Book of Abstracts

National Conference on

One Health Synergy: Integrating Human, Animal, Plant and Aquatic Life for a Sustainable Future

25-27 February 2026

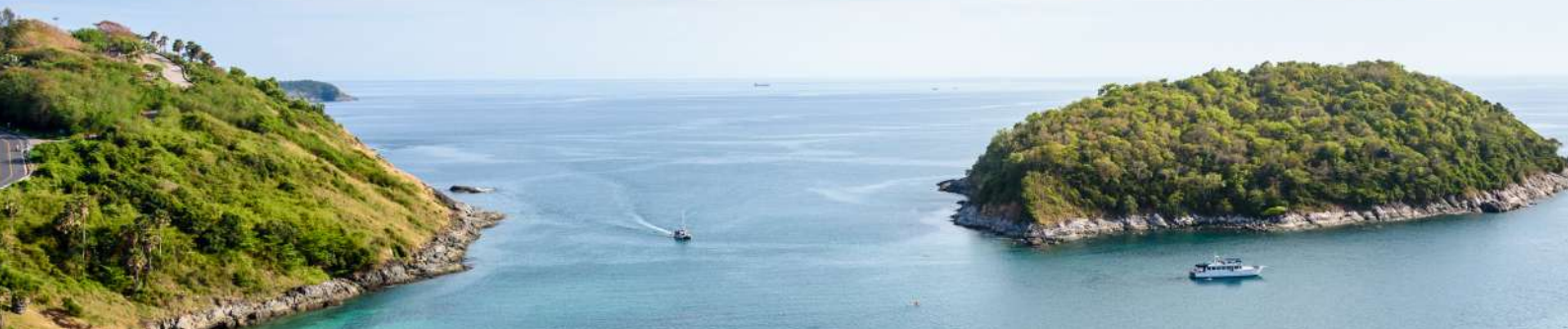
ICAR–Central Island Agricultural Research Institute (CIARI)
Sri Vijaya Puram, Andaman and Nicobar Islands

Organized by

Andaman Science Association (ASA), Sri Vijaya Puram

In collaboration with

ICAR- Central Island Agricultural Research Institute
Sri Vijaya Puram, Andaman and Nicobar Islands



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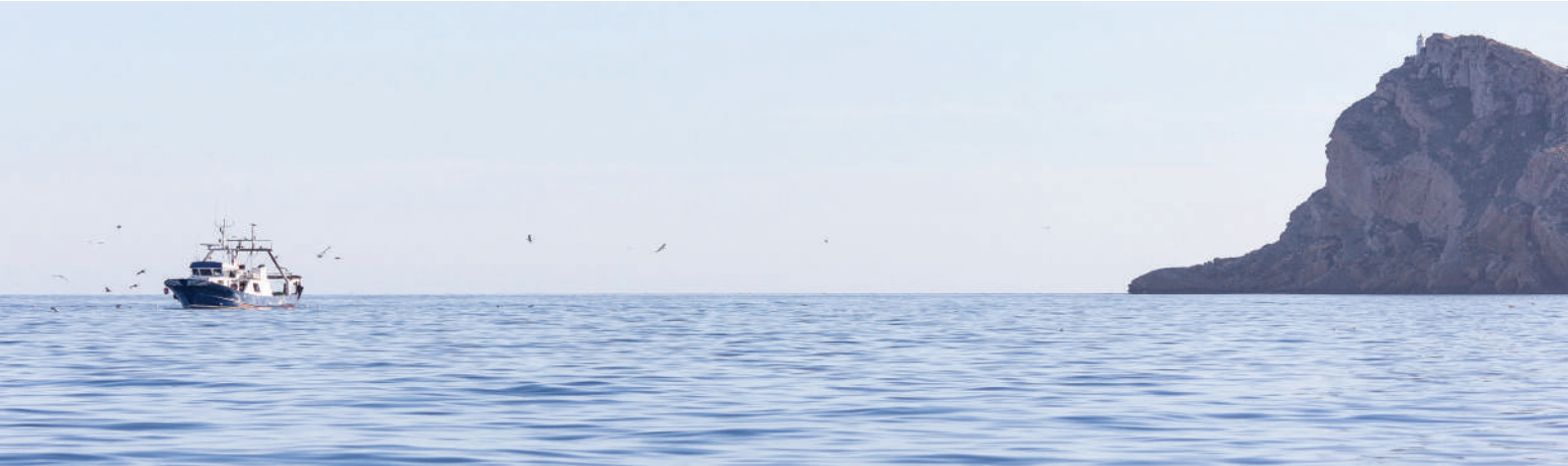

FOREWORD

It gives me immense pleasure to present the Abstract Book of the National Conference on One Health Synergy: Integrating Human, Animal, Plant and Aquatic Life for a Sustainable Future, jointly organised by the Andaman Science Association (ASA) and ICAR-Central Island Agricultural Research Institute (CIARI), Sri Vijaya Puram, during 25–27 February 2026. The One Health paradigm has emerged as a compelling scientific and policy framework in response to the increasingly complex interface between human, animal, plant and environmental health. The accelerating frequency of zoonotic spillovers, antimicrobial resistance, ecosystem degradation, and climate-induced vulnerabilities demands integrative thinking. In island ecosystems such as the Andaman and Nicobar Islands, where ecological interdependence is pronounced and biosecurity sensitivities are high, the relevance of One Health is even more profound.

This Abstract Book is a testament to the collective engagement of scientists, academicians, research scholars and students who have contributed original research, field experiences and conceptual insights aligned with the conference themes. The diversity of contributions spanning animal health, human health, aquatic systems, plant biosecurity and environmental monitoring reflects the spirit of convergence that lies at the heart of One Health. The abstracts compiled herein not only highlight current scientific advancements but also identify knowledge gaps and translational opportunities critical for building resilient health systems.

The Andaman Science Association, with its mandate to promote science in the island ecosystems, is proud to collaborate with ICAR-CIARI and sister scientific organisations such as Zoological Survey of India (ZSI), Botanical Survey of India (BSI), National Institute of Ocean Technology (NIOT), Pondicherry University Marine Biology Campus, Indian Council of Medical Research (ICMR), etc., in fostering such interdisciplinary dialogue. I am confident that the deliberations emerging from these contributions will catalyse collaborative research, informed policy interventions, and sustainable development pathways for the region and beyond.

I extend my sincere appreciation to the organizing committee, reviewers, contributors, and participants whose dedication has made this conference and this publication possible. I wish the conference every success and hope that the ideas captured in this volume will inspire sustained partnerships under the One Health framework.

Dr. Jai Sunder
(President)
Andaman Science Association

MESSAGE

It gives me immense pleasure to note that the National Conference on “One Health Synergy: Integrating Human, Animal, Plant and Aquatic Life for a Sustainable Future” is being organized by Andaman Science Association (ASA) in collaboration with ICAR-Central Island Agricultural Research Institute (CIARI), Sri Vijaya Puram, Andaman and Nicobar Islands. This event addresses one of the most pressing scientific imperatives of our time. The One Health concept correctly identifies the inseparable link between the health of humans, animals, plants, and our shared environment. In an era defined by emerging zoonotic diseases, antimicrobial resistance and climate change, a multisectoral and collaborative approach is no longer optional it is essential for our survival. This compendium of abstracts consolidates the progress made in the area of One Health by experts and will act as a beacon of light for future research activities.

I am particularly heartened to see the conference focus on integrating these disciplines to find solutions for biosecurity and environmental resilience. While the host venue in Sri Vijaya Puram highlights the unique challenges of island ecosystems, the insights shared here are deeply relevant to other biodiversity hotspots, such as Northeast India. The Northeast India, with its rich floral and faunal diversity, serves as a critical frontier where the interface of human and animal health must be managed with the same scientific rigour and synergy promoted by this conference.

I commend the organizers for providing this platform for scientists, academicians and students to share knowledge and bridge interdisciplinary gaps. My best wishes to all the participants for a productive exchange of ideas. May your deliberations lead to innovative strategies for a resilient and sustainable future

Best wishes for the successful organization of the event.

Dr. Girish Patel
Director
ICAR–National Research Centre on Mithun
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MESSAGE

It is a matter of great satisfaction to present the Abstract Book of the National Conference on One Health Synergy: Integrating Human, Animal, Plant and Aquatic Life for a Sustainable Future, organized jointly by the Andaman Science Association (ASA) and ICAR-Central Island Agricultural Research Institute (CIARI), Sri Vijaya Puram, during 25-27 February 2026. The One Health framework represents a decisive shift toward integrated science and coordinated action. In the context of island ecosystems, where human settlements, livestock, crops, aquatic resources, wildlife, and fragile environments coexist within close spatial proximity, health challenges are inherently interconnected. Addressing zoonotic risks, antimicrobial resistance, aquatic animal health, plant biosecurity, and environmental resilience require not only disciplinary excellence but also institutional collaboration and shared responsibility.

The abstracts compiled in this volume reflect the depth and diversity of scientific engagement across medical, veterinary, fisheries, agricultural and environmental sciences. They capture innovative research findings, methodological advancements, and field-level interventions that collectively strengthen the evidence base for One Health implementation. We are confident that the discussions stimulated by these contributions will lead to new research partnerships, interdisciplinary projects, and actionable strategies tailored to the needs of the islands and the nation.

On behalf of the Andaman Science Association, we place on record our sincere gratitude to the President, ASA for his guidance, encouragement, and unwavering support in steering this conference. We also extend heartfelt thanks to the Patron, Chairman, Convenors, Organising Secretary, Co-organising Secretaries, Coordinators, members of the organising committee, collaborating institutions, reviewers, and all contributors whose concerted efforts have ensured the successful organisation of this event and the timely publication of this Abstract Book.

We express our appreciation to all authors, delegates, and young researchers who have enriched this conference with their scholarly contributions. May this collective endeavour strengthen scientific cooperation and advance the One Health agenda toward a resilient and sustainable future.

The Editors
Book of Abstracts

Sessions at a Glance

Sl. No.	Theme	Short Form (for Abstract Book)	Code	Pages
1	Animal Health at the Core of One Health: Addressing Zoonoses, Food Safety, and Livestock Traceability for Healthier Ecosystem	Theme I: Animal Health & Zoonoses	**AHZ** (01-24)	03-25
2	Advancing Human Health Through One Health Strategies: Tackling Antimicrobial Resistance and Zoonotic Threats	Theme II: Human Health & AMR	**HHA** (01-15)	29-43
3	Enhancing Aquatic Animal Health Through Innovations in Disease Surveillance, Zoonotic Risk Management, and Antimicrobial Stewardship Under One Health Framework	Theme III: Aquatic Health & Surveillance	**AHS** (01-40)	47-86
4	Safeguarding Plant and Environmental Health: Addressing Biosecurity Risks, Microbial Threats, and Ecosystem Monitoring Through Integrated One Health Approaches	Theme IV: Plant & Environmental Health	**PEH** (01-59)	89-146

Contents of the Abstract Book

Theme 1

Animal Health at the Core of One Health: Addressing Zoonoses, Food Safety and Livestock Traceability for Healthier Ecosystem

Animal Health and Zoonoses–AHZ (01-24)

AHZ-01

Molecular Detection of *Anaplasma marginale* in Mithun from the Northeastern Hilly Region of India

Angughali Aheto Sumi1[1]*, Jayanta Kumar Chamuah[1], Livika T Awomi[1], Lipenthang Ezung[1], S S Hanah[1], Mahak Singh[2], Harshit Kumar[1] and Girish Patil S[1]

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Anaplasma infection in Mithun (*Bos frontalis*) remains poorly documented in Northeast India. This study investigated the seroprevalence and molecular characterization of *Anaplasma* spp. in Mithun and their tick vectors in Nagaland and Arunachal Pradesh, using serological and molecular approaches. Mithun sera were screened for *Anaplasma* antibodies with a competitive ELISA targeting the MSP5 antigen, while blood samples and ticks collected from Mithun were tested by PCR targeting the *rpoB* gene. Positive amplicons were sequenced and subjected to phylogenetic analysis. Serological testing detected *Anaplasma* antibodies in 11.90% of animals whereas PCR screening of 358 Mithun blood samples identified 2.23% positive for *A. marginale*, with sequence identity confirmed through phylogenetic placement. Among ticks, *Anaplasma* DNA was detected in one *Rhipicephalus microplus* specimen (1/340), while all *Amblyomma* spp. (n= 25) were negative. Phylogenetic analysis of *rpoB* sequences showed Mithun isolates clustering with established *A. marginale* reference strains from diverse regions. This study provides the first confirmed evidence of *A. marginale* infection in Mithun and associated ticks in Northeast India. The results highlight the importance of integrating serology, PCR and phylogenetic tools, and point to the need for improved vector management and continued regional surveillance. The findings also underscore the necessity of early and coordinated diagnostic strategies to enhance detection accuracy and prevent silent transmission within susceptible populations. Strengthening laboratory capacity and data-sharing networks will be crucial for timely outbreak response. Furthermore, sustained monitoring of circulating strains will aid in understanding pathogen evolution and informing targeted control measures.

Keywords

Tick-Borne Disease, cELISA, PCR, Anaplasmosis, Mithun

AHZ-02

Evaluation of the Efficacy of Acaricides against Ectoparasites, with Special Reference to Innovative Strategies for the Control of *Rhipicephalus microplus* in Mithun (*Bos frontalis*)

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Due to the congenial temperature and climatic conditions prevailing in the north-eastern hilly regions of India, Mithun are highly susceptible to a wide variety of ectoparasite infestations. Among the ectoparasites, tick, lice, fly, and leech infestations are very common. The major tick species identified include *Rhipicephalus microplus*, *Amblyomma testudinarium*, *Ixodes acutitarsus* and *I. ovis*. Tick identification was carried out based on gross morphology, followed by PCR amplification and sequencing at Delhi University. Similarly, lice and *Tabanus* flies were identified using gross morphological features. Different aquatic and terrestrial leech species were identified using PCR amplification of the mitochondrial enzyme COX1 and subsequent sequencing, which confirmed their species identities. Several herbal and chemical acaricides were evaluated for their efficacy against *R. microplus* infestation. For mechanical removal of ticks along with application of acaricides, a Large Animal Ectoparasite Expeller was developed, and its design was registered at the IPR Office, Government of India. Among the acaricides tested, chemical acaricides demonstrated superior efficacy against ticks. During experimental trials against aquatic and land leeches using herbal plant extracts, tobacco and soapnut showed better efficacy compared to other treatments. Overall, the study indicates that while chemical acaricides remain highly effective for tick control, certain plant-based extracts offer promising alternatives for managing leech infestations. The comparatively better performance of tobacco and soapnut suggests potential for developing eco-friendly, cost-effective formulations suitable for field conditions. Integrating selective chemical use with validated herbal treatments may reduce chemical load and delay resistance development. Further dose optimization and field validation studies are recommended to standardise application protocols under diverse agro-climatic conditions.

Keywords

Mithun, Ectoparasite Infestation, *Rhipicephalus microplus*, COX1 PCR Identification, Acaricide Efficacy, Herbal Antiparasitic Agents

AHZ-03

Seasonal Effect on Physiological and Haematological Profiles, Scrotal and Testicular Parameters in Andamani Bucks Under Tropical Humid Island Ecosystem

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Andamani goat (AG) is a meat animal in the Andaman and Nicobar Islands (ANI) of India. The present study was conducted to measure the seasonal effect on physiological and haematological profiles, scrotal circumference (SC) and testicular weight during rainy and dry summer seasons in AG. A total of 10 adult intact AG bucks (body condition score: 3.0-3.5 and classified as good; 3-4 years) were selected from the goat breeding farm, ICAR-CIARI, Sri Vijaya Puram, ANI, India. Results revealed that these experimental profiles differed significantly ($p < 0.05$) between the seasons. Significantly ($p < 0.05$) higher haematological profiles, SC and testicular weight were observed in the rainy season than in the dry summer season. In contrast, physiological profiles such as rectal, skin and scrotal temperatures were higher in the dry summer than in the wet rainy season. The study concluded that the rainy season has significantly greater beneficial effects than the dry summer season on reproduction and on artificial breeding programmes in semi-intensive goat management. These findings clearly indicate that seasonal variation exerts a measurable influence on reproductive physiology in Andamani goat bucks under semi-intensive management. The enhanced haematological indices and reproductive parameters during the rainy season suggest improved metabolic status and gonadal activity conducive to breeding efficiency. In contrast, elevated thermal stress indicators during the dry summer may adversely affect reproductive performance. Therefore, strategic planning of breeding and artificial insemination programmes during the rainy season could optimize reproductive outcomes in the Andaman and Nicobar Islands. Further long-term studies with larger populations are warranted to strengthen season-based reproductive management guidelines for this indigenous breed.

Keywords

Andamani goat, Seasonality, Haematological Parameters, Physiological Responses, Scrotal Circumference, Testicular Weight

AHZ-04

Seasonal Stress on Semen Quality Profiles, Seminal Biochemical and Oxidative Stress Attributes in Andamani Goat Breed of Andaman and Nicobar Islands

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The present study was designed to measure seasonal effects on semen quality profiles, seminal biochemical and oxidative stress attributes in fresh and liquid stored semen in monsoon and dry seasons. A total of 10 Andamani bucks (3-4 years) were selected from the breeding farm, ICAR-Central Island Agricultural Research Institute, Sri Vijaya Puram, Andaman and Nicobar Islands, India. Semen samples (n=25 per season) were collected through the artificial vagina method and preserved at refrigerated temperature (5°C) for 48 h with the use of Tris citrate glucose-based extender. We detected semen quality parameters [volume, mass activity, pH, sperm concentration, total motility, viability, total sperm abnormality, and plasma membrane, acrosomal and nuclear integrities], biochemical profiles [aspartate amino transferase (AST), alanine amino transferase (ALT) and total cholesterol], and oxidative stress markers [total antioxidant capacity (TAC) and malondialdehyde (MDA)] during monsoon and dry seasons. Semen quality parameters significantly differed between seasons (P<0.05) and among storage periods (P<0.05). Volume, pH, mass activity, motility, viability, acrosomal, plasma membrane and nuclear integrities and TAC were significantly higher (P<0.05). Sperm concentration, sperm abnormalities, MDA, AST, ALT and total cholesterol were significantly lower in the fresh semen of the monsoon than the dry season (P<0.05). Motility, viability, acrosomal, plasma membrane and nuclear integrities and TAC were significantly decreased (P<0.05) while sperm abnormality, AST, ALT, total cholesterol and MDA were significantly increased as the liquid semen storage period advanced (P<0.05). Monsoon season has higher beneficial effects on semen quality profiles, and liquid stored semen remained usable for up to 48 h. Good quality ejaculates with higher TAC and lower MDA can be cryopreserved and will be used for artificial insemination. In summary, seasonal variation markedly influences semen quality, biochemical milieu, and oxidative status in Andamani bucks, with the monsoon season offering a more favourable reproductive environment. The superior antioxidant capacity and reduced lipid peroxidation during monsoon underpin improved semen preservation outcomes up to 48 hours at 5°C. These findings provide a scientific basis for season-oriented semen collection and processing strategies to enhance artificial breeding efficiency in the region.

Keywords

Andamani buck, Seasonal Variation, Semen Quality, Oxidative Stress Markers, Liquid Semen Storage, total antioxidant capacity

AHZ-05

Season Modulates Endocrinological Profiles and Sex Behavioural Characteristics in Andamani Bucks under Tropical Humid Island Ecosystem

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The present study was designed to measure the seasonal effect on endocrinological profiles and sex behavioural profiles during rainy and dry summer seasons in Andamani bucks in Andaman and Nicobar Islands, India. Ten adult male Andamani goats were selected from the goat breeding farm, ICAR-Central Island Agricultural Research Institute, Sri Vijaya Puram, Andaman and Nicobar Islands, India. Endocrinological profiles such as follicle-stimulating hormone (FSH), luteinizing hormone (LH), testosterone, thyroid-stimulating hormone (TSH), triiodothyronine (T3), thyroxine (T4), cortisol and prolactin were analysed with enzyme-linked immunosorbent assay kits. Sex behavioural profiles such as libido score, mating ability score and sex behavioural score were measured during rainy and dry summer seasons in Andamani bucks. Endocrinological profiles as well as sex behavioural profiles differed significantly between rainy season and dry summer season (P<0.05). The levels of FSH, LH, testosterone, TSH, T3, and T4 were significantly higher in the rainy season than in the dry summer season, whereas cortisol and prolactin were significantly higher in the dry summer season than in the rainy season (P<0.05). The ratio of T3:T4 was significantly higher in the rainy season than in the dry summer season. Similarly, libido score, mating ability score and sex behavioural score were significantly higher in the rainy season than in the dry summer season (P<0.05). The rainy season has significantly higher beneficial effects than the summer season on reproduction and artificial breeding programmes in semi-intensive management of goats under the tropical humid island ecosystem in the Andaman and Nicobar Islands. Collectively, the results demonstrate a clear seasonal modulation of endocrine balance and sexual behaviour in Andamani bucks under tropical humid island conditions. The elevated gonadotropic and thyroid hormones during the rainy season, coupled with improved behavioural scores, indicate enhanced reproductive readiness and metabolic stability. Conversely, increased cortisol and prolactin during the dry summer suggest greater physiological stress that may compromise breeding efficiency. These findings support strategic scheduling of breeding and semen collection programmes during the rainy season to maximize reproductive performance in this indigenous island breed.

Keywords

Andamani Bucks, Seasonal Variation, Endocrinological Profile, Reproductive Hormones, Sexual Behaviour, Tropical Island Ecosystem

AHZ-06

Effect of Melatonin on Reproductive Parameters in Andamani Goats of Andaman and Nicobar Islands

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The Andamani goat breed of the Andaman and Nicobar Islands is uniquely adapted to the humid tropical island ecosystem. The present study evaluated the effects of exogenous melatonin on body weight (BW), scrotal circumference (SC), testicular volume (TV), testicular weight (TW), reproductive hormones, libido, oxidative stress markers, and semen quality profiles (SQPs) during the rainy and dry summer seasons. Twelve mature Andamani bucks (3–4 years old) were equally divided into control and melatonin-treated groups (n = 6 each). The treated group received melatonin at a dose of 18 mg per 50 kg body weight via subcutaneous injection at 30-day intervals. Parameters assessed included BW, SC, TV, TW, serum follicle-stimulating hormone (FSH), luteinizing hormone (LH), testosterone, cortisol, prolactin, total antioxidant capacity (TAC), malondialdehyde (MDA), libido score, mating ability score, sex behavioural score and SQPs across both seasons. Melatonin-treated bucks showed significantly higher ($p < 0.05$) BW, SC, TV, TW, FSH, LH, testosterone and TAC, along with significantly lower cortisol, prolactin and MDA levels compared to controls. Semen volume, pH, sperm concentration, mass activity, total motility, viability, acrosomal integrity, plasma membrane integrity and nuclear integrity were also significantly improved ($p < 0.05$) while the total sperm abnormalities were reduced in the melatonin group. The findings demonstrated that melatonin supplementation positively influenced the reproductive hormones, antioxidant status, libido, testicular traits and semen quality, thereby enhanced reproductive performance of Andamani goat bucks under tropical island conditions. The study clearly demonstrates that exogenous melatonin administration enhances endocrine function, antioxidant defense, and testicular development, resulting in improved semen quality and reproductive efficiency in Andamani bucks. By mitigating oxidative stress and stress-associated hormonal responses, melatonin supports superior reproductive performance across seasons. These findings highlight melatonin as a promising management intervention to strengthen artificial breeding programmes under tropical humid island conditions.

