, North Goa

No.	Name	Designation
1.	Dr. N. Bommayasamy	Senior Scientist-cum-Head KVK
1.	Dr. Udharwar Sanjay Kumar	Subject Matter Specialist (Animal Science)
2.	Shri Rahul Kumar	Subject Matter Specialist, (Agronomy)
3.	Ms. Nivya K.R.	Subject Matter Specialist, (Floriculture & Landscaping)
4.	Shri Rahul Kumar	Subject Matter Specialist, (Agronomy)
5.	Ms. Nivya K.R.	Subject Matter Specialist, (Floriculture & Landscaping)
6.	Shri Shashi Vishwakarma	Senior Technical Officer, T-6 (Lab Tech)
7.	Shri Vishwajeet Prajapati	Technical Officer
8.	Shri Dilkush Velip	Technical Assistant (Driver)

Appointments / Joining

No.	Name	Post	Date of Joining
1.	Shri Manish Patel	Technical Trainee for period of one year from 25/04/2024 to 24/04/2025 Joined as Technician (T-1)	25-04-2024
2.	Shri Rahul Kumar	Subject Matter Specialist (Agronomy), KVK	03-06-2024
3.	Shri Aatil Aman	Assistant	14-08-2024
4.	Shri Deepak Kumar	Assistant	14-08-2024
5.	Ms. Nivya K.R.	Subject Matter Specialist (Floriculture & Landscaping), KVK	18-11-2024

Promotions

Category	Name/Designation of the Officials	Promoted / Granted higher Pay in the Pay band / Level	Date of promotion
Administrative	Smt. Sneha Shashikant Arlekar, AAO	Promoted as Administrative Officer in Level 10	29-04-2024
	Shri Vishwas Sharma, Assistant	Promoted as Assistant Administrative Officer in Level 7	30-04-2024
	Smit. Sujata Kamble, LDC	1st MACPS	25-02-2024
	Shri Nitin J. Naik, SSS	1st MACPS	06-01-2024
	Shri Prallad H. Zambaulikar, SSS	1st MACPS	08-01-2024

Transferred from ICAR-CCARI, Goa to Other Institute

Name & Designation	Transferred to	With effect from
Dr. Maruthadurai R. Senior Scientist (Agricultural Entomology)	Transferred to ICAR-SBI, Coimbatore, Tamil Nadu	03-12-2024

Transferred from Other Institute to ICAR-CCARI, Goa

Name & Designation	Transferred from	With effect from
Dr. Raghunandan K. Scientist (Genetics & Plant Breeding)	ICAR-IARI, New Delhi	02-12-2024