Keywords

Andamani Goat, Melatonin Supplementation, Reproductive Hormones, Semen Quality Parameters, Oxidative Stress Markers, Tropical Island Environment

AHZ-07

Single-Cell RNA-Sequencing Upstream and Downstream Analysis Identifies Cell Types, Key Genes, and Gene Networks Associated with Bovine Host Responses to HPAIV H5N1 Exposure

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Recent outbreaks of highly pathogenic avian influenza virus (HPAIV) H5N1 infection raised severe health problems in dairy cattle in the United States. The virus infects the bovine mammary gland and is found in milk. Through milk, this infection spreads among humans, posing a great concern for public health. The molecular mechanism of H5N1 infection in cattle is still largely unknown. Thus, this study was conducted to get insights into the cellular and molecular mechanisms of H5N1 infection in cattle. To address this problem, a structured computational protocol involving upstream and downstream analyses was developed, which can help researchers to analyze the scRNA-seq data effectively and efficiently to get important biological information at the single-cell. This protocol was applied to study the cellular mechanisms underlying H5N1 infection in cattle using a very recent scRNA-seq dataset related to H5N1. We identified 10 distinct, unique cell clusters mostly annotated with Neutrophil, MKI67+natural killer cell, Monocyte, CD4-CD8-T cell, *etc*. Furthermore, the differential expression analysis of the normalized scRNA-seq data suggested 67 and 1327 genes exhibiting down and up regulations, respectively. The KEGG pathway and gene ontology analyses revealed the key pathways and biological processes involved in host immune response. Next, the expression counts of 1394 differentially expressed genes were used to construct the underlying gene networks under control and infected conditions. The analytical findings suggested that 659 and 185 differential genes were involved in 506 and 130 gene-gene interactions under control and infected gene networks, respectively. A total of 77 and 394 hub genes (highly interacting in the gene networks) were identified in H5N1-infected and control gene networks, respectively. The pathway and gene ontology analysis of these hub genes revealed the key pathways associated with cytokine-cytokine interaction, chemokine signalling pathway, and viral protein interaction with cytokine and cytokine receptor. This study explains the importance of scRNA-seq data analytics to better understand the complexity of bovine host response to H5N1 infection through single-cell transcriptomics.

Keywords

scRNA-seq, Cattle, HPAIV, H5N1, DEG, Gene Networks, Pathways

AHZ-08

Comparative Evaluation of Semen Extenders on Liquid Semen Preservation Quality of the Andamani Pig Under Humid Tropical Island Ecosystems

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The present study was conducted to evaluate the efficacy of the different semen extenders on the preservation quality and fertility potential of semen in the Andamani pig, a newly registered indigenous breed. Six healthy, sexually mature boars aged 25–30 months were selected and maintained under the standard managemental practices at the ICAR-Central Island Agricultural Research Institute, Sri Vijaya Puram, Andaman and Nicobar Islands, India. The semen samples were collected with the use of the gloved-hand method during two distinct seasons *viz.*, dry (January–March) and rainy (July–September) seasons, and evaluated for the physical and microscopic parameters. The gel-free ejaculates were diluted (3×10^9 spermatozoa/80 mL) with the use of three different extenders *viz.* IMV PRIMXcell™, NBSE (Novel Boar Semen Extender) and Modified Beltsville Thawing Solution (BTS-M). The extended semen samples were stored at 16 °C and evaluated at 12h intervals for 10 days (240h) for the sperm motility, viability, total sperm abnormalities and acrosomal integrity. All the extenders had maintained the acceptable semen quality profiles up to 240 h; however, the NBSE consistently had recorded the superior values for the motility (45.58 ± 2.26%), live spermatozoa (65.91 ± 1.36%) and acrosomal integrity (69.66 ± 3.70%) as compared with IMV and BTS-M. The seasonal influence was minor but significant ($P<0.05$), with higher values observed in the dry season. The results indicated that the NBSE had provided improved protection of sperm membrane and acrosomal structures during storage. It was concluded that the NBSE extender was the most suitable for the liquid semen preservation of Andamani pig under the tropical humid island ecosystem, which enabled the semen storage for up to 10 days at 16 °C without significant loss of the functional quality. These results established the baseline reproductive parameters for the Andamani pig and highlighted the potential of extender optimization to improve the semen preservation efficiency.

Keywords

Andaman Pig, Semen Extender, Liquid Semen Preservation, Sperm Motility, Tropical Climate

AHZ-09

Multi-Origin Associated Bacteria, Isolation and Characterisation along with Pathological Interpretation in Respiratory Infections in Kodiaadu Goats of Pudukottai Region, Tamil Nadu, South India

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Respiratory diseases, especially pneumonia and associated mortality, cause a significant threat to goat farming with economic loss in the drought patches of the Pudukottai region of Tamil Nadu, and small ruminants play a major role in livelihood options for the farmers of this region. Among the respiratory infections in goats, *Klebsiella* spp., *Pasteurella* spp., *Escherichia* coli and *Staphylococcus* spp. infections have been under recorded. To determine the occurrence of respiratory diseases among goats, the current study was designed with an objective of isolation, identification and characterization of organisms causing respiratory infections, especially important pathogenic *Klebsiella* spp. *Mycoplasma* spp., *Pasteurella* spp., *E. coli*, and *Staphylococcus* spp. A total of 105 samples were collected during postmortem examination of goats and processed for isolation of respiratory pathogens, phenotypic characterization, pathological lesions, localization of organisms in tissues by immunohistochemistry and scanning electron microscopy (SEM). Out of 105 samples, 43.55% of *Klebsiella* spp., 15% *E. coli*, 18-21% *Pasteurella* spp., and 21.11% *Staphylococcus* spp. identified in the respiratory tract of Kodiaadu goats based on their morphology, colony characteristics and biochemical properties. The samples for pathological investigation involved lungs and nasal swabs. On gross pathology, consolidation was noticed in cranio-ventral and cranio-lateral lobes of the lungs, congestion, haemorrhages and fibrinous pleuritis. Histopathological lesions such as bronchopneumonia with infiltration of neutrophils, haemorrhages, and necrotic regions contained spindle-shaped/elongated leukocytes. The loss of cilia is seen under SEM. Most of the isolated *Klebsiella* were correlated with the standard bacterial isolates of *Klebsiella pneumoniae*. The Kodiaadu goat farms in field conditions were advocated with necessary control measures, strict biosecurity and advisories in the form of pamphlets. This study highlights the emergence of multidrug-resistant strains, underscoring the urgent need for judicious antimicrobial selection and stewardship.

Keywords

E. coli, *Klebsiella* spp., SEM, Pneumonia, Kodiaadu goats

AHZ-10

Effects of Varying Levels of Dietary Protein on Growth Performance and Nutrient Utilisation of growing Andamani Pig

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In pigs, a high crude protein diet may give rise to high ration cost, undesirable microbial fermentation, energy loss towards excretion of excess protein and may pollute the environment. Thus, a study was undertaken to test the effect of high protein diet on growth performance and to ascertain its effect on the pigs during growth and digestibility. A feeding trial was conducted for 3 months, with 24 weaned (28th day) Andamani Local piglets (ALP), randomly distributed to fetch 3.5% of body weight as feed with 18.0% CP (Control), 20.0% CP (TR-I), 22.0% CP (TR-II), and 24.0% CP (TR-III), with 5.62±0.27 kg initial body weight. Final body weight of the control group attained 26.27±0.13 kg, with daily intake of 681.33±1.34g feed, 3.60 FCR, 75.93±0.32% dry matter digestibility (DMD) and 3068 Kcal of Digestible energy (DE) intake. The TR-I group attained 24.20±0.14 kg body weight, with intake of 631.00±2.26g feed, 3.57 FCR, 72.38±0.45% DMD and 3067 Kcal of DE intake. Similarly, TRII group attained 22.89±0.11 kg body weight, with intake of 597.67±2.31 feed, with 3.56 FCR, 72.60±0.29% DMD and 3068 Kcal of DE intake, while TRIII group attained 21.74±0.09 kg body weight, 567.32±2.20g feed intake, with 3.55 FCR, 71.09±0.33% DMD and 3069 Kcal of DE intake. DM intake and protein intake were significantly higher in the control group than in the other groups. Similarly, Dry matter, protein, ether extract, and crude fibre digestibility were significantly higher in the control group than in the other groups. The experiment revealed that 18% CP in feed with optimum level of energy can support optimal growth of the pigs, but increasing CP% over 18% may affect growth and digestibility negatively in pigs. The findings indicate that increasing crude protein levels beyond 18% does not confer additional growth advantages and may impair nutrient digestibility in Andamani Local piglets. Therefore, a balanced diet containing 18% CP with adequate energy appears optimal for economic growth performance while minimizing nutrient wastage and environmental load.

Keywords

Andamani Local Piglets, Crude Protein Levels, Growth Performance, Feed Conversion Ratio, Nutrient Digestibility, High-Protein Diet Effects

AHZ-11

Evaluation of Antibacterial Activity of Medicinal Plant Extracts from Nicobarese Farm Against Bacterial Pathogens Isolated from Poultry and Cattle

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Phytogenic compounds have shown potential as alternatives to antibiotics in animal feed for sustainable food animal production. The use of combinations of different phytogenic compounds represents a viable approach to ensure food safety. The current in vitro study was carried out to evaluate the antibacterial efficacy of selected medicinal plants against pathogenic bacterial isolates obtained from poultry and cattle, in which *Escherichia coli* and *Klebsiella pneumoniae* were isolated from poultry cloacal swab samples, while *Staphylococcus aureus* was isolated from cattle milk. The medicinal plants used in the study were collected from Nicobarese farms, where indigenous knowledge systems play a vital role in animal and human healthcare practices. Five medicinal plants, namely Kavap (*Heliotropium arboreum*), Ta roy tachoich (*Premna serratifolia*), Lurong (*Morinda citrifolia*), Amplili (*Annona squamosa L.*), and Sa nuk (*Ganophyllum falcatum* Blume), were selected based on their traditional use in the management of various ailments such as diarrhoea, enteritis, fever, respiratory and eye infections, as well as skin and wound healing. The plant extracts were prepared using methanol, followed by dilution with DMSO. Herbal extracts in different concentrations were used to evaluate the antibacterial activity by the standard disc diffusion method, wherein discs loaded with the plant extracts were placed on the Mueller-Hinton agar (MHA) plates inoculated with the test organisms and incubated under appropriate conditions (for 24 hrs at 37°C). The zones of inhibition were measured and recorded in millimetres (mm). The observed diameters for the selected plants were about 12 to 15 mm. Antibiotics such as Vancomycin, Tetracycline and Chloramphenicol were used as reference standards. The observed findings demonstrated that the methanolic extracts of the selected plants showed antibacterial activity and could be further explored for herbal product preparations.

Keywords

Herbal extracts, Antibiogram, Poultry pathogens, Cattle milk, Antimicrobial activity

AHZ-12

Environmental Aspergillosis in Native Cattle: A One Health Perspective on Animal, Human and Farm Ecosystem Health

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The present study was carried out during an outbreak of wart-like lesions in an organized farm comprising native Umblacherry cattle. The lesions were widely distributed over the groin region, testicles, and near the base of the ears, indicating a possible infectious etiology associated with farm management conditions. Wart-like scabs were collected aseptically and subjected to microbiological investigations. Bacterial culture was performed using Eosin Methylene Blue agar, Blood agar, and Mannitol Salt agar, while fungal isolation was carried out on Sabouraud's Dextrose Agar supplemented with chloramphenicol and Potato Dextrose Agar. Six samples showed yeast-like fungal growth and were further cultured on Potato Dextrose Agar. Based on colony morphology and biochemical characteristics, the fungal isolate was identified as *Aspergillus fumigatus*, while concurrent bacterial isolates were identified as *Staphylococcus aureus* on Mannitol Salt Agar and *Escherichia coli* spp. on Eosin Methylene Blue Agar. *Aspergillus fumigatus* exhibited rapid growth with downy to powdery grey-green colonies, smooth-walled colourless conidiophores, uniseriate phialides concentrated on the upper surface of the vesicle, and round conidia when incubated for 72 hours at 37–48°C, confirming its identity. The occurrence of cutaneous aspergillosis in Umblacherry cattle is likely associated with high humidity, poor air circulation, and inadequate sanitation within the farm premises, emphasizing the need for improved hygienic practices and environmental management in organized farms. From a One Health perspective, *A. fumigatus* is a ubiquitous environmental fungus capable of causing respiratory and cutaneous aspergillosis in immunocompromised humans, particularly farm workers and animal handlers with chronic exposure to fungal spores. The close interaction between animals, humans, and the shared farm environment highlights potential occupational health risks and underscores the importance of integrated surveillance, improved farm hygiene, adequate ventilation, and increased awareness among farm personnel to reduce fungal load and prevent aspergillosis in both animals and humans, thereby safeguarding livestock productivity, occupational health, and public health.

Keywords

Aspergillosis, *Aspergillus fumigatus*, Native cattle, Environmental health, Occupational exposure, One Health

AHZ-13

Integrated Surveillance of Japanese Encephalitis in Indian Equines: Serology, Molecular Diagnostics and One Health Preparedness

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Japanese encephalitis (JE) is a mosquito-borne zoonotic viral disease of major public health relevance and an important cause of acute neurological illness in horses in Asia. Equine infections can manifest as fever, ataxia, altered mentation and encephalitis with occasional fatalities, leading to economic losses through mortality, prolonged convalescence and reduced performance in working and athletic animals. Horses are frequently exposed to the same vector ecologies that drive human transmission, equine disease and seroconversion provide a practical One Health signal of local virus activity and can support early risk recognition in endemic and peri-endemic settings. To strengthen JE detection and surveillance, a combined approach using serology and molecular confirmation is essential. Field-level sero surveillance can be implemented through standardized hemagglutination inhibition (HI) testing to detect anti-JE antibodies and map spatial heterogeneity of exposure. Using this approach in Gujarat, 12.5% (75/600) of horses were seropositive, with marked district-wide variation, indicating focal transmission and the need for risk-based sampling aligned to mosquito abundance, water bodies and animal management practices. Evidence from other Indian regions further supports the relevance of equine surveillance, with serological positivity observed in horses from Chhattisgarh (10/20), Rajasthan (09/52) and Punjab (12/53), reinforcing that JE exposure is not confined to a single geography and that multi-state monitoring is warranted. Alongside serology, confirmatory diagnostics should be available for suspected clinical cases and outbreak investigations. NS1 gene-based TaqMan real-time RT-PCR provides sensitive detection of viral RNA and supports identification of active infection during the viraemic window, complementing antibody-based tools, including ELISA formats used for screening and sero-epidemiology. Integrating equine surveillance with entomological data and targeted sampling improves situational awareness; in the broader One Health framework, pigs can be used as sentinel animals to provide early warning of increased transmission intensity and to guide timely vector control and vaccination strategies in high-risk areas.

Keywords

Japanese Encephalitis, Equine Sero surveillance, One Health Approach, NS1 RT-PCR, Hemagglutination Inhibition Test, Sentinel Surveillance

AHZ-14

Hidden Zoonotic Risk: Seroprevalence Serovar Detection and Molecular Characterisation of *Salmonella* spp. in Stray Dogs

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Salmonellosis is a significant zoonotic disease of global public health importance, with dogs recognised as potential reservoirs for transmission to humans. Stray dogs housed in animal shelters are at increased risk due to environmental exposure, close human contact, and stress-related immunosuppression. The present study was undertaken to determine the seroprevalence of *Salmonella* spp. in stray dogs, detect circulating serovars, and molecularly characterise the isolates, thereby assessing their zoonotic significance from a One Health perspective. A total of 100 samples comprising faecal swabs and blood samples were collected from clinically symptomatic (case) and apparently healthy (control) stray dogs maintained in four animal shelters. Dog food samples were also analysed. Bacteriological isolation was performed using selective enrichment and culture methods. Serological screening was carried out using the tube agglutination test, followed by serovar identification of isolates. Molecular confirmation was achieved by polymerase chain reaction (PCR). Antimicrobial susceptibility testing was carried out using the disc diffusion method. Haematological analysis was performed to assess inflammatory markers in both groups. Clinically affected dogs commonly exhibited fever, lethargy, diarrhoea, and abdominal discomfort, while bloody diarrhoea was observed infrequently. *Salmonella* spp. was isolated from 11 faecal samples in the case group and 4 faecal samples in the control group, whereas blood cultures were negative in all cases. PCR confirmed all bacteriologically positive isolates. Serological analysis revealed higher seroprevalence in symptomatic dogs (12%) compared to apparently healthy dogs (5%). Haematological examination indicated inflammatory markers in 60% of dogs in the case group and 100% of dogs in the control group, suggesting subclinical inflammatory responses. Antimicrobial susceptibility testing revealed the highest resistance against gentamicin and the lowest resistance against ciprofloxacin. The findings highlight the role of stray dogs as asymptomatic carriers of *Salmonella* spp., posing a potential zoonotic risk to humans. Continuous surveillance, improved shelter hygiene, and judicious antimicrobial use are essential to mitigate transmission risks under the One Health framework.

Keywords

Salmonella spp., Stray dogs, Seroprevalence, Serovar detection, Molecular characterisation, Zoonosis, One Health

AHZ-15

NCVTC Microbial Repository: Preserving Biodiversity for One Health Synergy

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Microbial biodiversity, within the One Health framework, encompasses the vast diversity of microorganisms that safeguard animal and human health, provide critical insights into zoonotic diseases, and contribute to the economic sustainability of livestock and animal-based industries through improved productivity and disease management. Preserving this diversity is critical not only for understanding microbial ecology but also for addressing global challenges such as antimicrobial resistance, emerging infectious diseases, and climate change. The National Centre for Veterinary Type Culture (NCVTC) serves as a premier microbial repository in India, dedicated to the systematic collection, authentication, and preservation of microbial strains of veterinary, animal and public health importance. By maintaining reference cultures of bacteria, viruses, bacteriophages, rumen and dairy microorganisms, NCVTC provides a vital resource for researchers, clinicians, and industries engaged in diagnostics, vaccine development, and biotechnological innovation. Aligned with the One Health framework, the repository underscores the interconnectedness of human, animal, and environmental health. The animal body and gut represent one of the greatest reservoirs of microbial diversity, where microbes coexist in complex relationships ranging from pathogenic to mutualistic and opportunistic. Microbes preserved at NCVTC capture this diversity, enabling surveillance of zoonotic pathogens, facilitating comparative studies across species, advancing microbial taxonomy, and supporting translational research aimed at safeguarding both animal and public health. NCVTC plays a pivotal role in safeguarding microbial biodiversity and advancing One Health synergy. By integrating microbial conservation with translational applications, the repository strengthens regional and national capacities to respond to health threats, fosters innovation in biotechnology, and ensures that microbial resources remain accessible for future applications. Specialized microbial repositories such as NCVTC act as vital reservoirs of microbial genetic resources (MGRs), serving as cornerstones of biodiversity preservation and driving scientific advancement within the One Health framework.

Keywords

Microbial Biodiversity, One Health, Veterinary Pathogens, Microbial Genetic Resources (MGRs), zoonosis, Antimicrobial Resistance

AHZ-16

Investigation of the Gut Microbiota Composition and Acaricide Resistance in *Rhipicephalus* spp. in Different Host Assemblages

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The present study was undertaken to investigate acaricide resistance and the diversity of the tick-borne bacterial pathogens. A total of ten samples of *R. microplus* were collected from different parts of India and screened for acaricide resistance. Molecular detection of resistance to synthetic pyrethroids involved amplification and sequencing of a partial fragment of the voltage-gated sodium channel gene, while amitraz resistance was investigated using the octopamine/tyramine receptor gene. The GenBank accession numbers for voltage gated sodium channel domain II gene obtained were PP480631 and PP486414-15, while for the partial fragment of the octopamine/tyramine receptor gene were PP480627-30. Sequence comparison with the reference susceptible and resistant strains revealed the presence of non-synonymous single nucleotide polymorphism (SNPs) associated with resistance. One Andaman isolate of *R. microplus* exhibited resistance to synthetic pyrethroids, while two Andaman isolates showed molecular evidence of amitraz resistance. The metagenomics analysis of *R. microplus* (cattle) and *R. sanguineus* (dog) was done by aseptically dissecting the midgut tissues, sequencing the hypervariable regions of 16S rRNA gene using the Illumina Miseq platform. Analysis of bacterial diversity showed that *Proteobacteria* was the predominant phylum across all the sample groups, followed by Firmicutes, Bacteroidata and then Actinobacteriota. Several pathogenic bacterial genera, including *Proteus*, *E. coli*, *Streptococcus*, *Shigella*, *Pseudomonas*, *Coxiella* and *Klebsiella* were also detected in the midgut microbiota of both tick species. This investigation shows the molecular evidence of emerging acaricide resistance in *R. microplus* from the Andaman region and highlights the presence of diverse pathogenic bacteria in the tick midgut. These findings emphasize the need for continuous molecular surveillance of acaricide resistance and a better understanding of tick-associated microbiota to develop effective and sustainable strategies for tick and tick-borne disease control.

Keywords

Rhipicephalus microplus, Acaricide Resistance, Synthetic Pyrethroid, Amitraz, SNP, Metagenomics, Tick-Borne Pathogens, 16S rRNA

AHZ-17

Surgical Management of Dystocia Due to Ectopic Pregnancy in a Cat

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A three-year-old indigenous female cat was presented with symptoms of dystocia persisting for three days after delivering one kitten. Radiographic and ultrasonographic examination revealed the presence of four live foetuses, with one dead foetus located abnormally more anteriorly attached to the wall of the small intestine. It was confirmed as a case of concurrent intrauterine and ectopic pregnancy. An emergency caesarean section was performed, during which four live intrauterine foetuses were retrieved, and a dead mummified foetus embedded in the serosal layers of the intestine was removed successfully. The case demonstrates the importance of diagnostic imaging and prompt surgical intervention in managing rare reproductive anomalies such as ectopic pregnancy in felines.

Keywords

Feline Dystocia, Ectopic Pregnancy, Concurrent Intrauterine Pregnancy, Caesarean Section, Diagnostic Imaging, Reproductive Anomaly

AHZ-18

Comparison of Different Staining Methods of Bacterial Polysaccharides

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The three most used methods for detecting polysaccharides in bacteria are alcian blue, silver nitrate, and alcian-silver stain. A comparative study was conducted using Sodium Deoxycholate Polyacrylamide gel electrophoresis (DOC-PAGE) to examine the effectiveness of these three staining techniques for the sensitive detection of polysaccharide extracts of bacterial culture and the co-precipitated proteins. Based on the results, the alcian-silver stain showed the most effective method to detect polysaccharides with minimal detection of protein co-precipitate.

Keywords

Polysaccharides, Alcian Blue, Silver Stain, DOC

AHZ-19

Serum Protein Interactions Associated with Fecundity Divergence in Goats: Insights from Receptor Tyrosine-Kinase Signalling Networks

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Reproductive efficiency is central to goat productivity, yet the molecular basis of fecundity remains unclear. We examined six candidate proteins with established or emerging reproductive roles: insulin-like growth factor receptor 1 (IGF1R), ErbB2 receptor tyrosine kinase (ERBB2), fibroblast growth factor receptor 1 (FGFR1), growth differentiation factor 9 (GDF9), histone methyltransferase SETDB2, and stress-associated kinase MAP3K19. Serum protein expression data were obtained by ELISA and analyzed using generalized linear models (GLM) in R (version 4.5.2) with four fixed factors, viz., effect of fecundity, breed admixture, parity, and rearing system practices. Pairwise protein associations were assessed through Pearson's correlation with regression plots, and significant correlations were visualized as networks in R. Predicted protein–protein interactions (PPIs) from STRING were compared with the empirical network. IGF1R and ERBB2 were significantly elevated in low-fecundity goats ($p < 0.05$) and displayed a near-perfect correlation ($r \approx 0.99$). IGF1R also correlated positively with FGFR1, GDF9, and SETDB2, while SETDB2 showed strong associations with FGFR1 and GDF9. MAP3K19 exhibited weak but significant negative correlations with IGF1R and ERBB2, suggesting divergent regulation. The correlation network highlighted the central IGF1R–ERBB2 axis and a co-regulated cluster of SETDB2, FGFR1, and GDF9. The curated STRING predictions confirmed the canonical RTK–oocyte modules, and our dataset additionally revealed novel associations, including the SETDB2–GDF9 link and MAP3K19 divergence The findings of present study confirm conserved RTK–MAPK signalling pathways while uncovering novel associations involving epigenetic and stress-responsive regulators in fecundity. Integration of empirical serum correlations with predictive interactomes identifies IGF1R, ERBB2, GDF9, SETDB2, and MAP3K19 as promising biomarkers and targets for genetic improvement strategies in goats.

Keywords

Goat reproduction, Serum Biomarkers, Receptor tyrosine kinases, Growth differentiation factor 9 (GDF9), SETDB2, Protein–protein interaction networks

AHZ-20

Microbially Derived Extracellular Polysaccharides as a Natural Cryoprotective Strategy for Livestock Semen Preservation

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The present study evaluated extracellular polysaccharide substances (EPS) derived from the psychrophilic bacterium *Colwellia psychrerythraea* strain 34H as a biologically derived, low-toxicity cryoprotective additive for semen cryopreservation. *C. psychrerythraea* 34H was grown aerobically at 4 °C, –1 °C, and –20 °C in marine broth, and EPS was extracted from culture supernatants using chilled ethanol, followed by purification, dialysis, and lyophilization. EPS was characterized by DOC-PAGE using Alcian blue–silver staining. Antioxidant potential was assessed through lipid peroxidation inhibition, hydroxyl radical scavenging, and reducing power assays, along with evaluation of sperm superoxide production and malondialdehyde (MDA) levels. The functional efficacy of EPS was tested by supplementing semen extenders with different EPS concentrations during cryopreservation, followed by assessment of post-thaw motility (PTM), livability, hypo-osmotic swelling test (HOST), and sperm abnormalities. Developing low-toxicity, biologically derived cryoprotectants for livestock reproduction is critical for sustainable animal health management and environmentally responsible breeding technologies under the One Health framework. EPS exhibited strong antioxidant activity, with 12.86% lipid peroxidation inhibition at 10 µg/ml, corresponding to approximately 25% of butylated hydroxytoluene activity and markedly higher potency than ascorbic acid at comparable concentrations. EPS showed hydroxyl radical scavenging activity comparable to trehalose and two-fold higher reducing power. The addition of EPS significantly reduced sperm superoxide production and MDA levels compared to basal extender. Cryopreservation trials demonstrated that EPS supplementation at 240–480 µg/ml significantly improved PTM (55% vs. 40%), livability (73% vs. 66%), and HOST (52% vs. 49%) compared to the Tris–egg yolk–citrate control, whereas trehalose negatively affected sperm quality. Higher EPS concentrations, however, induced sperm aggregation and increased structural abnormalities. These findings indicate that EPS from *C. psychrerythraea* 34H is a promising, naturally derived cryoprotectant capable of improving post-thaw semen quality when used at optimised concentrations.

Keywords

Semen Cryopreservation, Extracellular Polysaccharides (EPS), *Colwellia psychrerythraea* 34H, Antioxidant Activity, Post-Thaw Sperm Quality, One Health Biotechnology

AHZ-21

Microbial Challenges and Revisit of Biosecurity in Control of Newly Emerging Livestock Diseases in the Era of Human-Animal Interface

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Antimicrobial Resistance (AMR), the "silent pandemic", is establishing its existence slowly as the livestock environment serves as a high-pressure incubator were commensal bacteria exchange resistance genes with zoonotic pathogens. Climate change has pushed vectors like *Hyalomma* ticks and Culicoides midges into new latitudes, bringing Crimean-Congo Hemorrhagic Fever (CCHF) and Bluetongue (BTV-3) to previously naive livestock populations. Re-envisioning biosecurity from the "Checklists" to "Culture" is failing because it ignores the human element and the invisible microbial pathways. We need real-time biosecurity that scales based on local outbreak forecasting and migratory bird patterns. In an endemic world, we must shift focus from trying to keep every microbe out (exclusion) to managing the microbial load within (biocontainment), particularly regarding subclinical shedding of pathogens like *Leptospira* and *Salmonella*. The metagenomic surveillance from "targeted" testing (looking for what we know) to unbiased metagenomic sequencing of environmental samples (slurry, air, water) to detect novel pathogens before they cause clinical outbreaks must be considered. IoT and Real-Time Monitoring detect subtle physiological changes (febrile spikes, altered rumination) days before a farmer notices a "sick animal. "The Changing Disease Landscape such as Intensification of livestock production, climate change, wildlife–livestock overlap, and urban expansion are reshaping host-pathogen dynamics, increasing frequency of emerging, re-emerging, and transboundary diseases, blurring of species barriers and rise in zoonotic and reverse-zoonotic transmission led to emerging microbial challenges such as Rapid evolution of RNA viruses, including mutation, recombination, and host adaptation. Re-conceptualizing Biosecurity like shift from perimeter-based biosecurity to network-based biosecurity and shift from perimeter-based biosecurity to network-based biosecurity. The One Health Concept to put into Practice as Operational integration of veterinary, medical, and environmental disciplines, Joint outbreak investigations, coordinated risk communication and strengthening veterinary public health as a frontline defence system is the need of the hour.

Keywords

Antimicrobial Resistance (AMR), Climate-Driven Vector Expansion, Network-Based Biosecurity, Metagenomic Surveillance, One Health Integration, Transboundary Zoonotic Diseases

AHZ-22

Vigilance on Emerging and Re-emerging Zoonotic Viral Diseases

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Zoonotic diseases (zoonoses) are those that can spread naturally between vertebrate animals and humans, and vice versa. The causative agents of zoonoses are diverse and may include bacteria, viruses, fungi, parasites, and unconventional agents such as prions. The emergence of zoonotic diseases may be driven by intensification of animal production, habitat destruction, human encroachment, and climate change. It is now recognized that a One Health approach at the human-animal-environmental interface is needed for effective investigation, prevention, and control of zoonotic diseases. Emerging zoonoses are those that are new to a population or that have previously existed but are increasing in incidence or geographic spread, exemplified by highly pathogenic avian influenza (HPAI). The HPAI H5Nx goose/Guangdong (GS/GD) lineage threatens domestic poultry, wild birds, dairy animals, mammals, including humans, and global biodiversity. In light of the current threat, the global strategy for the prevention and control of HPAI (2024-2033) has been revised to support effective prevention and control across the poultry value chains, protecting domestic animals, wildlife, the environment, and humans. As part of preparedness, the WHO and OFFLU are working together to select avian influenza vaccine strains for humans and animals, respectively. In India, the National One Health Mission (NOHM) was launched to integrate the animal, human, and environmental health sectors to enhance pandemic preparedness and control zoonoses. The solution requires coordinated action, including surveillance at the animal-human-ecosystem interface to identify zoonotic transmission in humans and the emergence of viruses with pandemic potential in animals. Risk assessment will identify vaccine seed strains or pre-pandemic vaccine stockpiles. Improvements in biosecurity measures are required to prevent infections, virus circulation, spread, and spillover events.

Keywords

Zoonotic Diseases, One Health Approach, Highly Pathogenic Avian Influenza (Hpai), and Pandemic Preparedness

AHZ-23

Island Faunal Diversity: A Molecular Approach to Biodiversity Conservation

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The Andaman and Nicobar Islands are a globally recognized biodiversity hotspot, harbour a rich assemblage of terrestrial and marine fauna, including several endemic species such as the Narcondam Hornbill *Rhyticeros narcondami* (Hume, 1873), Nicobar Megapode *Megapodius nicobariensis* (Blyth, 1846), Long-tailed Macaque *Macaca fascicularis umbrosa* (Miller, 1902), Andaman Wild Boar *Sus scrofa andamanensis* (Blyth, 1860), and Andaman Serpent Eagle *Spilornis elgini* (Blyth, 1863). Due to high level of endemism and the taxonomic challenges arising from morphological similarities among closely related species, DNA barcoding has emerged in recent years as an effective molecular approach for accurate and rapid species identification. We collected specimens from various habitats, including forests, intertidal zones, and coral reef ecosystems, which were systematically sampled and morphologically identified. Genomic DNA was extracted, and mitochondrial COI and 16S rRNA regions were amplified and sequenced. A total of 1262 DNA barcodes were generated from 12 different taxonomic groups, including Aves, Amphibia, Mollusca, Reptilia, Mammalia, Odonata, Insecta, Annelida, Echinodermata, Malacostraca, Teleostei, and Orthoptera. The species were confirmed using the BLAST and BOLD reference databases. Preliminary analyses revealed potential cases of cryptic diversity and extended distribution records for certain taxa. The generated barcode data was deposited in the BOLD and GenBank databases to strengthen the national and global reference libraries. This effort establishes a molecular baseline for the region, facilitating rapid species-level identification, biodiversity monitoring and conservation planning. Our findings underscore the significance of integrating molecular tools with taxonomy to document and conserve the fragile island biodiversity of the Andaman and Nicobar Islands.

Keywords

DNA barcoding, Island biodiversity, Endemic species, Andaman and Nicobar Islands, Cryptic diversity, Molecular taxonomy

AHZ-24

Livestock Traceability for Achieving One Health

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Livestock traceability has emerged as a critical pillar of modern food systems, linking animal health, public health, environmental sustainability, and market access within an integrated framework. Defined as the ability to track animals and animal products across all stages of production, processing, and distribution, traceability ensures transparency, rapid response to food safety incidents, and strengthened consumer trust. In the Indian context, significant progress has been made through national initiatives such as the Bharat Pashudhan digital database, the National Digital Livestock Mission, ear-tagging programs covering over 28 crore livestock, and export-oriented systems like MeatTrace and MeatNet. These platforms collectively enable farm-level data capture, disease monitoring, product authentication, and compliance with international standards. Beyond trade facilitation, livestock traceability serves as a strategic enabler of the One Health approach by establishing a data-driven bridge between human, animal, and environmental health. Through real-time identification, movement tracking, vaccination records, and antimicrobial usage monitoring, traceability systems support early detection of zoonotic threats, improved antimicrobial stewardship, targeted disease control, and minimised economic losses. Integration of digital tools, blockchain technologies, and QR-based labelling further enhances transparency and recall efficiency while empowering stakeholders across the value chain. However, challenges such as farmer resistance to tagging, technological fragmentation, limited inter-platform integration, and low awareness of traceability labelling remain barriers to full implementation. Strengthening system interoperability and aligning traceability databases with One Health objectives can transform livestock management from a reactive to a proactive public health safeguard. Harnessing traceability data for One Health applications represents the next logical step toward building a resilient, competitive, and sustainable livestock sector in India

Keywords

Livestock Traceability, One Health, Zoonotic Diseases, Antimicrobial Stewardship, Digital Livestock Database, Meat Trace, Bharat Pashudhan, Disease Surveillance

Theme 2

Advancing Human Health through One Health Strategies

Human Health and AMR–HHA (01-15)

HHA-01

Isolation of Multidrug-Resistant *E. coli* from Subclinical Mastitic Milk of Cattle in Bikaner

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Subclinical mastitis is the most prevalent and economically significant form of mastitis in dairy animals, characterized by inflammation of the mammary gland without visible clinical symptoms. The condition is primarily diagnosed through indirect tests such as the California Mastitis Test (CMT), somatic cell count (SCC), and bacteriological culture. A total of 80 milk samples from 20 apparently healthy cattle were collected and screened by using the California mastitis test and somatic cell count. A total of 22 samples (27.5 %) were found positive for SCM. All 18 samples were cultured on MacConkey and EMB agar. Colonies showing a typical metallic green sheen on EMB agar were presumptively identified as *E. coli* and further confirmed by Gram staining, biochemical tests (Indole, Methyl Red, Voges-Proskauer, Citrate utilization). The prevalence was found to be 13.6%. The isolates were confirmed by PCR (amplification of 16S rRNA/phoA gene at 720 bp). The *E. coli* was found to be most resistant to antibiotics like Penicillin, Ampicillin, Streptomycin, Tetracycline, Vancomycin, Cefepime, and Amoxicillin-clavulanate. The rampant use of antibiotics in the dairy sector for improving milk-meat yield and to combat diseases is the main cause of an increased resistance amongst pathogens. Therefore, the strategies for prudent use of antibiotics in the dairy industry should be implemented, and the line of treatment for mastitis must be suggested only after antibiotic sensitivity tests.

Keywords

Subclinical Mastitis, *Escherichia coli*, Somatic Cell Count, Antibiotic Resistance, Polymerase Chain Reaction (PCR), Dairy Cattle

HHA-02

Integrated Antioxidant Defence and Biosecurity: Evaluation of *Allium*-Derived Organosulfur Compounds in Mitigating Oxidative Stress and Promoting Ecosystem Health

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Ecosystem health is increasingly threatened by reactive oxygen species (ROS) and microbial stressors that drive cellular transformation and disease progression. This research explores the efficacy of Aged Black Garlic Extract (ABGE) as a sustainable, plant-derived intervention for safeguarding biological health. The study highlights how the ageing process converts raw garlic into stable, water-soluble organosulfur compounds like S-allyl cysteine (SAC), which possess high radical scavenging activity. Experimental results show that ABGE significantly increases the activity of vital antioxidant enzymes, specifically superoxide dismutase (SOD) and glutathione peroxidase (GSH-Px), in a dose-dependent manner. By enhancing these natural defence mechanisms and providing a safe, environmentally compatible alternative to synthetic chemical treatments, ABGE supports integrated biosecurity strategies aimed at monitoring and maintaining the equilibrium of plant and animal ecosystems. The findings demonstrate that ABGE effectively mitigates oxidative stress by strengthening endogenous antioxidant defense systems and neutralizing excess ROS. Its dose-dependent enhancement of SOD and GSH-Px activity confirms its potential as a functional bioactive compound for cellular protection. As a plant-derived and environmentally compatible intervention, ABGE offers a promising alternative to synthetic antioxidants in integrated ecosystem health management. Incorporating such natural strategies may contribute to sustainable biosecurity frameworks that prioritise long-term ecological resilience.

Keywords

Allium sativum, Antioxidant enzymes, Superoxide dismutase, S-allyl cysteine, Biosecurity, Ecosystem monitoring

HHA-03

Proteome Profiling of *Leptospira* for Rational Anti-Leptospirosis Targets

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Leptospirosis, caused by pathogenic *Leptospira* spp., is a re-emerging zoonotic disease of global importance, transmitted to humans through contact with water contaminated by the urine of infected animals. Clinical symptoms typically appear 5-14 days after exposure, followed by rapid disease progression that can result in multi-organ failure and death. Effective early diagnostics and human vaccines remain unavailable. Understanding the molecular mechanisms underlying host invasion, immune evasion, and persistence is therefore critical for the rational development of diagnostic, therapeutic, and preventive strategies. We employed a multipronged approach integrating proteomics, bioinformatics, and biochemical analyses to investigate leptospiral proteins expressed under pathogenic conditions. Using Triton X-114 fractionation, extracellular proteome enrichment, and mass-spectrometry–based proteomics, we characterized extracellular, membrane-associated, and subcellular protein fractions from pathogenic *Leptospira* strains. This analysis revealed numerous secreted and surface-exposed proteins that are enriched during pathogenic adaptation and show promise as diagnostic antigens, therapeutic targets, and vaccine candidates. Several identified proteins exhibit proteolytic activity that degrades extracellular matrix components, suggesting roles in tissue invasion and dissemination. Together, these findings highlight extracellular proteases and secreted enzymes as key targets for early diagnosis and intervention and support their further functional validation in infection models. The resulting comprehensive *Leptospira* proteome database, the largest of its kind, provides a foundational resource for mapping factors involved in invasion and persistence, as well as for future protein characterization studies. Collectively, these findings advance our understanding of the molecular determinants of leptospiral pathogenicity and provide a prioritized repertoire of candidate molecules for translational research. Continued functional validation and host–pathogen interaction studies will be essential to accelerate the development of effective diagnostics, therapeutics, and vaccine strategies against leptospirosis.

Keywords

Leptospira, Leptospirosis, Secretome, Proteomics, Gelatinase, Cell-Wall Hydrolase, Triton X-114, Diagnostics

HHA-04

Efficacy of Phytochemical Screening and Evaluation of Antimicrobial Properties of *Strychnos potatorum* L. Leaf Against Clinical Microbes

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This investigation provides a comprehensive comparative analysis of the phytochemical profiles and multifaceted bioactivities of hydrated Methanol, Ethanol, Chloroform, Hexane and Aqueous leaf extracts derived from *Strychnos potatorum* L. Qualitative and quantitative screenings revealed that while solvents effectively sequestered core metabolites such as amino acids, carbohydrates, flavonoids, phenols, steroids and terpenoids, the choice of solvent significantly dictated the recovery of specific secondary metabolites. The ethanol extract uniquely isolated coumarins, phlobatannins and tannins, resulting in generally higher total metabolite levels; conversely, the aqueous extract demonstrated a superior capacity for recovering water-soluble alkaloids, glycosides, quinones and proteins compared to chloroform, hexane illustrating the profound impact of solvent polarity on chemical yields. Bacterial & Fungal infections were one of the deadliest infections, accounting for more than one million deaths annually worldwide. The major reason bacterial and fungal infections are more life-threatening is that they have been neglected by society. The plant kingdom has always been a hub for many natural compounds with novel structures and the efficacy of drugs of pharmacognosy against microbes. The present investigation suggested that the *S. potatorum* leaf extract with different solvents such as hydrated methanol, ethanol, chloroform, hexane and aqueous was analyzed. Among the plant leaves and seeds of different concentrations against *Staphylococcus aureus, Bacillus subtilis, Klebsiella pneumoniae, Escherichia coli* and *Pseudomonas aeruginosa* and anti-fungal activity by *Aspergillus niger; Aspergillus flavus; A. fumigatus; A. terreus; Penicillium lilacinum* were found to be recorded respectively. The specific concentration of plant extract showed excellent anti-bacterial and anti-fungal properties when compared with other concentrations of the plant. Moreover, 100µl concentration of methanol and ethanol extracts showed higher zones of inhibition in both the activity of anti-bacterial and anti-fungal, whereas chloroform and hexane were similar in the low zone of inhibition range. Hence, the medicinal plant *S. potatorum* is more suitable as a drug candidate for biomedical properties with reference to anti-microbials for future endeavors.

Keywords

Phytochemical, Pharmacognosy, Zone of inhibition, Secondary metabolites, Anti-bacterial and Anti-fungal

HHA-05

Efficacy of Backward Walking on Pain, Quadriceps Strength and Physical Function in Osteoarthritis of the Knee Joint- An Experimental Study

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Osteoarthritis of the knee joint is the most common cause of locomotor disability in ageing people. Different techniques are commonly used to reduce pain in patients with osteoarthritis of the knee joint. The purpose of this study was to find out the effect of backwards walking along with conventional physiotherapy in patients with osteoarthritis of the knee joint. A total of 30 confirmed diagnosed cases of osteoarthritic knee joint, aged between 40 and 60 years and both male and female were included in the study. Patients were randomly divided into two groups of 15 each. Group A-control received only conventional treatment, and Group B received backwards walking training with Conventional physiotherapy treatment. Both groups were treated and examined for six days for pain in NPRS, quadriceps strength and WOMAC scale for disability was assessed before the treatment and after one week of treatment. Statistical Analysis was done using the Primer software by using 3.3.3. Paired t-test was used to compare intra-group parameters, whereas the unpaired t-test was used to compare both groups. Statistical significance was accepted at the confidence interval of 95% and $p < 0.05$ level**.** The study concludes that backward walking has a significant effect on osteoarthritis knee patients on decreasing pain, improving quadriceps strength and function; hence, backward walking can be incorporated with backward walking training in the treatment protocol of osteoarthritis knee cases. These findings suggest that incorporating backward walking into conventional physiotherapy protocols provides additional functional benefits beyond standard care alone. Therefore, backward walking may serve as a simple, low-cost, and clinically effective adjunct intervention for improving outcomes in patients with knee osteoarthritis.

Keywords

Knee Osteoarthritis, Backward Walking Training, Conventional Physiotherapy, Quadriceps Strength, WOMAC Scale, Pain Reduction

HHA-06

Addressing Microbial and Biosecurity Threats through Ayush (Ayurveda)-Driven One Health Frameworks

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The growing prevalence of emerging microbial threats, antimicrobial resistance, and biosecurity challenges affecting human, animal, plant, and environmental systems necessitates integrated and preventive approaches. The One Health framework has been widely recognized for addressing such interconnected risks. Within this framework, AYUSH systems represent established traditional knowledge domains with potential relevance to sustainable biosecurity and ecosystem health. A conceptual and integrative review methodology was employed, drawing on classical Ayurveda literature, peer-reviewed scientific studies, and relevant policy documents related to microbial threats, biosecurity, and One Health. Evidence pertaining to antimicrobial activity, immunomodulation, plant health protection, and ecological sustainability was systematically examined. Areas of convergence between AYUSH-based interventions and modern tools for surveillance, ecosystem monitoring, and risk management were identified. The review indicates that Ayurveda encompasses preventive and supportive measures aligned with One Health objectives. Plant-based formulations and practices documented in Ayurveda have been reported to exhibit antimicrobial, anti-inflammatory, and bio-protective properties. In addition, traditional approaches to soil health, natural pest management, and ecological balance were found to support plant and environmental health, thereby contributing indirectly to biosecurity preparedness. Integration of AYUSH principles into One Health strategies may contribute to reducing dependence on chemical inputs, mitigating the development of antimicrobial resistance, and strengthening ecosystem resilience. Nevertheless, limitations related to standardisation, evidence generation, and operational integration remain. Addressing these challenges will require interdisciplinary research, harmonised validation frameworks, and institutional coordination. AYUSH (Ayurveda)-driven One Health frameworks may serve as complementary approaches for addressing microbial and biosecurity threats. Systematic integration of traditional knowledge with contemporary scientific and policy mechanisms has the potential to enhance ecosystem monitoring, preventive biosecurity, and sustainable health security.