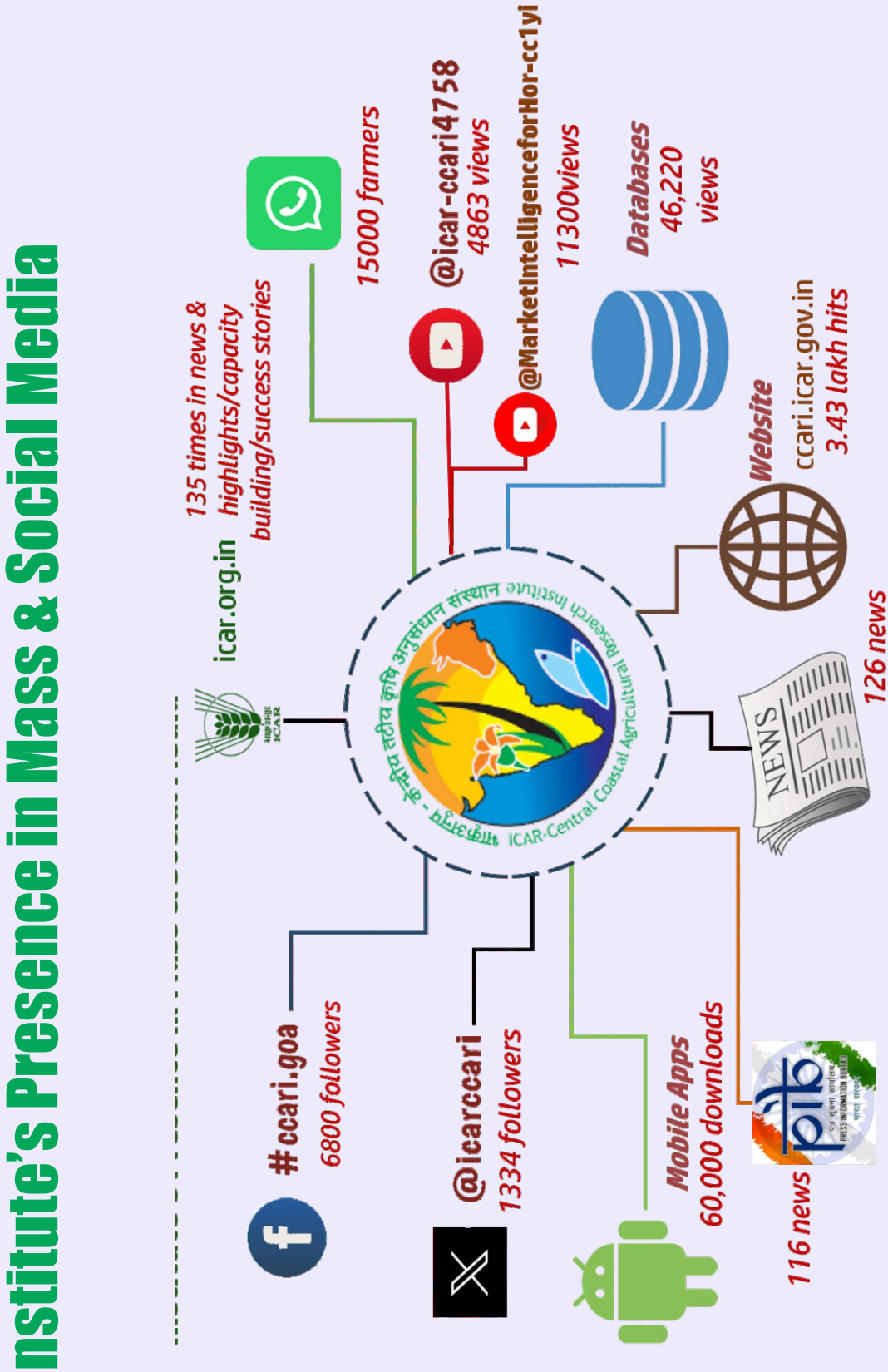
Inter- Institution Transfer

Name & Designation	Institute Name	With effect from
Shri Ashish M. Pitre, Sr. Technical Assistant (T-4)	ICAR-CRIJAF, Barrackpore, West Bengal	01-11-2024
Shri Mohd Sadiq M. Mulla, Senior Technician (T-2)	ICAR-CIFE, Mumbai, Maharashtra	01-11-2024

Selection

Name & Designation	Post	With effect from
Dr. V. Arunachalam Principal Scientist (Horticulture)	Selected for the post of Director at Jawahralal Nehru Tropical Botanical Garden Research Institute, Thiruvanthapuram (Kerala) for a period of a five year (24-10-2024 to 23-10-2029)	24-10-2024

ICAR - CCARI in Media



Annual Accounts

up to 31-03-2025

Details of Institute Govt. Grants Expenditure for the year 2024-25 (Rs. in lakhs)

S. No.	Particulars	RE 2024-25	Expenditure	% of Utilization
I	Grants for Creation of Capital Assets			
1	Works			
a	**Land**	0.00	0.00	0
b	**Building**	0.00	0.00	0
i	Office Building	0.00	0.00	0
ii	Residential Building	0.00	0.00	0
iii	Minor Works	4.50	4.50	100
2	Equipment	11.50	11.50	100
3	Information Technology	2.99	2.99	100
4	Library Books and Journals	0.96	0.96	100
5	Vehicles & Vessels	0.00	0.00	0
6	Livestock	3.05	3.05	100
7	Furniture and Fixture	5.30	5.30	100
8	Others	0.00	0.00	0
	Total - Capital (Grants for Creation of Capital Assets)	28.30	28.30	100
II	Grants in Aid - Salaries			
1	Establishment Expenses			
2	Salaries			
i	Establishment Charges	1319.32	1319.32	100
ii	Wages	0.00	0.00	0
iii	Overtime Allowance	0.00	0.00	0
	Total - Grants in Aid Salaries	1319.32	1319.32	100
III	Grants in Aid - General (Revenue)			
1	Pension & Other Retirement Benefits	210.06	210.06	100
2	Travelling Expenses			
a	Domestic TA/Transfer TA	6.51	6.51	100
b	Foreign TA	0.00	0.00	100
	Total - Travelling Expenses	6.51	6.51	100