Keywords

One Health, Ayurveda, Biosecurity, Microbial Threats, Ecosystem Health

HHA-07

Antimicrobial Resistance in Human Health Associated with Raw Fish Consumption Habit- A Review

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Antimicrobial resistance (AMR) represents a major and escalating global public health challenge, with foodborne exposure pathways receiving increasing attention. The consumption of raw or minimally processed fish, including sushi, sashimi, ceviche, and related products constitutes a significant yet underappreciated route for human exposure to antimicrobial-resistant bacteria. In aquaculture systems, the prophylactic and therapeutic use of antibiotics exerts selective pressure that promotes the emergence and persistence of resistant bacterial populations in cultured fish, rearing water, and surrounding aquatic environments. These bacteria may survive post-harvest handling, storage, and distribution processes, thereby retaining their potential to colonize or infect humans upon consumption of raw fish. Aquatic ecosystems facilitate the horizontal transfer of antimicrobial resistance genes among bacterial communities, further amplifying the dissemination of AMR. Factors such as traditional dietary practices, inadequate cold-chain management, environmental contamination, and insufficient regulatory oversight can exacerbate the risk of resistant bacteria entering the human food chain. This review highlights the interconnected roles of antibiotic use in aquaculture, environmental reservoirs of resistance, and raw fish consumption in the propagation of AMR. Strengthening antimicrobial stewardship in aquaculture, implementing routine surveillance of raw fish products, and enhancing public awareness of food safety practices are critical interventions to mitigate AMR risks while maintaining cultural and culinary traditions.

Keywords

Sashimi, Aquaculture, Antibiotics, Antibiotic-resistant bacteria, Seafood safety, Public health

HHA-08

In Vitro and In Silico Antifungal Activity of *Desmodium triflorum* Against Vulvovaginal Candidiasis

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Vulvovaginal candidiasis (VVC) is a common fungal infection among women of reproductive age, predominantly caused by *Candida albicans*. The increasing resistance of *C. albicans* to conventional antifungal drugs necessitates the exploration of alternative therapeutic agents, particularly from medicinal plants. The present study evaluates the antifungal potential of *Desmodium triflorum* leaf extracts through in vitro, phytochemical, GC–MS, ADME, PASS, and molecular docking approaches targeting secreted aspartyl proteinase-1 (Sap1), a key virulence factor involved in mucosal infection. Leaf extracts of *D. triflorum* were prepared using hexane, ethyl acetate, and methanol solvents. Among these, the methanolic extract showed the highest percentage yield (2.83%) and exhibited significant antifungal activity against *C. albicans* (MTCC 183), producing a zone of inhibition of 12 mm, while hexane and ethyl acetate extracts showed no activity. Phytochemical screening of the methanolic extract revealed the presence of flavonoids, alkaloids, tannins, glycosides, terpenoids, saponins, phenols, and steroids. GC–MS analysis identified thirty phytocompounds, including N-hexadecanoic acid; phytol, stigmasterol, and stigmast-5-en-3-ol.ADME and toxicity analysis showed that sixteen compounds possessed favorable drug-likeness properties. PASS prediction confirmed antifungal and anti-inflammatory activities for several compounds. Molecular docking studies against Sap1 (PDB ID: 2QWZ) demonstrated that stigmasterol exhibited the strongest binding affinity with a Glide score of −2.85 kcal/mol, forming a stable interaction with the active site residue GLY-220. The findings suggest that *Desmodium triflorum*, particularly its methanolic leaf extract and bioactive compounds, holds promise as a potential natural antifungal agent for the management of vulvovaginal candidiasis.

Keywords

Desmodium triflorum, Vulvovaginal candidiasis, *Candida albicans*, Antifungal activity, GC–MS

HHA-09

Antimicrobial Resistant Gene Profile of the Pathogenic Bacteria from Livestock, the Agricultural Sector and its Impact on Community Public Health

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Antimicrobial Resistance has not only been a challenge for all but has become a reality for the whole globe. Drug resistant Bacterial infections impact animal and plant health threaten food security. The evolution of AMR is a natural phenomenon, but overuse of multivalent drugs accelerated significantly. The One Health approach is a solution for AMR. Livestock samples have been collected from three districts of A & N Groups of Islands. Food animal includes Poultry, Goat, Pigs, Cattle & Buffalo Milk, water etc., from all samples Gram negative bacteria *E. coli*, and Gram-positive bacteria *Staphylococcus aureus*, *CONS* have been isolated. Molecular confirmation detection of gene for *E. coli* is done by UidA (β-D-galactosidase) and *Staphylococcus aureus* by thermonuclease (nuc) gene or 23S rRNA. Antibiotic susceptibility testing. A drug profile for each bacterial isolate has been carried out after the molecular identification by the disk diffusion method. ESBL Screening is necessary because these are the enzymes that mediate resistance against third-generation Cephalosporins i.e., CAZ, CTX, CTR & monobactams, such as Aztreonam, but do not mediate IPM & CX. Extended spectrum β-Lactamase enzymes are TEM-1 (AMP Resistant), SHV, CTX-M β (clavulanic acid) AmpC β- lactamase encoded on the chromosome's mediate resistance Cefoxitin, Penicillin and β-lactamase inhibitor clavulanic acid. These enzymes show a high level of mutation. Similarly, detection of *MRSA* & *MRCoNS* is to be done. It shows resistance profile to Cefoxitin or Oxacillin. Molecular detection of the mecA & mecC gene can be confirmed after the disk diffusion. Susceptibility towards Penicillin and Vancomycin, isolates that show resistance to vancomycin may be further processed for the presence and detection of VanA & VanB resistant genes. AMR data profiling will generate a database worldwide to record the zone reading of each isolated bacterium. AMR Surveillance can easily modify this plasmid-mediated horizontal gene profiling and Resistance gene entering from livestock into the food chain.

Keywords

Livestock Sample, Antibiotic susceptibility, ESBL, AmpC β- lactamase, Cephalosporins, *MRSA*, *MRCoNS*, mecA & *mecC gene*

HHA-10

Molecular Characterization and Genomic Analysis of *Corynebacterium pseudotuberculosis* (CP) causing Caseous Lymphadenitis in Andamani goats from South Andaman

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Caseous Lymphadenitis (CLA) is a chronic infectious disease of small ruminants caused by *Corynebacterium pseudotuberculosis*, resulting in significant economic losses due to reduced productivity and carcass condemnation. The present study was undertaken to isolate and undertake detailed molecular characterisation of *C. pseudotuberculosis*, focusing on virulent genes, antimicrobial resistance and whole genome analysis of Andaman isolates. Genotypic confirmation was achieved using standard molecular markers, including 16S rRNA and *rpoB* genes. The virulence-associated genes, including *pld* and *pip* were detected by PCR amplification followed by sequencing and sequence analysis. Sequencing of 16S rRNA gene confirmed the species identity by showing 100% sequence similarity to *C. pseudotuberculosis*. Phylogenetic analysis based on partial *rpob* sequences revealed the Andaman isolates clustered within the *C. pseudotuberculosis* biovar *ovis*. Antimicrobial susceptibility testing of isolates against antibiotics was also performed. Whole genome sequencing of four *C. pseudotuberculosis* isolates was carried out using Illumina platform (2×150bp). Genome analysis, annotation and comparative genomic analysis revealed high genome coverage (>99%) with reference strains and identified 2,100 coding sequences per isolate. Several virulence determinants and antibiotic resistance -associated genes were identified through genomic analysis. These findings are the baseline epidemiological and genetic data, which are essential for disease surveillance, development of control strategies and antimicrobial stewardess in the ANI.

Keywords

Corynebacterium pseudotuberculosis, Caseous lymphadenitis, Andamani goats, Whole Genome Sequencing, Antimicrobial Resistance and Andaman and Nicobar Islands

HHA-11

Awareness-Driven Behavioral Processes and Sustainable Health Food Choices Under the One Health Framework: Evidence from the Andaman and Nicobar Islands

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This study examines how value–belief–norm processes influence sustainable and health-oriented food choices within the One Health framework, with specific focus on the Andaman and Nicobar Islands. Grounded in Value–Belief–Norm (VBN) theory, the research proposes that environmental–health value orientation shapes beliefs about the consequences of food choices and the interconnectedness of human, environmental and health outcomes. These beliefs are expected to activate responsibility attribution and personal norms, leading to responsible food choice intentions. Data will be collected from residents and visitors in the Andaman and Nicobar Islands through purposive sampling using on-site surveys at food retail locations, with a target sample of approximately 400 respondents. Measures include environmental–health value orientation, consequence beliefs, perceived human–environment–health interconnectedness, awareness of consequences, ascription of personal responsibility and personal norms. Behavioural outcomes include sustainable and healthy food purchase intentions and willingness to pay. Data will be analysed using confirmatory factor analysis and PLS-SEM. Expert interviews will be conducted to support construct validation and contextual interpretation. The study is expected to show that stronger environmental–health values significantly strengthen consequence and interconnectedness beliefs, which increase responsibility attribution and activate personal norms toward responsible consumption. Personal norms are expected to positively predict sustainable and healthy food purchase intentions and willingness to pay. The findings are expected to support the value–belief–norm pathway in explaining responsible food choice behavior in an ecologically sensitive island context. The results will inform public health and sustainability communication strategies for eco-sensitive regions.

Keywords

Value–Belief–Norm Theory, One Health Framework, Sustainable Food Choices, Environmental–Health Values, Responsible Consumption Behavior, Andaman and Nicobar Islands

HHA-12

One Health–Based Pharmacovigilance in Ayush Systems of Medicine: Strengthening Drug Safety Through Research

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Pharmacovigilance for AYUSH systems of medicine is a critical yet underexplored component of the One Health framework, which integrates human, animal, plant, and environmental health for holistic risk management. AYUSH formulations derived largely from medicinal plants, minerals, and natural resources are deeply interconnected with ecosystem health, biodiversity conservation, and sustainable resource utilisation. Ensuring their safety, therefore, extends beyond patient-level outcomes to broader biosecurity and environmental considerations. Despite long-standing traditional use, AYUSH medicines face contemporary challenges such as adverse drug reactions (ADRs), herb–drug and herb–herb interactions, variability in raw materials, contamination with heavy metals, pesticides, or adulterants, and ecological stress on medicinal plant sources. A robust, research-oriented pharmacovigilance system is essential to address these issues systematically. The Pharmacovigilance Programme for AYUSH (PPVAYUSH), initiated by the Ministry of Ayush, Government of India, provides a structured mechanism for ADR reporting, causality assessment, signal detection, and regulatory feedback. Integrating AYUSH pharmacovigilance within the One Health paradigm strengthens biosecurity by linking drug safety surveillance with ecosystem monitoring, quality control of raw materials, and sustainable harvesting practices. Pharmacoepidemiological studies, post-marketing surveillance, and real-world data generation support evidence-based risk–benefit evaluation while safeguarding both human health and environmental integrity. This convergence promotes responsible use of biodiversity, prevents transboundary biological risks, and enhances food and medicinal security. In conclusion, One Health–oriented pharmacovigilance bridges traditional knowledge with modern scientific evidence, ensuring the safety, quality, and sustainability of AYUSH medicines. Strengthening interdisciplinary collaboration, standardized reporting, and advanced analytical methods is pivotal for resilient healthcare systems and the global credibility of AYUSH practices.

Keywords

One Health, AYUSH Pharmacovigilance, Drug Safety, Ecosystem Health

HHA-13

Zoonoses Due to Rats in India and its Associated Factors

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Zoonosis, as is known, can be linked to a lot of factors which include the developmental status, level of poverty, food security and climatic factors of a country, to name a few. Rat-borne zoonosis (RBZs) can be linked mainly to the socio- economic status of the area of concern, which forms a vicious cycle of further spread of such diseases. The increasing incidence of RBZDs, which are transmitted by bacterial, viral, fungal and parasitic organisms, primarily infects humans through contaminated food or water from infected rodents, or through vector organisms. Due to pandemic situations associated with RBZDs, much attention has been paid to identifying and managing emerging disease-outbreaks in India. Factors such as high population density, diverse ecological landscapes, and close human-animal interactions may drive the risk of RBZDs, particularly in populated countries like India. Therefore, the Government of India has implemented a programme on "One World, One Health: Prevent Zoonoses" to address the interconnectedness of human, animal, and environmental health. This strategy spotlights the need to understand the dynamic relationships among rodent populations, associated pathogens, human exposure pathways, and environmental determinants. Hence, this study comprehensively reviewed the incidence, risk and management of RBZDs, and related morbidities and mortality. Our study highlights the necessity of inter-sectoral collaboration among public health institutions, veterinary sciences, and environmental agencies through organizations like National Vector Borne Disease Control Programme (NVBDCP), National Centre for Disease Control (NCDC), National Standing Committee on Zoonoses (NSCZ) and National One Health Programme for Prevention and Control of Zoonoses (NOHP-PCZ) to mitigate the burden of RBZDs across India.

Keywords

Rat-Borne Zoonotic Diseases, One Health Approach, Rodent-Associated Pathogens, Public Health Surveillance, Intersectoral Collaboration, India

HHA-14

Application of Machine Learning Polymer Models Explaining Schizophrenia in COVID-19 Patients

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Machine learning (ML) methods are used in genomics studies to elucidate the three-dimensional structure of chromatin in the genome. In chromatin, the formation of a loop in the 3D structure controls the expression of specific genes in transcription and replication levels. There is a 100% sequence similarity between SARS CoV2 and the human genome for seventy-one nucleotide sequences in chromosome 2. This short stretch of nucleotide sequence has been thoroughly analyzed with the help of the UCSC Genome Browser. A few machine learning models for the construction of a 3D structure of the human genome for this specific chromosomal region have been explored. In specific chromosomal regions, the presence of a protein-coding gene (KCNJ3), enhancer, promoter and LTR region is identified. With the help of machine learning methods, the loop formation on the genome structure has been confirmed. Topologically Associating Domains (TADs) in this specific chromosomal region are also predicted. The loop formation along the chromosomal region facilitates the binding of RNA polymerase II and CTCF in the promoter region of the KCNJ3 gene. During transcription of the KCNJ3 gene, epigenetic control of this gene expression occurs through acetylation of the histone protein present in the nucleosome complex. Thus, the rate of gene expression of *KCNJ3* gene increases in COVID-19 patients, which raises the K^+ concentration inside the cells, resulting in schizophrenia in the brains of COVID-19 patients. In summary, the study demonstrates the utility of machine learning approaches in resolving fine-scale chromatin architecture and identifying functional loop formations within specific genomic regions. These findings provide a structural–functional framework for investigating host–virus genomic interplay and its potential neurobiological consequences. However, experimental validation through chromatin conformation capture and transcriptomic analyses is essential to substantiate the proposed mechanistic link.

Keywords

3D Chromatin Looping, Machine Learning Models, KCNJ3, Schizophrenia

HHA-15

Potentiating Host Immunocompetence and Cellular Defense: The Role of Aged Black Garlic Extract (ABGE) as a Natural Alternative to Conventional Therapeutics

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The rise of antimicrobial resistance and zoonotic challenges necessitates the development of novel therapeutic strategies that move beyond conventional chemotherapy and radiotherapy. This study investigates Aged Black Garlic Extract (ABGE) as a potent bioactive agent with significant antibiosis, antioxidant, and immunomodulative properties. Using *in vitro* human gastric cancer models and *in vivo* murine models, research demonstrates that ABGE induces dose-dependent apoptosis and inhibits pathological growth. Crucially, ABGE was found to significantly increase serum Interleukin-2 (IL-2) levels and enhance the indices of the spleen and thymus, indicating a robust stimulation of the host immune response. By bolstering innate immunity and offering a safe, non-toxic pharmacological profile, ABGE presents a viable "One Health" pathway for reducing reliance on synthetic drugs and improving resistance against biological threats.

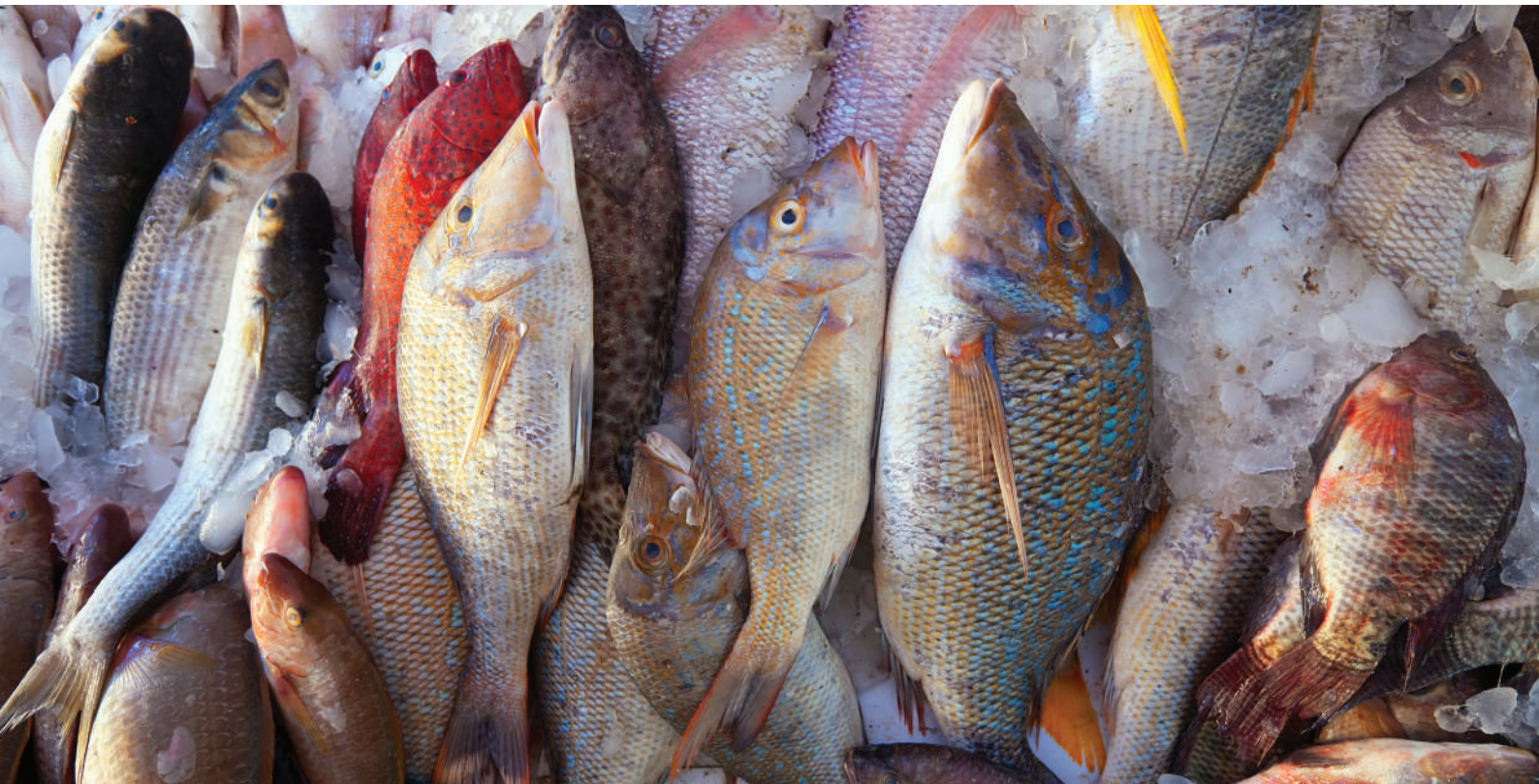
Keywords

Aged black garlic extract, Immunomodulation; Interleukin-2; Antibiosis; Apoptosis; One Health

Theme 3

Enhancing Aquatic Animal Health Through Innovations in Disease Surveillance, Zoonotic Risk Management and Antimicrobial Stewardship Under One Health Framework

Aquatic Health and Surveillance-AHS (01-40)



AHS-01

Interlinked Gene Expression Pattern of Immune Response and Antimicrobial Defense Response Genes Between Organs and Sexes of Zebrafish

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Zebrafish are pivotal in modeling human disease and immune responses; however, most transcriptomic studies overlook sex-specific gene expression. We examined how female and male zebrafish differ in immune and antimicrobial gene expression, focusing on brain, liver, and kidney tissues under control conditions. RNA-seq data from 30 paired-end samples (brain, liver, kidney) of male and female zebrafish were aligned to GRCz11 using HISAT2. Differential expression ($log_2FC \geq 1$ or ≤ -1; $q \leq 0.05$) was quantified via StringTie/Cuffdiff. Enrichment analyses were conducted using Gene Ontology (PantherDB) and KEGG Mapper. Focus was placed on immune and antimicrobial defense-related genes, visualized through volcano plots and heatmaps. Tissue-specific expression comparisons employed two-tailed t-tests. Females showed more upregulated genes (URGs) in the brain and liver, whereas kidney expression was balanced. Immune processes were enriched by brain URGs (1.8 %) but by liver downregulated genes (DRGs, 1.7 %). Pathway enrichment highlighted female brain dominance in immunity e.g., Salmonella, cytokine signalling, while the liver showed liver-associated DRG bias. Antimicrobial gene analysis revealed brain-upregulated and liver-downregulated bacterial and viral defense genes in females; however, yeast/fungal defense genes were similarly expressed across tissues. Immune response genes, especially those tied to innate/adaptive immunity, were constitutively higher in the female brain versus the liver or kidney. Chromosomal mapping revealed hotspots on chromosomes 1 and 2 for immune genes, with co-expression of gene clusters (e.g., mpeg1.1/prf1.5). Sex-specific and tissue-dependent immune gene expression exists in zebrafish: female brains upregulate immune pathways, while livers exhibit opposite trends. These findings underscore the importance of accounting for sexual dimorphism and organ-specific expression in transcriptomic studies related to immune responses.

Keywords

Differential Gene Expression, Transcriptomic Gene Analysis, Immune Response Genes, Antimicrobial Defense Responses, Sexual Dimorphism, Zebrafish Model

AHS-02

Growth and Survivability of *Labeo rohita* (Hamilton, 1822) Spawns in *Moina Micrura* Augmented Biofloc-Based Nursery System

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Biofloc technology is an intensive, water-efficient aquaculture system; however, it lacks sufficient zooplankton live-feed diversity required for nursery rearing of larvae. The present study aimed to assess the potential of *Moina micrura* augmentation in a biofloc system to improve the growth and survival of *Labeo rohita* from the spawn to fry stage. A 30-day experiment was conducted using stocking densities of 5,000, 6,000, and 7,000 spawn m^{-3} in both biofloc (T1, T3, T5) and zoofloc (T2, T4, T6) treatments. The floc was prepared using jaggery, and a C:N ratio of 10-15:1 was maintained, which enabled the production of a floc volume of 8–10 mL L^{-1}. High fry survivability (79–91%) was achieved, which decreased significantly ($p \leq 0.05$) with increasing stocking density in both biofloc and zoofloc treatments. Fry length (29.7 ± 1.47 mm) and weight (212.2 ± 4.49 mg) of *L. rohita* were significantly higher in the T2 treatment compared to the other treatments. The proximate composition of biofloc did not vary significantly, whereas the muscle crude protein content of fry increased significantly ($p \leq 0.05$) in zoofloc-based treatments compared to biofloc treatments at the same stocking density. Water quality parameters did not vary significantly, except for total suspended solids (TSS) and total dissolved solids (TDS). The study demonstrates that augmentation of *Moina micrura* in a biofloc system (zoofloc) significantly enhances growth performance and muscle protein deposition of *Labeo rohita* fry without compromising water quality. While survival declined with increasing stocking density, optimal performance was achieved at moderate density under zoofloc conditions. The integration of targeted live-feed enrichment within biofloc systems thus offers a practical strategy to improve nursery rearing efficiency in intensive, water-efficient aquaculture. Further refinement of stocking density and live-feed dynamics could enhance scalability and economic viability.

Keywords

Biofloc, Zoofloc, *Labeo rohita, Moina micrura,* Intensive culture

AHS-03

Sequential Haematological and Hematobiochemical Alterations in Nile Tilapia (*Oreochromis niloticus*) During Experimental Tilapia Parvovirus Infection

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Disease caused by Tilapia parvovirus (TiPV) poses serious threats to productivity in commercial Tilapia culture operations. Haematological parameters indicate physiological stress, immune activation, and disease severity in fish during viral infections. Although TiPV-associated mortality and tissue pathology have been reported, experimental data describing temporal haematological and hematobiochemical alterations during TiPV infection are scarce under controlled conditions. This study evaluated sequential haematological and hematobiochemical responses of Nile tilapia (*Oreochromis niloticus*) following TiPV infection, focusing on erythropoietic suppression, immune activation, and systemic physiological imbalance. Healthy Nile tilapia fingerlings were challenged with an optimized median lethal dose (LD_{50}) of TiPV. Blood samples were collected from 0 to 45 days post-infection (dpi). Haematological parameters, including haemoglobin (Hb), red blood cell (RBC) count, hematocrit (HCT), white blood cell (WBC) count, platelet count, and erythrocyte indices (MCV, MCH, MCHC) were analyzed. Serum biochemical indices, including total protein, albumin, globulin, and albumin-to-globulin ratio, were evaluated. TiPV infection caused anemia characterized by reduced Hb, RBC, and HCT values, with peak severity at 10 dpi. Leukocytosis occurred during the acute phase, indicating innate immune activation, while thrombocytopenia suggested hematopoietic disruption. Elevated globulin levels, hypoalbuminemia, and reduced albumin-to-globulin ratios reflected hepatic dysfunction and enhanced humoral immune response. The study shows TiPV induces severe hematopoietic and metabolic disturbances in Nile tilapia, and hematological profiling can serve as an effective diagnostic tool for early detection and monitoring of TiPV infection in aquaculture systems.

Keywords

Tilapia parvovirus, *Oreochromis niloticus*, Hematopoietic dysfunction, Immune activation, Serum biochemical biomarkers

AHS-04

Human-Jellyfish Interactions in Coastal Fisheries: Indigenous Sting Management Practices During Jellyfish Bloom Events Along the Maharashtra Coast

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Jellyfish blooms represent an emerging *One Health* challenge by linking marine ecosystem changes with human health risks and the sustainability of coastal fisheries. This study examines human–jellyfish interactions along the Maharashtra coast, focusing on fishers' perceptions of operational impacts and indigenous sting management practices during bloom events recorded between 2017 and 2025. The perceived intensity of hindrance to commercial fishing operations decreased in the following order: increased catch-sorting time > painful stings > change in fishing grounds > temporary fishery closure > clogging and bursting of nets > reduction in fish catch. Among these, 94.54% of respondents identified painful jellyfish stings as a major occupational health concern affecting work efficiency and well-being. Species commonly interacting with fisheries included the cubozoan *Chiropsoides buitendijki*; scyphozoans *Rhopilema hispidum*, *Cephea cephea*, and *Chrysaora chinensis*; and the hydrozoan *Physalia physalis*. Stings from *C. chinensis* and *P. physalis* were reported to cause severe pain lasting 8–12 hours, posing acute health risks to exposed fishers. Within a *One Health* context, fishers depend on traditional ecological knowledge to manage sting-related health impacts in remote marine settings. Indigenous remedies documented included application of coconut oil; leaf extracts of *Ipomoea pes-caprae*; lemon juice; toothpaste; sea sand; kokam (*Garcinia indica*) algal or vinegar; washing with seawater to remove adherent nematocysts; tamarind water; onion leaf extract; and, in some cases, ingestion of human urine for immediate pain relief. Reported symptoms included skin and eye redness, burning sensation, increased palpitation, and intense pain lasting 2–4 hours. Severe envenomation, particularly from box jellyfish and *P. physalis*, involving extensive skin exposure or multiple stings, resulted in lymph node swelling and prolonged pain for 3–5 days, often requiring medical consultation. This study provides baseline evidence integrating marine bloom ecology, occupational health, and indigenous knowledge, highlighting the relevance of a *One Health* approach for enhancing preparedness, risk mitigation, and resilience of coastal fishing communities.

Keywords

One Health, Gelatinous zooplankton, Sting, ITK, Venom, Cnidocytes

AHS-05

Assessment of Fish Diversity in the Lower Stretch of Ulhas, Kalu and Bhatsa Rivers, Maharashtra

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The Western Ghats, a global biodiversity hotspot, support a rich and diverse ichthyofauna, especially in rivers originating from this range. However, comprehensive studies on river systems remain limited. Monthly sampling was conducted from December 2024 to July 2025 to document the ichthyofaunal diversity in the lower stretches of the Ulhas, Kalu, and Bhatsa, west-flowing rivers originating in the Western Ghats, Maharashtra. Fish samples were collected from the fishermen in the lower stretches of the rivers, identifying 28 species across 9 orders, 13 families, and 23 genera. Cypriniformes dominated (12 species), followed by Siluriformes and Cichliformes. Cyprinidae and Danionidae were the most represented families, and *Garra mullya, Dawkinsia filamentosa, Amblypharyngodon mola*, and *D. filamentosa* as the dominant species. Taxonomic identification of fish also includes the hard parts. Otolith analysis for 19 species, targeting the largest of the three otoliths morphology. Sagitta, lapillus, and asteriscus otoliths showed distinct morphologies across families, ranging from spindle-shaped in Mastacembelidae to pentagonal in *Channa punctata*. Vertebrae counts and scale morphology (from pre-dorsal and lateral line scales) were also documented. The ichthyofauna included endemic and threatened species such as *Mystus malabaricus* (NT), *Wallago attu* (VU), and *Ompok bimaculatus* (NT), emphasizing the ecological value of the region. Shannon-Wiener range between 1.475–2.37, Evenness index (J') varied between 0.39 and 0.67, Margalef's index ranged between 0.39-0.67, and Simpson's diversity index (1–D) ranged from 0.58 to 0.89**.** The diversity indices reveal a moderately stable fish community structure with varying dominance patterns, reflecting differential habitat quality and seasonal influences in the lower stretches of the Ulhas, Kalu, and Bhatsa rivers. Despite this richness, anthropogenic pressures, including pollution, damming, sand mining, and industrial discharge, are degrading habitats and threatening fish diversity, which calls for conservation and management measures.

Keywords

Ichthyofauna, Riverine, Biodiversity, Maharashtra, Western Ghats

AHS-06

First Comprehensive Study of Ichthyofaunal Diversity and Assemblage Structure in the Ulhas River, Maharashtra

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The Western Ghats riverine system is one of India's biodiversity hotspots facing escalating threats. This is the first comprehensive study on fish diversity and assemblage structure in the freshwater ecosystem of the Ulhas River. Ichthyofaunal surveys were conducted at five sites along the river from June 2024 to November 2025 through experimental fishing and a local fishery-dependent sampling technique. A total of 59 fish species, including 7 exotic species, belonging to 11 orders, 21 families, and 42 genera, were identified. Most common fish orders and families were Cypriniformes (n=28), followed by Siluriformes (n=10), Anabantiformes (n=5), Cyprinidae (n=19), and Danionidae (n=7), respectively. According to the IUCN Red List of Threatened Species, 48 species fall under Least Concern (LC), four are Vulnerable (VU), 3 are Data Deficient (DD), 3 are Near Threatened (NT), and 1 as Endangered. Relative abundance analysis revealed *Garra mullya* (27.39%) as the most abundant fish species, followed by *Systomus sarana* (9.98%), *Puntius amphibius* (6.81%), *Puntius sophore* (6.33%), *Mystus cavasius* (6.12%), *Dawkinsia filamentosa* (5.69%) and *Rasbora daniconius* (5.53%). The Shannon-Wiener (H') and Simpson's (1-D) indices exhibited seasonal variation, with the highest value recorded during the monsoon (2.89) and (0.91), respectively. Margalef's (Dmg) index value showed the highest during post-monsoon (6.2). Pielou's evenness index (J) value of 0.7 indicates an even distribution of fish species. Spatial variation in species composition was evident as the highest diversity was recorded at Apati (Ambarnath), likely to reflect greater habitat heterogeneity and reduced anthropogenic pressure. Less frequent occurrence of herbivores compared to higher-order consumers, specifically omnivores and carnivores, indicates ecosystem instability and alterations in the flow of energy across trophic levels. Research findings emphasized the necessity of implementing management measures, habitat restoration, and regular monitoring to protect native fish species in this rapidly degrading riverine ecosystem.

Keywords

Ulhas River, Fish abundance, Diversity index, Anthropogenic threats, Conservation

AHS-07

Immune-protective Potential of Selective Herbal Extracts against *Edwardsiella tarda* in *Labeo calbasu* Fingerlings

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The use of plant-derived immunostimulants offers a sustainable alternative for improving fish health and disease resistance in aquaculture. This study investigated the effects of dietary supplementation of three selected herbal extracts on immune responses, biochemical parameters, and resistance to *Edwardsiella tarda* in *Labeo calbasu* fingerlings (average weight 4.58 ± 0.94). The experimental used three herbal extracts, each exract have three different levels and one control i.e., *Eclipta alba* (EA) at 0.01%, 0.1%, and 1%, *Cynodon dactylon* (CD) at 0.05%, 0.5%, and 5% and *Zingiber officinale* (ZO) at 0.05%, 0.5%, and 5%, fed to Calbasu fingerlings at 3% body weight twice daily for 60 days. Immunological assays revealed that EA at 1%, CD at 0.5-5%, and ZO at 0.5-5% induced pronounced stimulation of innate immune responses, including respiratory burst activity, phagocytic index, lysozyme, antiprotease, and myeloperoxidase activities. Humoral responses, measured through serum immunoglobulin concentrations, were also significantly elevated in treated groups. Upon challenge with *Edwarsiella tarda*, survival rates were significantly higher in all supplemented groups, confirming the protective role of these herbal extracts. In conclusion, dietary supplementation among the treatments, *C. dactylon* at 0.5% and *Z. officinale* at 5% exhibited superior growth performance, while *E. alba* at 1% was particularly effective in enhancing humoral immune responses. Comparative Efficacy among three extracts were analyzed through PCA and Chord diagram. Among the tested extracts, CD exhibited the highest immunostimulatory potential, followed by ZO, while EA showed comparatively lower efficacy. This variation may be attributed to the higher content of bioactive compounds such as alkaloids, flavonoids, pigments, phenolics, terpenoids, steroids, and essential oils in CD, along with their strong antioxidant properties. These findings underscore the potential application of medicinal plants as eco-friendly health-promoting additives in aquaculture.

Keywords

Cynodon dactylon, Dietary supplementation, *Eclipta alba, Edwarsiella tarda, Labeo calbasu, Zingiber officinale*

AHS-08

Water Spread Dynamics, Stocking Potential and Valuation of Watershed Sediment Retention Ecosystem Service: A Case Study from Ujjani Reservoir in Bhima River, India

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Effective fisheries and aquaculture planning in reservoirs requires a clear understanding of water spread dynamics and the availability of potential fish culture areas. Demarcation of zones for enclosed fish culture based on perennial and seasonal water spread facilitates optimal placement of culture facilities such as cages and pens, thereby avoiding overcrowding and ensuring efficient utilization of reservoir resources. The present study demonstrates a time-saving and efficient approach for water spread area analysis and site demarcation for enclosure culture compared to conventional methods. Reservoir watersheds also function as critical sediment retention systems, reducing excessive downstream sediment transport. This process enhances water quality and improves habitat conditions for aquatic organisms, thereby supporting sustainable fisheries and aquaculture development. However, identifying priority sites for soil conservation remains challenging due to the large data requirements of ecosystem-based models. Rapid economic development has caused significant land use and land cover (LULC) changes, which have altered sediment export dynamics within watersheds, although their impacts are still not well understood. In this study, the Integrated Valuation of Ecosystem Services and Tradeoffs (InVEST) Sediment Delivery Ratio (SDR) model was applied to estimate soil loss, sediment retention, and sediment export in the Ujjani Reservoir watershed, located in the drought-prone Solapur district. The analysis revealed an annual total soil loss of approximately 342.76 kilotons. Barren land was identified as the largest contributor to sediment export, accounting for about 27% of the total. Owing to existing forest cover, nearly 199.17 kilotons of sediment were retained annually. The economic cost associated with sediment yield was estimated at approximately USD 2.8 million. The findings provide valuable insights for policy formulation and watershed management, particularly in addressing land use change, soil erosion, and deterioration of reservoir water quality.

Keywords

Water spread, Production potential, Ujjani watershed, Reservoir Sedimentation, InVEST SDR model, Ecosystem Service Valuation

AHS-09

Potential Candidate Freshwater Ornamental Fishes of Andaman and Nicobar Islands–Need for conservation

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A wide variety of local and indigenous fish species with significant potential for the ornamental fish business can be found in the freshwater habitats of the Andaman and Nicobar Islands. Because of their remote location, these islands are home to rare freshwater fish with eye-catching colours, unusual body patterns, and intriguing behaviors that make them good choices for aquariums. *Aplocheilus andamanicus, Sicyopterus gara, Channa royi, Oryzias javanicus, Redigobius tambujon, Redigobius bikolanus, Butis butis,* and *Danio rerio* are among the species that have been identified as promising freshwater ornamental fish. The endemic killifish *Aplocheilus andamanicus* is particularly prized for its vivid colouring and tendency to live on the surface. Because of their adaptation to hill streams and freshwater habitats impacted by estuaries, *Sicyopterus garra* and gobiid species like *Redigobius tambujon, Redigobius bikolanus, and Butis butis* exhibit distinctive benthic activities that add to their aesthetic value. While *Channa royi* appeals to amateurs because of its remarkable body patterns and resilience, *Oryzias javanicus* is a small, tranquil schooling fish that is ideal for community aquariums. These fish live in a variety of freshwater habitats, including slow-moving rivers with clear, well-oxygenated water, streams, ditches, and forest pools. Most species can adapt well to captivity and accept artificial meals with ease. Unfortunately, their habitats are threatened due to anthropogenic activities like pollution, sand mining, habitat modification and invasive fish species. There is a need for conservation of these species to prevent local extinction for their long-term survival in the insular waters. In conclusion, the freshwater ornamental fishes of the Andaman and Nicobar Islands represent both a valuable bioresource and a unique component of the region's insular biodiversity. Sustainable exploitation through captive breeding, habitat protection, and regulated trade is essential to balance economic opportunities with ecological responsibility.

Keywords

Andaman Islands, Freshwater ornamental fishes, Endemic species, Aquarium trade

AHS-10

Biofloc-Origin *Bacillus tequilensis* BFT2 as a Dietary Prophylactic for Sustainable Disease Management in *Etroplus suratensis*

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The increasing demand for sustainable, non-antibiotic strategies in aquaculture has highlighted the potential of biofloc-derived probiotics to mediate disease prophylaxis and enhance fish health. Biofloc systems are recognized as rich reservoirs of beneficial autochthonous microorganisms with probiotic potential. This study evaluated the dietary prophylactic efficacy of a biofloc-derived probiotic, *Bacillus tequilensis* BFT2, on growth performance, gut health, hematobiochemical responses and disease resistance of *Etroplus suratensis* reared under clear-water conditions. The isolate was characterized for probiotic attributes, including tolerance to pH (4–8), bile salts (5%), NaCl (5%), phenol (0.2–0.6%), cell surface hydrophobicity, biofilm formation and amplification of probiotic-associated genes (*gpmM, bsh, ArcD, FbpA* and *LuxS*). Biosafety was confirmed through antibiotic susceptibility and pathogenicity assays. A 30-day feeding trial was conducted with two dietary treatments: commercial feed (CC) and probiotic-supplemented feed (CP). Growth parameters, feed conversion ratio (FCR), hematobiochemical indices, intestinal histomorphology and disease resistance following *Aeromonas veronii* challenge were evaluated. Fish fed the probiotic diet exhibited significantly improved growth performance, with higher final body weight and reduced FCR compared to the control group. Haemoglobin, erythrocyte count and total protein levels were significantly elevated in the CP group. Intestinal histology revealed increased villus length, indicating enhanced nutrient absorption and gut integrity. Following bacterial challenge, probiotic-fed fish showed reduced pathogen load, improved recovery of beneficial *Bacillus* populations and higher relative percentage survival. Overall, these findings demonstrate that biofloc-derived *Bacillus tequilensis* BFT2 functions as a safe and effective dietary prophylactic, enhancing growth, gut health and disease resistance in *E. suratensis*. The study highlights the potential of biofloc-origin probiotics as sustainable alternatives to antibiotics in finfish aquaculture.

Keywords

Biofloc technology, *Bacillus tequilensis*, Dietary probiotic, Disease prophylaxis, *Etroplus suratensis*

AHS-11

Antimicrobial and Proteolytic Properties of B*acillus* spp. from Mackerel Fish Gut: A One Health Perspective

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The One Health framework recognizes the interconnection between human, animal, and environmental health, particularly in addressing the growing challenge of antimicrobial resistance. Fish gut microbiota represents an important reservoir of beneficial microorganisms with potential applications across multiple health sectors. *Bacillus* species, widely distributed in diverse ecological niches, are well known for their ability to produce bioactive metabolites and extracellular enzymes of biomedical and industrial importance. In the present study, *Bacillus* species isolated from the gut of mackerel fish (*Rastrelliger kanagurta*) were screened for antimicrobial and proteolytic activities. Two isolates, identified as *Bacillus cereus* and *Bacillus subtilis*, were screened for antagonistic activity against the fish-borne pathogens *Aeromonas hydrophila* and *Vibrio parahaemolyticus* using the disc diffusion method. Both isolates exhibited notable antimicrobial activity, with *B. cereus* producing inhibition zones of 10.7 ± 0.6 mm against *A. hydrophila* and 11.3 ± 0.6 mm against *V. parahaemolyticus*. Similarly, *B. subtilis* showed inhibition zones of 11.0 ± 1.0 mm and 10.3 ± 0.6 mm against *A. hydrophila* and *V. parahaemolyticus*, respectively. Proteolytic activity was confirmed using skim milk agar, where clear zones of casein hydrolysis indicated extracellular protease production. These findings highlight the potential role of fish gut–associated *Bacillus* species in pathogen suppression, gut health enhancement, and nutrient metabolism, supporting integrated One Health strategies aimed at reducing dependence on conventional antimicrobials.

Keywords

Antimicrobial Resistance (AMR), One Health Framework, Fish gut, *Bacillus sp,* Antimicrobial activity

AHS-12

Aquatic Animal Diseases in the Andaman and Nicobar Islands: A One Health Perspective

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Fisheries serve as a vital livelihood sector in the Andaman and Nicobar Islands (ANI), where freshwater aquaculture predominates. Historically presumed to be free from major aquatic animal diseases, recent intensive surveillance under the National Surveillance Programme for Aquatic Animal Diseases has revealed a broad spectrum of pathogenic threats affecting both freshwater and marine ecosystems. Aquatic animal health in ANI is increasingly compromised by parasitic, bacterial, viral, fungal, and environmental or nutritional deficiency-related diseases impacting economically significant finfish and shellfish species. Notable parasitic infestations such as myxoboliasis, argulosis, lernaeasis, and isopod infections have been documented in both cultured and wild populations. Marine species are particularly affected by isopods (*Norileca*, *Renocila*) and copepods (*Caligus*, *Lernaeenicus*). Viral pathogens like White Spot Syndrome Virus (WSSV), Infectious Hypodermal and Hematopoietic Necrosis Virus (IHHNV), and Laem-Singh Virus (LSNV), along with bacterial pathogens, significantly impact shrimp populations. Fungal infections (*Achlya*, *Aphanomyces*) and environmental/ nutritional imbalances further exacerbate health challenges. This study documents key disease outbreaks, pathogen diversity, and host-specific patterns across the islands, emphasizing the urgent need for a region-specific robust biosecurity framework, early diagnostic systems and stakeholder capacity building. From a One Health perspective, the emergence of these diseases illustrates the interconnectedness of aquatic health, environmental changes, and human livelihoods. The rising incidence of exotic pathogens, often linked to seed import and insufficient biosecurity, necessitates enhanced surveillance and ecosystem-based health management tailored to the unique insular context of ANI. This study outlines a practical roadmap for disease management and sustainable aquaculture development, ensuring food security, economic resilience, and biodiversity conservation in these fragile island ecosystems.