3	**Research & Operational Expenses**			
a	Research Expenses	100.96	100.96	100
b	Operational Expenses	200.28	200.28	100
	Total - Research & Operational Expenses	**301.24**	**301.24**	**100**
4	**Administrative Expenses**			
a	Infrastructure	96.08	96.08	100
b	Communication	1.20	1.20	100
c	Repairs & Maintenance			
i	Equipment Vehicle & Others	12.16	12.16	100
ii	Office Building	10.01	10.01	100
iii	Residential Building	9.97	9.97	100
iv	Minor Works	4.70	4.70	100
d	Others (excluding TA)	40.78	40.78	100
	Total - Administrative Expenses	**174.90**	**174.90**	**100**
5	**Miscellaneous Expenses**			
a	HRD	0.98	0.98	100
b	Other Items (fellowship, Scholarship etc.)	0.00	0.00	100
c	Publicity & Exhibitions	0.00	0.00	100
d	Guest House - Maintenance	16.37	16.37	100
e	Other Miscellaneous	0.00	0.00	100
	Total - Miscellaneous Expenses	**17.35**	**17.35**	100
	Total - Grants in Aid General (Excluding Pension)	**500.00**	**500.00**	**100**
	Total Revenue (Grants in Aid Capital + Salaries + Grants in Aid General)	**2057.68**	**2057.68**	100
IV	**Tribal Sub Plan (TSP)**			
a	Grant in Aid Capital	7.00	7.00	100
b	Grants in Aid General	20.00	20.00	100
	Total TSP	**27.00**	**27.00**	**100**
V	**Scheduled Caste Sub Plan (SCSP)**			
a	Grant in Aid Capital	15.75	15.75	100
b	Grants in Aid General	24.00	24.00	100
	Total SCSP	**39.75**	**39.75**	100
	Grand Total	**2124.43**	**2124.43**	**100**

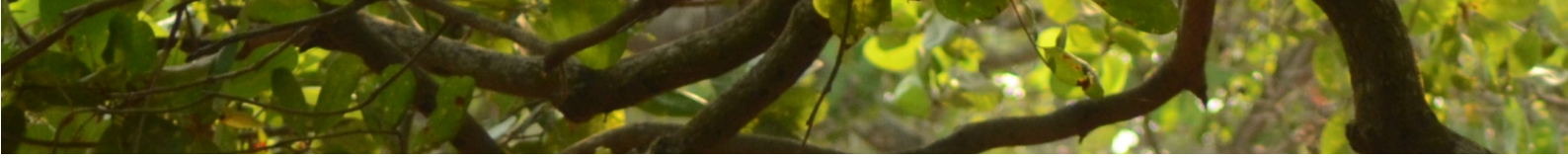
Revenue Receipt

S. No.	Head of Account	Amount (Rs.)
1	Sale of Farm Produce	48,46,589
2	Sale of Fish & Poultry	9,19,426
5	Sale of Publication and advertisement	408
6	License Fee	18,08,258
7	Analytical and testing fee	12,41,543
11	Receipts from services rendered	5,80,770
12	Income generated from Training	18,100
13	Net Profit in Revolving funds	55,264
14	Interest earned on Term Deposits	6,12,663
15	Miscellaneous Receipts	17,28,291
	TOTAL	**1,18,11,312**

Details of Projects Expenditure for the year 2024-25 (Rs. in lakhs)

Projects	Opening Balance as on 01-04-2024	Remittance Received	Expenditure	Amount Lapsed during the year	Refund	Closing Balance
ICAR Schemes Projects	23.39	379.07	348.31	2.64	49.55	1.96
Deposit Schemes (External Funded) Projects	34.42	143.42	114.71	13.45	1.9	47.78

Catch from Sea | ©Annmariya J. 2025



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Indian Council of Agricultural Research
केन्द्रीय तटीय कृषि अनुसंधान संस्थान
Central Coastal Agricultural Research Institute
Ela, Old Goa - 403 402, Goa, India
+91-0832-2993097, director.ccari@icar.org.in, ccari.res.in