Keywords

Aquatic Animal Diseases, Surveillance, Biosecurity, One health, Andaman and Nicobar Islands

AHS-13

Assessment of the In-Vitro Selective Killing Property of *Carica papaya* Extracts against Aquatic Microbes

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The present study investigates the selective antibacterial property of *Carica papaya* ethanol extracts. Yield percentage, phytochemical screening, antimicrobial activity like agar well and disc diffusion, Minimum inhibitory concentration and Minimum bactericidal concentration, Nucleic acid leakage, and biofilm inhibition assays were performed. Phytochemical screening revealed that methanolic extracts contained the richest diversity of secondary metabolites such as alkaloids, phenols, flavonoids, tannins, and terpenoids. Ethanol and acetone also extracted glycosides and flavonoids. Antimicrobial activity, evaluated using agar well and disc diffusion assays, showed that *C. papaya* ethanol extracts showed selective inhibition of pathogens with minimal effect on *Lactobacillus plantarum* and *Bacillus oceanisediminis*. Nucleic acid leakage assays showed significant leakage in *Aeromonas veronii* treated with *C. papaya* ethanol extract at 2xMIC after 6 hours, while *L. plantarum* remained stable. Biofilm inhibition was highest in *A. veronii* (67%) and lowest in *L. plantarum* (30%). These results suggest that *C. papaya* ethanol extracts are promising selective antibacterial agents for aquaculture, offering pathogen control without harming beneficial microbiota. This study opens a new avenue for the selective killing of bacterial pathogens in aquaculture. However, in vivo tests and molecular mechanism studies must be explored soon.

Keywords

Carica papaya, *Aeromonas veronii*, *Bacillus oceanisediminis*, Selective killing, Nucleic acid leakage

AHS-14

Ecological significance of Mudskippers in the Andaman and Nicobar Islands

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Mudskippers (Teleostei: Gobiidae: Oxudercinae) are amphibious fishes inhabiting mangrove-associated mudflats and intertidal ecosystems, where they play a vital role in maintaining ecosystem structure and function. In the Andaman and Nicobar Islands, mangroves provide essential ecosystem services, including shoreline stabilization, nutrient cycling, and support to fisheries; however, these ecosystems are increasingly threatened by anthropogenic pressures such as plastic pollution and sediment contamination. The present study highlights the ecological significance of mudskippers and evaluates their potential as bioindicators of mangrove and mudflat ecosystem health. Field observations and literature-based assessments were used to examine mudskipper habitat associations, burrowing behaviour, feeding ecology, and interaction with sediments in mangrove mudflats of the Andaman region. Emphasis was placed on their exposure to sediment-bound pollutants, including microplastics and associated toxic substances. Mudskippers were found to contribute significantly to ecosystem services through sediment bioturbation, enhancement of nutrient availability, and regulation of benthic microfaunal communities. Their burrowing activity improves sediment aeration and influences mangrove root respiration, indirectly supporting mangrove productivity. Results indicate that mudskippers, due to their benthic lifestyle, high site fidelity, and direct ingestion of sediment particles, are effective sentinel organisms for monitoring microplastic contamination and toxicological stress in intertidal ecosystems. Changes in their abundance, behaviour, and physiological condition can reflect underlying environmental degradation. Given the increasing plastic load along the Andaman coast, mudskippers provide valuable insights into pollution dynamics within mangrove-mudflat systems. The study concludes that integrating mudskippers into coastal monitoring frameworks can strengthen ecosystem-based management and conservation strategies, particularly in fragile island ecosystems where conventional monitoring approaches are limited.

Keywords

Mudskippers, Mangrove ecosystems, Ecosystem services, Bioindicators, Microplastics, Andaman and Nicobar Islands

AHS-15

Nested PCR Assay for Specific Detection of Tilapia Parvovirus

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Tilapia farming is one of the fastest-growing aquaculture sectors globally due to adaptability, rapid growth and low maintenance requirements. However, aquaculture intensification has led to the emergence of viral pathogens, resulting in disease outbreaks and significant economic losses in tilapia production. Tilapia parvovirus (TiPV), an emerging single-stranded DNA virus, has been linked to mass mortalities of tilapia across Asia. This study aimed to develop a specific nested PCR diagnostic assay for TiPV detection. Self-designed primers targeting the non-structural 1 (NS1) gene of TiPV were developed for first-round and nested PCR, comprising outer primers (TiPVNS1F690/TiPVNS1R690) and inner primers (TiPVNS1F201/TiPVNS1R201). Primer sets were standardized using gradient PCR to determine optimal annealing conditions. Assay specificity was evaluated against Tilapia Lake virus (TiLV), Carp edema virus (CEV), and common bacterial pathogens (*Aeromonas* sp. and *Streptococcus* sp.), while analytical sensitivity was assessed using ten-fold serial dilutions of TiPV template DNA. The assay generated specific amplicons of 690 bp (NS1) and 201 bp (nested NS1). Gradient PCR optimization identified 63.4 °C as the optimal annealing temperature for all primer sets. The primers exhibited 100% specificity, with no cross-reactivity against TiLV, CEV, *Aeromonas* sp., or *Streptococcus* sp. The detection limits were 10 pg for the first-round NS1 PCR and 1 pg for the nested NS1 PCR, demonstrating the higher analytical sensitivity of the nested assay. The NS1-based nested PCR assay provides a sensitive and specific diagnostic tool for TiPV detection, enabling early disease surveillance and informed health management in tilapia aquaculture under a One Health–oriented framework.

Keywords

Tilapia parvovirus, Nested PCR, NS1 gene, Molecular diagnostics, Disease surveillance

AHS-16

First report of *Centrocestus* sp. (Trematoda)-A Non-native Parasite from an Aquarium Imported *Carassius auratus* from the Andaman Islands

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Centrocestus sp., an invasive digenetic trematode of Asian origin, has gained increasing attention due to its wide global distribution and pathogenic impact on freshwater fishes. The parasite has been reported from several countries, including Taiwan, China, Japan, Thailand, Hawaii, Vietnam, Croatia, India, the USA, Mexico, and Colombia. Despite its expanding range, information on its occurrence in island ecosystems remains limited. In the present study, we report the first occurrence of *Centrocestus* sp. infecting the gills of *Carassius auratus* imported through the ornamental fish trade in the South Andaman Islands. Fish samples were obtained from an aquarium retailer who sourced ornamental fish from Chennai, mainland India. Light microscopic examination of the gill tissues revealed a heavy infestation of metacercariae of *Centrocestus* sp., primarily embedded within the gill filaments. Clinically, infected fish exhibited marked lethargy, abnormal swimming behaviour, loss of body colouration, and reduced feeding activity, indicating compromised physiological function. Parasitological examination revealed a high prevalence of infection (72%) among the sampled *C. auratus* individuals. Furthermore, infected fish showed progressive mortality, with a cumulative mortality rate of 23% recorded within one week of observation. The presence of high infection intensity and associated mortality underscores the pathogenic potential of *Centrocestus* sp. under confined aquarium conditions. This first report of *Centrocestus* sp. from the Andaman Islands highlights the significant biosecurity risks posed by unregulated aquarium fish imports from mainland India. The findings emphasise the urgent need for strengthened quarantine measures, routine health screening of ornamental fish, and increased awareness among stakeholders to prevent the introduction and establishment of exotic parasites that may threaten native aquatic biodiversity in the fragile island ecosystems.

Keywords

Alien, Parasite, Biodiversity, Transboundary, Aquatic Animal disease

AHS-17

Comparative Analysis of Water Quality Parameters for Fish Farming in North and Middle Andaman District

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A total of 90 water samples were collected and analyzed from three blocks in the North and Middle Andaman district, with 30 samples taken from each block. Water temperature affects fish growth and metabolism, and in our study, it ranged from 25 to 29°C for all samples, indicating conditions suitable for aquaculture. Water pH indicates the acidity or alkalinity of the water, and keeping it within a suitable range (about 6.5 – 8.5) is important for fish health, growth and survival in aquaculture; in our analysis the pH values fell within that range, with the highest values recorded in Diglipur Tehsil (7.2), followed by Mayabunder (6.8) and Rangat (6.6). The dissolved oxygen levels were within acceptable limits for all three regions, suggesting adequate oxygenation of the water. Total alkalinity reflects the buffering capacity of the water, and the ideal range for pisciculture is about 60 – 300 ppm; in our study, the Diglipur Tehsil water samples (67.50 ppm) fell within this range, whereas Mayabunder (50.00 ppm) and Rangat (47.50 ppm) showed lower alkalinity, suggesting that Diglipur water has better buffering capacity compared to Mayabunder and Rangat. Total hardness reflects the concentration of divalent cations (mainly calcium and magnesium) in the water, and it fell within the ideal range for aquaculture across the study area, except for Rangat (70.50 ppm) and the highest value observed in Diglipur (98.50 ppm), followed by Mayabunder (79.50 ppm). Total ammoniacal nitrogen values in all blocks were within safe limits, indicating low levels of ammonia contamination in water. Overall, the water quality parameters measured in the North and Middle Andaman district fall within ranges suitable for aquaculture, and Diglipur consistently showed more favourable values for pH, alkalinity and hardness, suggesting it may provide more stable conditions for aquaculture compared to Mayabunder and the Rangat region.

Keywords

Temperature, pH, Alkalinity, Hardness, Pisciculture

AHS-18

Diversity, Distribution and Identification of Class Polyplacophora from the Intertidal Regions of South Andaman

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Polyplacophora (chitons) are key intertidal grazers, yet their biodiversity and ecology remain underexplored in Indian waters compared to other Indian Ocean regions. This study documents the diversity, distribution, and substrate specificity of chitons across seven rocky intertidal sites in South Andaman, India: Backside Beach, Burmanallah, Kodiyaghat, Rangachang, Marina Park, Mazar Pahad, and Wandoor. Specimens were collected during low tide surveys, identified morphologically, and associated with environmental parameters (temperature, salinity, pH). Of the 16 specimens, 15 were identified across 1 order (Chitonida), 3 families (Tonicellidae, Chitonidae, Ischnochitonidae), and 6 genera. *Acanthopleura gemmata* was most abundant and widely distributed, while rare species like *Tonicia chiliensis* (Kodiyaghat) and *Chiton granosus* (Wandoor) showed site-specificity. Kodiyaghat and Wandoor exhibited the highest diversity; the Science Centre had a peak abundance of large (60-70 mm) thorny chitons on filamentous green algae and stratified rocks. Green algae-enriched hard substrates were preferred over pebbles or weathered rocks. Symbiotic associations included *Leptochitona cinerea* and *Ischnochiton* spp. with crustose-coralline algae; Acanthopleura spp. hosted epibionts like *Gracilaria* spp. and *Balanus* spp. Temperature and salinity were uniform across sites, but pH varied. Chitons display distinct habitat preferences influencing their distribution. Long-term monitoring is essential to elucidate ecological roles, symbioses, and support conservation frameworks for Andaman's sensitive intertidal ecosystems.

Keywords

Polyplacophora, Chiton diversity, South Andaman, Substrate specificity, Intertidal ecology, Symbiotic associations

AHS-19

Performance of Integrated Livestock–Fish Farming Systems using Mixed Manure Inputs

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Fish are an excellent source of high-quality protein and exhibit superior feed conversion efficiency. Integrated fish farming systems facilitate the efficient recycling of agricultural and animal wastes, thereby enhancing overall productivity while reducing production costs and environmental pollution. Considering the abundance of livestock resources, an experiment was conducted using integrated systems comprising cattle + goat + fish (T1), cattle + duck + fish (T2), along with a feed-based system as the control (T3). Indian major carps—*Catla catla*, *Labeo rohita*, and *Cirrhinus mrigala*—were stocked at a density of 7,000 fish ha^{-1} to evaluate the influence of different manure combinations on fish production. Key water quality parameters, including temperature, pH (7.33–7.65), dissolved oxygen (~7.0 mg l^{-1}), alkalinity (131.86–256.86 mg l^{-1}), and hardness (179.43–217.43 mg l^{-1}), remained within acceptable limits across all treatments. Similarly, total ammonia (0.18–0.24 mg l^{-1}), nitrite (0.07–0.11 mg l^{-1}), and phosphate (0.15–0.18 mg l^{-1}) concentrations were within safe ranges, indicating no deterioration of water quality due to integrated farming practices. Gross and net primary productivity varied among treatments, with the highest gross primary productivity (197.14 mg C m^{-3} h^{-1}) and net primary productivity (137.14 mg C m^{-3} h^{-1}) recorded in the cattle + duck system, reflecting enhanced pond productivity. Zooplankton communities were dominated by rotifers and copepods, with maximum abundance observed in the cattle + duck integration. A seasonal decline in abundance was noted during December, and the overall pattern indicated a healthy, manure-enriched ecosystem. Microbiological analysis revealed higher bacterial load, and total plate counts in the cattle + goat system, followed by the cattle + duck system, with the lowest values recorded in feed-based ponds. The feed-based culture system produced the highest overall yield and water productivity, whereas survival was highest in the cattle + duck system (84%). Although feed-based systems were the most productive, the cattle + duck integration demonstrated a more balanced performance with higher survival rates, highlighting its potential as a cost-effective and sustainable option for resource-poor farmers.

Keywords

Integrated fish farming, Indian major carps, Manure recycling, Pond productivity, Water quality, Sustainable aquaculture

AHS-20

The Digital Efficiency Pivot in Indigenous Fisheries and Climate Mitigation through Citizen Science in Car Nicobar Island

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The small indigenous fisheries of Car Nicobar Island face persistent challenges, including information scarcity, inefficiency, and vulnerability to climate change. The negative impacts are not due to overfishing but from uncertain search and navigation efforts. This study explores the potential of digital interventions to revolutionize fishing efficiency and environmental sustainability in the restricted-access Island. A Digital Efficiency Pivot was established for GPS, participatory mapping, and citizen science. Establishment of the Coastal Fisheries Information Hub (CFIH) was pivotal as a community STI facility for long-term support of livelihood, fisheries, and conservation through training, citizen science, fisher-reported outcomes, sea safety, information broadcast systems, and a repository for local knowledge. The results show ~50-80% better CPUE and catch diversification, providing a green dividend. The involvement of Nicobarese as citizen scientists proved to be a game changer with the mapping and digitalization of 52 traditional fishing grounds and the conservation of ~1000 turtle hatchlings. By integrating TEK and scientific methodologies, this research redefines small indigenous fisheries as an active site of low-carbon emission rather than a passive recipient of adaptation assistance. This research can be used in fisheries economics and extension, sustainability science, and climate-smart fisheries management as a replicable model for SIDP to achieve Sustainable Development Goals (SDGs). In conclusion, the study demonstrates that context-specific digital interventions, when grounded in Traditional Ecological Knowledge (TEK) and community participation, can substantially enhance fishing efficiency, safety, and conservation outcomes in small indigenous fisheries. The measurable gains in CPUE, catch diversification, and biodiversity stewardship underscore the transformative potential of the Coastal Fisheries Information Hub as a scalable, low-carbon model. This integrated approach offers a replicable pathway for climate-smart, inclusive fisheries governance in Small Island Developing States while advancing multiple Sustainable Development Goals.

Keywords

STI facility, CPUE, Digital Efficiency Pivot, Green dividend, Citizen science, TEK, SIDP and SDGs

AHS-21

Microplastic Pollution in the Mangrove Area Around Cochin Estuary, Kerala

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Microplastics are synthetic polymer particles smaller than 5 mm that originate from the degradation of plastic materials discarded deliberately or accidentally discarded into terrestrial and aquatic environments. These particles contaminate the water and sediments of aquatic ecosystems and enter the bodies of organisms ranging from zooplankton to fish through the food chain. The present study evaluated microplastic pollution in the water and sediment of the Cochin Estuary and examined its accumulation across different trophic levels of the aquatic food web. Samples of sediment, water, zooplankton, molluscs, and fish were collected from eight stations in the estuary during pre-monsoon, monsoon, and post-monsoon seasons, with triplicate samples obtained at each station. Organic matter was digested using 10–25% hydrogen peroxide following Nikki et al. (2014), and microplastics were separated using saturated sodium chloride solution through density flotation. The results indicated an average abundance of approximately 300 microplastic particles per 10 g of sediment and 150–200 particles per litre of water. Zooplankton samples contained 10–20 particles per litre. Molluscs exhibited higher accumulation levels, with 40–50 particles isolated from various body parts, particularly the digestive system. In fishes, 20–30 particles were detected in tissues, including the gut, gills, gonads, and muscle. Statistical comparison revealed significantly greater microplastic accumulation in molluscs than in fish. Spatial variation analysis identified Vallarpadam and Thevara as major hotspots of microplastic contamination within the estuary. The findings demonstrate that microplastics persist in estuarine environments and readily transfer through trophic levels, highlighting the influence of anthropogenic activities such as improper plastic disposal. Due to their slow degradation rates, microplastics pose long-term ecological risks and may ultimately impact human health through seafood consumption.

Keywords

Microplastic, Pollution, Anthropogenic, Trophic levels, Hotspots

AHS-22

Microbial Contaminants (Faecal and Sewage Indicators) and Resistance Genes (heavy metal and AMR) in Indian Coastal Sediments: A Genomic Approach to Health Risk Assessment

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Despite ongoing inputs from domestic and industrial sewage, studies on microbial contaminants and resistance genes in Indian coastal sediments remain scarce. Metagenomic approaches enable culture-independent taxonomic and functional profiling, offering deeper insights into microbial community dynamics. This study investigates the distribution of microbial contaminants and resistance genes due to anthropogenic pressures. Surface sediment samples were collected 2 km inshore from 7 locations along the Indian coast: Veraval, Mumbai, Goa, Mangalore, Paradip, Visakhapatnam, and Chennai. Sediment DNA was sequenced using the Illumina NextSeq-500 platform, assembled with metaSPAdes, and annotated using Prodigal for gene prediction. The results revealed that faecal indicators were dominated in the following order: Clostridium > Bacteroides > Alkaliphilus > Marinifilum > Enterococcus > Escherichia, while sewage indicators were Arcobacter > Acinetobacter > Aeromonas > Trichococcus > Dorea. Sediment samples from Paradip and Mumbai exhibited the highest abundance of faecal and sewage indicators, suggesting deteriorating coastal conditions. Goa exhibited the highest number of heavy-metal resistance genes among all locations, with 6,259 identified. Mercury resistance genes were detected in sediments from Mumbai, indicating an anthropogenic influence. AMR annotation using the CARD database revealed 75 antimicrobial resistance gene types (510 counts), including 54 multidrug resistance genes, in the coastal sediment. This study establishes a genomic baseline linking coastal sediments as reservoirs of pathogens and resistance genes, highlighting risks from contaminated seafood and waterborne infections. Genomic monitoring enhances health risk assessment and advances One Health efforts against antimicrobial resistance.

Keywords

Faecal indicator bacteria, Sewage indicator, Heavy metal resistance, Antimicrobial resistance, Sediment metagenome

AHS-23

Marine Fungi-Mediated Biodegradation of LDPE and PP Plastics from the Andaman Islands

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Plastic pollution in marine environments poses a major global challenge due to the persistence of polymers such as low-density polyethylene (LDPE) and polypropylene (PP). Microbial biodegradation, particularly by fungi, offers a sustainable alternative to conventional plastic waste management. This study assesses the plastic-degrading potential of fungi isolated from marine plastisphere debris and mangrove endophytes in the South Andaman Islands. A total of 62 fungal isolates (38 marine-derived and 24 mangrove-associated) were obtained from LDPE, PP, and PET debris, as well as from the mangrove species *Rhizophora mucronata* and *Avicennia marina*. Dominant genera included *Aspergillus, Penicillium*, *Chaetomium, Cladosporium*, and yeast-like taxa. Enzymatic screening revealed widespread production of manganese peroxidase, laccase, and peroxidase, key enzymes involved in oxidative polymer degradation. High enzyme-producing isolates were further evaluated for their ability to degrade untreated and chemically oxidized LDPE and PP films. Weight-loss assays, biofilm formation, and surface deterioration analyses confirmed measurable degradation, with chemically pretreated plastics showing greater susceptibility. The isolates MSF-57, MSF-16, MSF-40, and MEF-13 exhibited the highest degradation efficiencies, with 1.8–3.6% weight loss. Metabolic profiling indicated that growth on plastic substrates induced pronounced physiological adaptations, including enhanced antioxidant activity, phenolic production, lipid accumulation, increased exopolysaccharide secretion, and altered ergosterol levels. These findings highlight the potential of the marine plastisphere and mangrove-associated fungi as effective agents for fungal-based bioremediation strategies to mitigate marine plastic pollution.

Keywords

Marine fungi, Plastisphere fungi, LDPE and PP degradation, Ligninolytic enzymes, Mangrove endophytic fungi

AHS-24

Review on the Sustainable Utilization of Seaweeds in the Field of Agriculture and Environmental Management

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Marine macroalgae (seaweeds) are the primitive form of the organisms in the plant kingdom and play a vital role in the marine environment. They are promising and sustainable resources that offer enormous ecological and agricultural benefits for environmental management due to the existence of bioactive compounds and multifunctional agricultural applications. Despite these developments, the agricultural applications of seaweed in India remain underexploited. Hence, the present attempt is submitted for review and underscores the diverse applications of seaweed across the broad spectrum of agriculture as bio-stimulants, biofertilizers, and soil conditioners for environmental remediation in the Andaman and Nicobar Islands (ANI). Pursuant to the literature survey and field experiments, the survey confirms the occurrence of 244 taxa of seaweeds in different habitats of ANI, of which 60 are commercially promising and can be utilized in a sustainable approach to agriculture. They are rich in macro- and micronutrients, plant growth regulators, amino acids, and polysaccharides, which enhance soil fertility, promote plant growth, improve crop yield, and increase resistance to biotic and abiotic stresses. Also, the use of seaweed-based inputs offers an eco-friendly alternative to synthetic fertilisers and pesticides, helping reduce environmental pollution and improve soil health. Overall, the present study provides detailed information on the application of seaweed, aligning with global goals for agricultural resource efficiency, and making them a valuable natural solution for integrated agricultural and environmental management systems.

Keywords

Bioactive compounds, Impacts on agriculture, Environmental sustainability, Marine macroalgae, Resource conservation

AHS-25

Nutraceutical potential of *Chlorella* sp. Isolated from the Andaman and Nicobar Islands: Growth Characteristics, Lipid Content, and Fatty Acid Profiling

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Microalgae are unicellular microscopic organisms inhabiting aquatic environments and possess immense potential for applications in human health. The microalga *Chlorella* sp., isolated from the Andaman and Nicobar Islands, was evaluated for its growth characteristics and pigment production. *Chlorella* sp. exhibited a stable 14-day growth cycle, characterized by an initial lag phase during days 0–2, followed by an exponential growth phase between days 2–8, and a subsequent stationary phase. Chlorophyll content increased markedly after day 6, reaching a maximum on day 12, indicating enhanced photosynthetic efficiency and biomass accumulation. Carotenoid production increased progressively throughout the culture period, with peak levels observed on day 14, suggesting the activation of photoprotective and stress-adaptive mechanisms during the later stages of growth. The lipid content of *Chlorella* sp. was found to be 55.5%. Fatty acid profiling revealed omega-6 fatty acid 9,12-octadecadienoic acid (linoleic acid) and omega-3 fatty acid 9,12,15-octadecatrienoic acid (α-linolenic acid) as the predominant components. Linoleic acid is known to support skin barrier function, reduce inflammation, and improve hyperpigmentation and overall skin health, while α-linolenic acid is an essential omega-3 fatty acid with established roles in reducing cardiovascular risk, preventing stroke, modulating inflammation, and supporting neurological health. The presence of these bioactive fatty acids highlights the nutraceutical and cosmeceutical potential of *Chlorella* sp. from the Andaman and Nicobar Islands and underscores the importance of further exploration of regional microalgal resources for therapeutic and functional applications.

Keywords

Chlorella sp, Microalgae, Pigments, Lipids, Fatty acids, Nutraceuticals, Andaman and Nicobar Islands

AHS-26

Phylogenetic Identification and Metabolite Activities of Culturable Marine Bacteria Isolated from the South Andaman Archipelago, India

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Marine ecosystems host diverse microorganisms and serve as rich reservoirs with noteworthy ecological and biotechnological roles. The Andaman region is considered a hotspot for the discovery of novel marine bacteria, as it encompasses biologically rich regions that support diverse microbial communities. The present study investigates marine bacteria isolated from seawater and sediment samples collected from the South Andaman region, highlighting their ecological significance and the presence of heavy metal contaminants in both sample types. A total of 74 bacterial isolates were obtained using Zobell Marine Agar medium, characterized, and screened for their metabolic potential. Functional screening revealed that 6 isolates, i.e., PBS 14, PBS 17, PBS 23, PBW 01, PBW 07, and CBW 03, exhibited strong positive results for major metabolic activities, including amylase, cellulase, lipase, urease, gelatinase, and other enzymes. The results demonstrated a diverse population of marine bacteria with significant functional traits. Several isolates showed promising enzymatic potential, suggesting industrial and environmental applications. This study emphasizes the importance of exploring marine bacterial diversity from the South Andaman region to better understand ecological functions and discover novel bioresources.

Keywords

Marine Bacteria, Marine Ecosystems, Functional Screening, Metabolic Activity, Biotechnological Potential

AHS-27

Bio-Foaming Saponins from the Red Seaweed *Halymenia durvillei* Coastline of Hut Bay, Andaman and Nicobar Islands

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Bio-foaming agents play a vital role in biomedical, industrial and environmental applications due to their biodegradability, sustainability and high performance. Bio-derived saponins are eco-friendly and safe alternatives to chemically synthesized, toxic surfactants. Marine macroalgae (seaweeds) represent a highly feasible source of saponins due to their abundance and their lack of requirement for arable land or aquatic resources. A red seaweed, *Halymenia durvillei* was collected from Hut Bay, Little Andaman Island, and used for saponin extractions employing both fresh and dried algal biomass. In the first approach, saponins were extracted from dried biomass using consecutive Soxhlet extraction with organic solvents (petroleum ether, methanol and water) based on solvent polarity. Crude residues were obtained following successive solvent extraction. In the second method, fresh seaweed samples were initially subjected to ultrasonication prior to solvent extraction. The approximate yield of saponin was 62.5% from dried seaweed biomass and 15% from fresh biomass. Bio-foaming potential of the extracted saponin was confirmed through the frothing test and emulsification index analysis of the final product. In the previous investigations, a maximum saponin content of 17% reported in *Gracilaria edulis* isolated from the Gulf of Mannar. Overall, our study suggests that *H. durvillei* is a promising source of sustainable, non-toxic and pharmaceutically important bioactive compounds.

Keywords

Solvent, Extraction, Polarity, Biosurfactant, Emulsification, Biomass

AHS-28

Phytoplankton Community Structure as an Indicator of Anthropogenic Influence in the Coastal Waters of the Andaman Islands

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Phytoplankton is widely recognized as a sensitive bioindicator of aquatic pollution due to their rapid response to changes in environmental conditions, particularly nutrient enrichment. During the pre-monsoon season, phytoplankton samples were collected from Haddo Harbour (PT1) and the Open Sea (PT4) of Port Blair Bay (South Andaman), as well as from a Human Settlement (HS) region and the adjacent Open Sea (MT3) of Mayabunder (North Andaman). Significant spatial variations in phytoplankton abundance and species diversity were observed between anthropogenically influenced and relatively less impacted sites ($p < 0.05$). Higher phytoplankton abundance was recorded at PT1 and the HS region compared to the corresponding open-sea stations. Species diversity was highest at PT1 (46 species) and lowest at PT4 (28 species). Community composition analysis revealed diatom dominance at PT1 (98.59%), HS (99.21%), and MT3 (80.36%), whereas dinoflagellates dominated at PT4 (58.16%) and showed increased representation at MT3 (19.64%). These statistically significant differences in phytoplankton abundance, diversity, and taxonomic structure highlight the strong influence of anthropogenic nutrient inputs on coastal ecosystems and reaffirm the effectiveness of phytoplankton as reliable bioindicators of environmental quality in the Andaman coastal region. The observed shifts in phytoplankton community structure clearly reflect nutrient-driven alterations in coastal water quality, particularly in harbour and human settlement regions. Diatom proliferation at impacted sites suggests enrichment conditions, while increased dinoflagellate dominance in open waters may indicate differing hydrographic influences. These patterns emphasize the need for continuous phytoplankton-based monitoring as an early-warning tool for eutrophication and ecological imbalance. Strengthening nutrient management and coastal regulation measures is essential to safeguard the ecological integrity of the Andaman marine environment.

Keywords

Phytoplankton, Bioindicators, Anthropogenic impact, Nutrient enrichment, Species diversity, Andaman and Nicobar Islands, Coastal ecosystems

AHS-29

Chitons (Phylum: Mollusca; Class: Polyplacophora) from the Intertidal Regions of the South Andaman Islands: Exploring the Medicinal Applications

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Polyplacophora is typically found in mid-littoral zones and shallow sublittoral boulder fields. The chitons are conical vermiform molluscs. Because of misidentification errors, it is important to note that chitons are very difficult to identify up to the species level. Different types of shell sculpture, girdle designs, and radula are the key features of the identification process in taxonomy. Chitons are common grazers of algae along rocky carbonate coastlines worldwide. Although it is considered an algal grazer, several studies have shown that it exhibits various feeding types, viz., omnivorous, carnivorous, xylophagous, detritivorous, herbivorous, and spongivorous. A study on chiton distribution in the Andaman Islands was conducted from February 2024 to April 2024 at selected stations, namely Kodiyaghat, Burmanallah, Corbyn's Cove, and Brookshabad Beach. Environmental (physico-chemical) parameters were assessed at these stations. A total of two species, belonging to two genera, were identified in the present study at the two selected locations along the south Andaman coast. The two chiton species, namely *Acanthopleura gemmata* and *Squamopleura* miles, were recorded during the investigation. The results revealed that *Acanthopleura gemmata* was the dominant species at all study sites. Chitons play a major role in structuring the low-shore algal communities on rocky shores. Chitons can be used as bait for fisheries. Some studies reported that the alcoholic extract of Persian Gulf chiton inhibits angiogenesis-dependent disease, as demonstrated in the chick chorioallantoic membrane. Another study examined the cytotoxic effects of a chitosan extract from Persian Gulf chiton (*Acanthopleura vaillantii*) on liver cells. From their study, they found that the extracted chitosan has strong cytotoxicity against HepG2 cells. So, in the future, it can be considered for the treatment of liver cancer.

Keywords

Polyplacophora, Chiton diversity, Rocky intertidal ecology, Andaman Islands, Algal grazing, Bioactive compounds

AHS-30

One Health in a One Earth System: Integrating Source-to-Sea and Mountain-to-Ocean (M2O) Perspectives on Climate, Biodiversity and Fisheries

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The Himalayan mountain system is a critical source of freshwater, sediments, and nutrients that regulate the ecological dynamics of the Ganges–Brahmaputra–Meghna (GBM) river delta complex and the connected Bay of Bengal (BoB). A sediment budget assessment by ICAR-IISWC, Dehradun, estimates a gross soil erosion rate of 15.59 t ha^{-1} yr^{-1}, amounting to ~5.3 billion tonnes annually, of which ~34% is trapped in reservoirs, ~43% deposited within river basins, and ~23% exported beyond national boundaries. Despite covering less than 1% of the global ocean area, the BoB contributes ~7–8% of global marine fishery landings, highlighting its ecological and socio-economic significance. Riverine nutrients - particularly nitrogen (N), phosphorus (P), and silicate (Si) - are key drivers of coastal primary productivity. Available estimates indicate that rivers draining into the BoB exported ~7.1 Tg N and ~1.5 Tg P around 2000, with nitrogen exports projected to increase substantially by 2050 due to intensified land use and agricultural inputs. Widespread NPK fertilizer application across the Indo-Gangetic Plains creates nutrient surpluses that are mobilized during monsoon runoff and transported to coastal waters. Monsoon extremes strongly modulate sediment and nutrient delivery, besides upper-ocean stratification, that regulate marine food availability - and consequently fisheries productivity. While river-derived nutrients sustain coastal productivity and fisheries, excessive loading increasingly triggers harmful algal blooms and hypoxia, posing serious threats to aquatic biodiversity. Recent *Noctiluca* sp. and red-tide events along the BoB coast, associated with large-scale fish mortalities and fisheries losses, exemplify major ecological consequences of the mountain-to-ocean (M2O) continuum. Also, pollutants including heavy metals, pesticides, hydrocarbons, and microplastics chock Rivers and oceans, which bioaccumulate in food webs and degrade ecosystem services. Mountains, monsoons, and marine productivity are closely linked within a single climate system operating across source-to-sea (S2S), ridge-to-reef (R2R), or M2O continua, underscoring a One-Health perspective within a One-Earth framework. Linking terrestrial and marine observational networks with socio-ecological monitoring can enable quantification of sediment and nutrient pathways, anticipation of climate-driven productivity changes, and development of ecosystem-based management strategies.

Keywords

Bay of Bengal productivity, Sediment and nutrient fluxes, Source-to-Sea (S2S) approach, One Health framework

AHS-31

Silent Signals in the Sea using eDNA for Invasive Species Monitoring in Reef Ecosystem

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Reef ecosystems are among the most biologically diverse and ecologically valuable marine habitats. Environmental DNA (eDNA) analysis has emerged as an innovative and highly sensitive tool for invasive species monitoring, offering significant advantages over traditional survey methods. Environmental DNA (eDNA) monitoring has emerged as a powerful, non-invasive tool for the early detection and surveillance of invasive aquatic species such as lionfish, invasive starfish, and non-native mussels. Organisms continuously shed genetic material into their surroundings through mucus, scales, gametes, faeces, and decomposing tissues, which can be captured from water samples and analysed using molecular techniques. This approach allows detection of invasive species even at very low population densities, often before they become visually observable or establish breeding populations. For cryptic or nocturnal invaders like lionfish, and for larval or juvenile stages of starfishes and mussels that are difficult to identify morphologically, eDNA offers a sensitive and species-specific alternative to traditional survey methods such as diving surveys, trapping, or benthic sampling. The application of eDNA monitoring is particularly valuable for supporting rapid management responses and long-term biosecurity programs. Regular eDNA surveillance can help map invasion fronts, assess spread dynamics, and evaluate the effectiveness of control or eradication measures for invasive starfishes and mussels that threaten coral reefs, seagrass beds, and aquaculture systems. Because eDNA sampling is cost-effective, scalable, and requires minimal disturbance to ecosystems, it is well-suited for large coastal areas, marine protected zones, and ports where invasive species introductions are likely. When integrated with conventional monitoring and ecological data, eDNA-based approaches strengthen early warning systems and contribute to evidence-based management strategies aimed at protecting native biodiversity and ecosystem functioning.

Keywords

Marine Biosecurity, Coral Reef Health, Trophic imbalance, Alien species, Genetic Traces

AHS-32

Biosecurity Measures and Vaccination in Aquatic Animal Health Management

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Aquaculture plays a vital role in global food security, livelihoods, and economic development, contributing more than half of global aquatic animal production. However, the rapid expansion and intensification of aquaculture systems have increased the vulnerability to infectious diseases, invasive species, and environmental degradation. Disease outbreaks remain a major constraint to sustainable aquaculture, resulting in significant economic losses and threats to animal welfare and ecosystem health. In this context, biosecurity has emerged as a fundamental component of modern aquaculture health management, emphasizing proactive disease prevention rather than reactive control. Aquaculture biosecurity encompasses a broad range of preventive measures designed to minimize the introduction, establishment, and spread of pathogens within and between production systems, while also supporting environmental protection, food safety, and economic resilience. Vaccination has gained recognition as a key biological pillar of biosecurity, particularly in finfish aquaculture, by reducing host susceptibility, pathogen transmission, and reliance on antimicrobials. Advances in vaccine technologies further strengthen preventive health strategies. Despite proven benefits, the adoption of biosecurity and vaccination remains inconsistent, especially in traditional systems and shrimp aquaculture, where vaccines are largely unavailable. Biosecurity in shrimp aquaculture includes the use of SPF/SPR stocks, physical barriers, periodic cleaning and disinfection, restricted entry for vehicles and personnel, locating farms away from environmental hazards and potential sources of infection, pre-treatment of source water, etc. Biosecurity in finfish aquaculture includes, in addition to the above, the use of prophylactic techniques such as vaccination against common pathogens. Several types of vaccines, such as inactivated, live attenuated, sub-unit, recombinant, DNA and mRNA vaccines, are reported, and vaccines can be administered parenterally, orally or by immersion routes. While parenteral administration results in the highest serum antibody levels, oral and immersion routes produce significant antibody production at the mucosal sites, which are the portals of pathogen entry. The combined application of biosecurity and vaccination, embedded within a One Health framework, offers the most effective pathway towards resilient, sustainable, and socially responsible aquaculture.

Keywords

Aquaculture, Biosecurity, One Health, Vaccination

AHS-33

Enhancing Seaweed Farming Resilience: Evaluation of Small Plastic Raft Design for *Gracilaria edulis* Cultivation in Andaman and Nicobar Islands

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The feasibility and performance of *Gracilaria edulis* seaweed cultivation were evaluated using small plastic rafts of 1 m² area for their ability to withstand rough sea conditions. Cultivation trials were conducted at the Marine Research Laboratory foreshore areas in Sri Vijaya Puram, involving seventy-two small rafts designed to evaluate endurance under rough weather conditions for the culture of *Gracilaria edulis* seaweeds. Small net pouches were fixed on the rafts and tested to evaluate growth rates and survival under field conditions during the Northeast Monsoon as well as the Southwest Monsoon (November 2024 to July 2025). At the time of stocking, the initial biomass of seaweed was maintained uniformly at approximately 1.0 to 1.2 kg per raft to ensure comparability across treatments. Regular monitoring was conducted over a 60-day culture period to assess growth performance, attachment efficiency, and survival. By Day 30, the biomass of *Gracilaria edulis* increased significantly, reaching 3.2–3.3 kg depending on the treatment method, representing nearly a threefold increase within one month. By Day 60, biomass accumulation further improved, ranging between 5.6–5.9 kg, indicating a fivefold increase from the initial stocking weight. Statistical analysis revealed that differences across treatments were significant ($p < 0.05$). The plastic raft design demonstrated promising resilience, sustaining 5–6-fold biomass increases while enduring rough weather with minimal and repairable damage. However, grazing pressure from herbivorous fishes influenced growth rates, indicating the need for protective measures and careful site selection. Small plastic rafts present a practical, weather-resilient alternative to bamboo structures with potential for adoption in community-based seaweed farming. Further refinements in raft durability and protective strategies against climatic hazards are essential for achieving year-round sustainability.

Keywords

Seaweed cultivation, Raft-based farming, Coastal resilience, Monsoon impacts, Mariculture, Island ecosystems

AHS-34

Understanding the Risks and Mitigation Strategies in Zoonotic Diseases of Fish and Shellfish for Protecting Human and Animal Health

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Aquaculture has emerged as the fastest-growing food-producing sector globally, now contributing more than half of the world's fish supply and playing a critical role in food and nutritional security. However, the rapid intensification, globalization of trade, and environmental changes associated with aquaculture expansion have amplified the risk of zoonotic diseases transmitted from fish and shellfish to humans. This paper examines the spectrum of zoonotic pathogens in aquatic systems, their transmission dynamics, epidemiology, and integrated mitigation strategies within a One Health framework. Aquatic zoonoses arise primarily through two pathways: occupational exposure and foodborne transmission. High-risk occupational groups, including fish farmers, handlers, processors, and aquarium hobbyists, are vulnerable to acquired infections through skin abrasions and environmental contact. Major bacterial pathogens include *Mycobacterium marinum*, *Streptococcus iniae*, *Aeromonas spp*., *Edwardsiella tarda*, and *Vibrio species*, some of which can cause severe invasive disease, particularly in immunocompromised individuals. Foodborne risks are closely associated with the consumption of raw or undercooked seafood, facilitating transmission of bacterial agents (e.g., Vibrio parahaemolyticus, V. vulnificus), viruses (norovirus, hepatitis A and E), and parasitic helminths such as Anisakis, Clonorchis, and Diphyllobothrium. Climate change, eutrophication, antimicrobial misuse, and transboundary seafood trade further intensify pathogen emergence, dissemination, and antimicrobial resistance. The epidemiology of aquatic zoonoses is characterized by under-reporting, limited integrated surveillance, and inadequate linkage between animal and human health systems. Effective mitigation requires strengthened farm biosecurity, water quality management, vaccination, antimicrobial stewardship, molecular diagnostics, and traceability systems across the supply chain. Public health education emphasizing safe handling, adequate cooking, and freezing protocols for raw consumption is equally critical. The paper underscores the urgent need to operationalize One Health governance, harmonize regulatory frameworks, and adopt genomic surveillance and predictive risk modelling to proactively manage zoonotic threats while ensuring sustainable aquaculture growth and public health security

Keywords

Aquatic zoonoses, Aquaculture intensification, Foodborne pathogens, Occupational exposure, One Health approach, and Antimicrobial resistance

AHS-35

Recurring Nesting of Olive Ridley Turtles at Teetop Beach, Car Nicobar: Evidence for Ecologically Sensitive Area Designation

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Citizen science initiatives at Car Nicobar Island have revealed the ecological significance of Teetop Fish Landing Centre beach as a consistent nesting site for the Olive Ridley turtle (*Lepidochelys olivacea*). From 2023 to February 2026, the beach landing site recorded repeated nesting events of the Olive ridley turtle with regular hatchling emergence at this beach location during February to April, indicating a stable and recurring reproductive site rather than sporadic nesting activity. In 2023 alone, over 150 hatchlings were rescued, safeguarded, and successfully released into the wild through coordinated community efforts from tribal fishermen near Teetop beach landing center. In 2024 and 2025, nesting events were noted with turtle track marks however, fishermen could not locate any emerging hatchlings on the beach. In early February 2026, more than 150 hatchlings of Olive ridley turtles were similarly protected and released, further reinforcing the site's importance. The continuity of nesting over multiple consecutive seasons underscores the ecological value of Teetop Beach within the Car Nicobar Island. Given the species' conservation importance and vulnerability to coastal disturbances, the nesting site and beach should be formally recognized as an Ecologically Sensitive Area (ESA) or as a designated Olive Ridley nesting site. Such demarcation would ensure that future developmental activities, landing center expansion, coastal infrastructure, and shoreline management plans are aligned with sea turtle conservation strategies. Recognizing Teetop Fish Landing Centre beach as a nesting beach of Olive ridley turtle would not only strengthen marine biodiversity conservation in the Andaman and Nicobar archipelago but also reinforce Citizen Science as a community-led stewardship integrating indigenous participation with science-based coastal management.

Keywords

Lepidochelys olivacea, Fish Landing Centre, Ecologically Sensitive Area (ESA), Olive Ridley nesting site, Citizen Science, Coastal Management

AHS-36

Taxonomic Studies on Hard Corals (*Hexacorallia* & *Antipatharia*) of Muttom, Kanyakumari

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Taxonomic investigations on hard corals in India have a documented history spanning nearly 160 years; however, detailed and updated regional inventories from several mainland coastal stretches remain limited. The present study focuses on the taxonomic assessment of hard corals belonging to the subclasses Hexacorallia (Scleractinia) and Antipatharia from Muttom, a coastal locality in the Kanyakumari district, Tamil Nadu. Historically referred to as part of the Travancore coast, this region holds significance in early Indian coral research but has received comparatively less recent taxonomic attention. The study was carried out using preserved coral samples obtained from the Department of Aquatic Biology and Fisheries. The specimens were initially cleaned by soaking in a bleach-to-water solution to remove organic matter, followed by sun-drying and storage in clean polythene bags. Detailed taxonomic identification was performed using standard coral identification guides and relevant published literature. Morphological characters were examined through skeletal features, and compound microscope images were captured to support species- and genus-level identification. The investigation documented representative genera and species of scleractinian and antipatharian corals occurring in the Muttom coastal region. The observed assemblage reflects the presence of ecologically significant hard coral taxa along the mainland southeast coast of India, contributing valuable baseline data from a comparatively understudied locality. Variations in skeletal morphology and diagnostic characters observed among the specimens underline the importance of careful morphological examination in coral taxonomy. This study provides updated taxonomic information on hard corals from Muttom and highlights the need for precise regional surveys to resolve existing inconsistencies in Indian coral checklists. The findings contribute toward strengthening regional biodiversity records and support the development of a coherent national inventory, which is essential for effective coral conservation and management strategies.

Keywords

Hard corals, Scleractinia, Antipatharia, taxonomy, Kanyakumari coast, Muttom

AHS-37

Dibutyl Phthalate Induced Endocrine Disruption in Nile Tilapia: Histopathological, Molecular and Hormonal Evidence of Reproductive Toxicity

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Dibutyl phthalate (DBP), an environmental plasticizer, disrupts fish reproduction through androgenic and estrogenic mechanisms. Using integrated histopathological, molecular, and hormonal parameters, this study assessed the endocrine dysfunction induced by DBP in Nile Tilapia (*Oreochromis niloticus*). Sub-lethal concentrations of DBP were administered to juvenile tilapia for 60 days. Hepatic tissue and gonad integrity were assessed through histopathological analysis. RT-PCR was employed to quantify the gene expression of cytochrome P450 aromatase (CYP19A1) and testis development factor (GSDF) in Brain and gonad. The levels of plasma vitellogenin (VTG) biomarker were assessed in liver samples. The brain, gonad, and liver were used to quantify the circulating testosterone and estradiol. DBP exposure resulted in substantial histological injury to the gonads and hepatic tissue. GSDF expression was significantly reduced in testicular tissue, indicating that spermatogonia proliferation was impaired and that testicular development was disrupted. In contrast, the expression of CYP19A1 was elevated in all tissues, resulting in an increase in the aromatization of androgens. Estrogenic disruption was verified by the presence of vitellogenin induction in both genders. Estradiol concentrations increased in liver and gonadal tissue, while testosterone concentrations decreased considerably in the brain and gonads suggesting the reproductive axis was disrupted. The integrated findings indicate that DBP functions as a potent endocrine disruptor in O. niloticus, suppressing genes involved in testicular development and dysregulating pathways for androgen biosynthesis. These mechanistic insights have implications for aquatic ecosystems and aquaculture via biomarkers (VTG, GSDF, CYP19A1) for phthalate-induced reproductive toxicity.

Keywords

Dibutyl phthalate (DBP), Endocrine disruption, Nile Tilapia, Biomarker, Reproductive Toxicity

AHS-38

Standardization of Culture Techniques for *Ompok bimaculatus* (Pabda) in Eastern India: A Comparative Study of Monoculture, Polyculture and Integrated Systems

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The three-year (2023–2026) basic and applied research project aimed to standardize the culture technique of *Ompok bimaculatus* (Pabda) in eastern India by evaluating its production performance under monoculture, polyculture, and integrated fish farming systems. The experimental design utilized 1000 m² ponds stocked with Pabda seed (0.24 g) at densities of 6000 and 2000 individuals per hectare for monoculture and polyculture, respectively, along with Indian Major Carps Catla (65 g) and Rohu (50 g) in polyculture systems. Water quality parameters, including ammonia, nitrite, and phosphate, remained within acceptable ranges across all treatments. Plankton analysis revealed higher plankton production in polyculture systems supplemented with organic manure, with key zooplankton (*Diaphanosoma sp*., *Cyclops sp., Brachionus sp*.) and phytoplankton (*Desmodesmus sp., Navicula sp., Pediastrum sp*.) identified. Growth performance results indicated that Pabda attained 42 g in 240 days under monoculture, while in polyculture with commercial feed, Catla exhibited superior growth compared to Rohu and Pabda. Organic manure supplementation resulted in slower growth across all species. Economic analysis demonstrated that polyculture systems with commercial feed (T_1) achieved the highest production, recovery rate, and benefit-cost ratio (BCR), outperforming both monoculture (T_0) and organically supplemented polyculture (T_2). The study concludes that polyculture of Pabda with Indian Major Carps, supplemented with commercial feed, is the most viable and economically feasible culture strategy for enhancing Pabda production in eastern India.

Keywords

Ompok bimaculatus, Polyculture system, Integrated fish farming, Indian Major Carps, Benefit-cost ratio, Plankton productivity

AHS-39

De Novo Transcriptome Assembly and Functional Annotation of *Artemia franciscana*

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Artemia franciscana plays a vital ecological role in hypersaline environments by contributing to nutrient cycling and serving as a key link in the aquatic food web. Biologically, it is a valuable model organism due to its stress tolerance, desiccation-resistant cysts, and suitability for studies in developmental biology, immunity, and aquaculture applications. Despite its importance, genomic resources for this species are limited. In this study, we performed a de novo transcriptome assembly to establish a comprehensive molecular resource. RNA was extracted from the sub-adult stage, and sequencing was carried out using Illumina NovaSeq 6000. The assembly using Trinity yielded 383,589 transcripts with an N50 of 2069. BUSCO analysis showed 95% completeness, indicating a high-quality assembly. Functional annotation was performed using BLAST, EggNOG, and GO terms through Blast2GO. The pathway enrichment was carried out using KEGG and Reactome databases. The resulting dataset provides valuable insights into various stress response studies and serves as a foundational resource for future functional genomics and ecotoxicological studies.

Keywords

Transcriptome assembly, Functional annotation, *Artemia franciscana*

AHS-40

Comparative Evaluation of Yolo Architectures for Automated Macrobenthic Fauna Detection in the Indian Marine Environment

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Monitoring marine biodiversity depends on accurately detecting benthic marine species; however, this is challenging, as few annotated datasets exist and most species are small and cryptic. In this paper, a single-species underwater object detection method is proposed to address these problems, utilising lightweight YOLO-based deep learning models and synthetic dataset generation. An artificial augmentation pipeline is constructed to synthetically create a new labelled dataset with scale, orientation, and spatial placement variation from a small number of original images. These are then automatically background-removed and bounding-box annotations are generated to assist with manual edits and improve labour efficiency and consistency. Three object detection models (i.e., YOLOv8, YOLO11s, and YOLO11n) are trained and tested on the generated dataset using the same experimental configuration. Based on experimental results, YOLOv8 significantly outperforms competing methods in terms of training time and detection accuracy, whereas YOLO11s exhibits the best reliability in livescan testing by successfully recognising all species at a higher computational cost. The model with the highest inference speed and full detection coverage is YOLO11n, at the expense of slightly lower confidence scores. This consideration of the models' accuracy, robustness, and efficiency is demonstrated in this live evaluation based on images captured from specimens. Results show that the proposed augmentation of synthetic data for combating data scarcity in maritime vision tasks works, and the model to be selected should depend on application needs.

Keywords

Underwater object detection, Synthetic data augmentation, Single-species detection, YOLO11s, Marine organisms

Theme 4

Safeguarding Plant and Environmental Health: Addressing Biosecurity Risks, Microbial Threats and Ecosystem Monitoring Through Integrated One Health Approaches

Plant and Environmental Health-PEH (01-59)

PEH-01

Harnessing Indigenous Entomopathogenic Fungi as an Eco-friendly Strategy for Managing Rugose Spiralling Whitefly (*Aleurodicus rugioperculatus* Martin) in Coconut

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Coconut (*Cocos nucifera* L.) is a perennial oilseed crop of high commercial importance and is often referred to as the "Kalpavriksha" due to its diverse uses. In India, four exotic neotropical whitefly species have been reported from coconut-growing areas within a short period, of which the rugose spiralling whitefly (*Aleurodicus rugioperculatus* Martin) has emerged as the most dominant and destructive species. Surveys conducted across multiple agro-ecosystems of Tamil Nadu from February 2021 to May 2022 led to the isolation of two indigenous entomopathogenic fungi (EPF), *Metarhizium flavoviride* var. *minus* and *Beauveria bassiana* (Bb2), from naturally infected insect cadavers. The isolates were characterized morphologically and molecularly using the internal transcribed spacer (ITS) region sequencing, which confirmed their identity with high homology to NCBI GenBank reference sequences. Bioassays using the leaf-dip method revealed that second instar nymphs of *A. rugioperculatus* were more susceptible than fourth instars. Among the treatments, Metarhizium anisopliae (MZ749658–TNAU strain) caused the highest mortality in second instars (85.00%), followed by *B. bassiana* Bb2 (73.33%) and *M. flavoviride* var. *minus* (54.17%). Against fourth instar nymphs, *M. anisopliae* recorded 73.33% mortality at 10 days after treatment, followed by *B. bassiana* Bb2 (65.56%), while *M. flavoviride* var. *minus* showed lower efficacy (32.22%). Although ovicidal activity was low, residual pathogenicity resulted in significant mortality of newly emerged crawlers. Concentration–response studies indicated a clear dose-dependent increase in nymphal mortality. The study highlights the potential of indigenous EPF as effective and environmentally safe alternatives for managing rugose spiralling whitefly in coconut ecosystems.

Keywords

Rugose Spiralling Whitefly (*Aleurodicus rugioperculatus*), Entomopathogenic Fungi (EPF), Biological Control, Coconut Pest Management

PEH-02

Sequential cropping in Andaman Padauk (*Pterocarpus dalbergioides*) based Agroforestry system

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In the small holder farming system prevalent in these Islands, the production of fruit, vegetables and fodder is often a sideline activity and not practiced by the Island farmers as a routine. Due to climate change and natural disasters, Islands have suffered a heavy loss of agricultural land permanently. Sequential cropping is a practice wherein short-term crops are planted with and eventually replaced by long-term trees. This study aims to develop and evaluate the Andaman Padauk (*Pterocarpus dalbergioides*) based sequential cropping system. We have studied for two consecutive years (2022-2024). The study was laid out in a Randomised Block Design with a combination of vegetables, fruits and tuber crops. Results have shown a significant difference among all the tree crop combinations. Under *Pterocarpus dalbergioides-based* sequential cropping system, harvested 35 kg of Tapioca tubers, veg. Cowpea crops with the yield of 2.2 kg in an area of 10 m^2 of each, Bhendi performed well under the Padauk-based sequential cropping system with the average yield of 0.72 kg/plant. The highest mean yield of Tapioca tubers and Brinjal fruits recorded 8t/ha in the system, followed by banana fruits (6.5 t/ha). The intermittent yield of the plantation through vegetables, fruits, and tubers improved the productivity of the plantation as well as the growth of the padauk trees during the initial growth stages of the padauk trees. The study demonstrates that a *Pterocarpus dalbergioides*-based sequential cropping system can enhance land productivity and provide sustained interim income during the early growth phase of tree plantations. Such diversified integration of vegetables, fruits, and tubers offers a climate-resilient and resource-efficient strategy for smallholder farming systems in the Islands.

Keywords

Andaman Padauk, *Pterocarpus dalbergioides*, Intercrop, Intermittent Yield, Sequential Cropping

PEH-03

Microgreens as Catalysts of One Health for Sustainable Futures

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Micro-greens are produced 7-21 days after germination and adaptable crop that synergises human health, veterinary care, plant pathologies, and aquatic issues for One Health. They offer a tender texture, novel Flavors, and high values far exceeding standard vegetables' intensity by 4–40 times higher vitamin levels (C, E, K) and mineral values (Fe, Zn) and more bioavailable bioactive plant secondary metabolites from parent plants due to higher concentration levels of polyphenols, glucosinolates, and carotenoids. These tertiary metabolites offer great value as antioxidants, reduce inflammation, and offer cardioprotective to safeguard against type 2 diabetes and cardio supplements to alleviate chronic pathologies caused by impaired glucose and lipid metabolism. In veterinarian applications, incorporating micro-greens within feed will offer greatly improved digestibility and higher bioavailable micronutrients, while lowering demands on resource-consuming feeds. In plant health agriculture, the micro-grown plants' crop raises stronger plants' Symbio trophic associations with great nutrient fixation integrity that suppresses plant pathologies and enhances resistance against abiotic stresses. The micro-grown plants' production plants will consume 90–95% less water and 90–95% less land when compared to food production company agriculture, to promote minimal use of pesticide inputs while enhancing soil turnover to reduce watercourse enrichment from nutrient spills to safeguard aquatic life from losses caused by decomposition. Micro-grown plants' yields within urban agriculture mitigate range length to strengthen food security status within human-dominated environments, while contributing to increased biodiversity within human-dominated environments to correspond to circular economies. Micro-grown plants within human-dominated environments face efficacy issues when crop variety-specific and potentiating bioactive degradation after harvesting within food production company agriculture, despite innovation within food production company agriculture looking to produce bio-rich and inexpensive feed within applied biomedical research.

Keywords

Microgreens, One Health Framework, Sustainable Agriculture, Phytonutrients, Urban Food Security, Bioactive Compounds, Resource Efficiency

PEH-04

Balancing the Himalayan Ledger: A One Health Policy Perspective for J&K

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The Himalaya represents one of the world's most fragile socio-ecological systems where the health of humans, livestock, wildlife, crops, soils, forests, wetlands, watersheds, and air is interdependent. Six decades of LULC transition from the 1960s to the present demonstrate the magnitude of ecological change: shrinking valley wetlands leading to the loss of natural flood basins; fragmentation of forest corridors; disappearance of perennial springs; degradation of high-altitude pastures under grazing and tenure pressures; rapid conversion of orchards; and widespread excision of Karewa soils for brick kilns and infrastructure. These changes have collectively diminished ecosystem-service flows and increased exposure to extreme events, as seen in the 2014 and 2025 floods. This is a direct One Health concern, and therefore a One Health framework for J&K is necessary to mitigate these issues. A robust One Health Policy for the Himalayan region should prioritize ecosystem-service accounting at district and watershed scales; landscape-level planning that respects ecological thresholds; and restoration of degraded commons pastures, forests, wetlands, springs, and riverbanks through nature-based solutions. It must promote sustainable agriculture and horticulture with reduced chemical inputs, integrated pest management, pollinator conservation, and agroforestry systems, alongside integrated livestock–pasture management supported by disease surveillance and veterinary outreach. Strong air and water quality regulation, waste management, and clean-energy transitions are essential. Community co-governance through Panchayat institutions, formal recognition of pastoral rights, and citizen monitoring networks should anchor implementation. One Health offers an integrative framework to operationalize this agenda. Beyond a public-health concept, it serves as a comprehensive policy architecture linking environmental governance, agriculture, livestock systems, biodiversity conservation, disaster risk reduction, and community resilience, an imperative for ecologically fragile regions like J&K.

Keywords

Himalayan One Health Framework, Land-Use Change and Ecosystems, Ecosystem-Service Accounting, Nature-Based Restoration, Climate and Disaster Resilience, Integrated Landscape Governance

PEH-05

Microgreens: Future Crop for Health and Nutrition

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Microgreens are young, edible seedlings consisting of a stem, cotyledons and true leaves. They are rich in vitamins, minerals, antioxidants and bioactive compounds, with diverse colours, flavours and textures that enhance their nutritional and culinary value. The bioavailability of nutritional compounds of microgreens is 30–40 times higher as compared to the mature stages. These nutrient-dense greens have gained attention in health and nutrition research for their potential to diversify and enhance the human diet and address nutritional deficiencies due to their high content of phytochemicals. In today's fast-paced lifestyle, imbalanced diets and inadequate nutrient intake contribute to rising diet-related non-communicable diseases. In India, despite spending 50–80% of their income on food, low-income households continue to face widespread micronutrient deficiencies. Integrating microgreens into daily meals can boost dietary diversity and nutrition. Microgreens production requires minimal input, time, and space, making it a cost-effective and profitable option compared to traditional farming. They can be easily grown at home on balconies, porticos, or windowsills, offering a sustainable solution to urban food and nutrition challenges. With a market value five to eleven times higher than production costs, microgreen cultivation holds great potential for enhancing the livelihoods of farmwomen. Empowering women through training programs and workshops on microgreen cultivation, coupled with access to resources and market linkages, can strengthen their entrepreneurial capacity. Partnerships with agricultural departments, NGOs, and microfinance institutions can further promote women-led microgreen enterprises, contributing to improved nutrition, economic empowerment, and sustainable livelihoods.

Keywords

Microgreens, Nutritional Composition, Health, Women

PEH-06

Baby Potatoes-an Innovative Method of Consuming Potatoes

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Potatoes have diversified usage and are mainly classified as potatoes for fresh consumption and processing. Consumer-oriented potato breeding has been initiated in India as well as across the globe. Produce size affects the pricing. Potato production goals require optimizing tuber size to maximize crop value, and hence, potato growers and researchers target different tuber sizes at harvest depending on market demand. Potatoes for processing need to have a specific tuber size for chips, french fries and flakes, besides quality parameters like high tuber dry matter and low reducing sugar for achieving the best product. For the fresh market, potato prices are variable over different types of potatoes like small (<20 gram), medium (20-75gram) and large (>75 gram) sized tubers, market location, as well as period of year. Normally, medium and large-sized tubers get premium rates as compared to small tubers, however in specific locations, small-sized tubers of specific varieties are liked and therefore get premium rates. In the changing food habit scenario, tubers of 20-40 grams weight, specially packed and marketed as “Baby potatoes” attract consumers. Baby potatoes are valued by consumers for freshness, taste, size and shape and are consumed worldwide in a variety of dishes through various culinary methods. In the year 2025, an advanced potato hybrid MSP/15-60 of CPRI Shimla has been recommended for release under CVRC as First ever Baby Potato Variety of India. The variety produces attractive red round-ovoid tubers with medium-deep eyes and yellow flesh having red vascular bundles (22-25 tubers/plant), average tuber weight (20-25 g) and total tuber yield (23-25 t/ha). It possesses higher carotenoid content (83 µg/100g FW in tuber flesh). Development of such genotypes opens novel avenues for potato producers as well as the consumer by enhancing the income and diversifying the plate, respectively.

Keywords

Potatoes, Baby potatoes, Tuber size, Fresh consumption, Processing

PEH-07

Island Agriculture and Women's Work: Tools for Productivity and Comfort

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Women farmers in the North and Middle Andaman districts contribute substantially to agricultural operations, yet their reliance on traditional tools such as the sickle, hoe and khurpi results in high drudgery, reduced efficiency, and adverse health outcomes. Building on evidence from on-Farm Trials in the North and Middle Andaman district, this assessment explores the potential of improved, ergonomically designed tools, such as the garden rake, circular blade weeder, hand fork, paddy cono-weeder and motorized shrub cutter for island agriculture. Findings indicate that improved tools reduce operation time by 20–30%, lower labor costs, and decrease physiological fatigue through reduced heart rate and energy expenditure. Women reported less musculoskeletal strain, greater comfort, and higher willingness to adopt these implements. The study concludes that gender-sensitive farm tools are economically viable, ergonomically superior, and essential for inclusive agricultural development in the Andaman Islands. The results clearly demonstrate that introducing ergonomically designed, gender-responsive farm tools can significantly enhance productivity while safeguarding the health and well-being of women farmers. Beyond reducing drudgery, such interventions contribute to labor efficiency, cost savings, and sustained participation of women in agricultural activities. Mainstreaming gender-sensitive mechanization through extension support and local availability of tools is therefore critical for advancing inclusive and climate-resilient island agriculture.

Keywords

Women farmers, ergonomics, farm tools, productivity, drudgery reduction, Andaman Islands

PEH-08

One Health, One Planet: Ayush Perspectives, Addressing Biosecurity Risks and Ecosystem Challenges

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The interconnectedness of human health, animal health, and environmental sustainability forms the foundation of the One Health, One Planet approach, which has gained global recognition in response to escalating biosecurity risks, emerging zoonotic diseases, climate change, and widespread ecosystem degradation. Increasing human–animal–environment interactions, biodiversity loss, and unsustainable development have intensified threats to global health security, necessitating integrative and preventive health frameworks beyond conventional biomedical models. In this context, the AYUSH systems of medicine, Ayurveda, Yoga & Naturopathy, Unani, Siddha, and Homoeopathy offer holistic, nature-centric perspectives that are highly relevant to addressing biosecurity and ecosystem challenges. This paper examines the conceptual foundations and practical relevance of AYUSH systems within the One Health, One Planet paradigm, with particular focus on prevention, ecological balance, and sustainable health governance. Using a narrative review and conceptual analysis of classical AYUSH texts, contemporary scientific literature, and national and international health policy documents, the study evaluates how AYUSH principles contribute to mitigating biosecurity risks such as zoonotic spill over, antimicrobial resistance, and climate-sensitive disease emergence. The analysis highlights Ayurveda's ecological philosophy of *Panchamahabhuta*, *Tridosha, Rituchary, Lok Purusha Siddhanta and Janapadodhwamsa* in understanding environmental imbalance and disease susceptibility, Yoga's role in enhancing individual and community resilience, and Naturopathy's emphasis on natural living and minimal ecological disruption. Unani and Siddha systems demonstrate climate-responsive health strategies, while Homoeopathy's principle of minimum dose supports reduced environmental toxicity. Collectively, these approaches promote biodiversity conservation, sustainable medicinal resource use, and community-based preventive care. The discussion underscores the potential of integrating AYUSH systems into public health and biosecurity policies to strengthen ecosystem resilience, reduce disease vulnerability, and advance the One Health, One Planet vision. The paper concludes that AYUSH perspectives provide a culturally grounded, ecologically sustainable, and preventive framework essential for addressing contemporary biosecurity risks and protecting planetary health.

Keywords

One Health, Biosecurity, Ecosystem Sustainability, AYUSH

PEH-09

Phytochemical Profiling and Antibacterial Activity of Endemic Medicinal Plants from the Native Species of the Bay Islands

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This study examines the medicinal properties of three endemic and native plant species *Macaranga nicobarica, Pterocarpus dalbergioides*, and *Morinda citrifolia*. It aims to highlight their therapeutic potential for applications in pharmacology and traditional medicine by utilising the leaves, stems, and bark of these plants. It identifies bioactive compounds and validates ethnomedicinal uses through Antibacterial activity, phytochemical screening and GC-MS analysis. Some of Promising bioactive compounds which possess pharmaceutical applications found in Andaman Padauk, *Macaranga nicobarica* and Noni tree samples were, 2-Methoxy-4-vinylphenol; GUANOSINE; Neophytadiene; Hexadecanoic acid, 2-hydroxy-1-(hydroxymethyl)ethyl ester; 1,3-Propanediol, 2-(hydroxymethyl)-2-nitro-; Phenol, 2,6-dimethoxy-4-(2-propenyl)-; ETHANONE, 1-(4-HYDROXY-3,5-DIMETHOXYPHENYL)-; (E)-4-(3-Hydroxyprop-1-en-1-yl)-2-methoxyphenol. Triethyl borate; Ethanol, 1-(2-methyl-2H-tetrazol-5-yl)-2-[(thiophen-2-ylmethyl)amino]-; Pregnane-3,11,20,21-tetrol, cyclic 20,21-[(1,1-dimethylethyl)boronate], (3.alpha.,5.alpha.,11.beta.,20; Glyceraldehyde; GUANOSINE; 3-Deoxy-d-mannoic lactone; Phytol; Sucrose; 1,2,3-Thiadiazole-4-carboxylic acid, hydrazide; Decanoic acid, silver(1+) salt; and Vitamin E; Among the compounds identified, 4H-Pyran-4-one, 2,3-dihydro-3,5-dihydroxy-6-methyl was found in all three species. Additionally, MOME Inositol and 1,3,4,5-Tetrahydroxy-Cyclohexanecarboxylic Acid were detected in the species *Pterocarpus dalbergioides* and *Macaranga nicobarica*. When it comes to antioxidant activity *M. nicobarica* leaf has the highest scavenging activity in DPPH, 6995.8 ± 21.2 (mg BHA/100g) DW Basis, followed by *M. nicobarica* 5976.6 ± 12.47 (mg BHA/100g) DW Basis and Andaman Padauk 3626.6 ± 9.4 (mg BHA/100g) DW Basis. Both *Pterocarpus dalbergioides* and *Macaranga nicobarica* demonstrate strong antibacterial activity. Therefore, these three tree species, which are native to biodiversity hotspots in the Andaman and Nicobar Islands, provide untapped resources for antioxidants, antimicrobials, and anti-inflammatory agents that are valuable to the pharmaceutical industry.

Keywords

Pterocarpus dalbergioides, *Macaranga nicobarica, Morinda citrifolia,* Ethnomedicine, Antibacterial activity, GC-MS, Phytochemicals, Endemic species

PEH-10

Studies on Genetic Diversity in Bottle Gourd [*Lagenaria siceraria* (Mol.) Standl.]

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The experiment entitled "Studies on genetic diversity in bottle gourd [*Lagenaria siceraria* (Mol.) Standl.]" was carried out during *kharif 2022* at Vegetable Research Farm, RLBCAU, Jhansi. In this investigation, a total of 30 genotypes of bottle gourd were sown in a randomized block design with three replications to estimate genetic variability, heritability and genetic advance, correlation studies, path coefficient analysis and genetic diversity among the genotypes. Observations were recorded on 15 characters. Analysis of variance of the experiment indicated highly significant differences among the 30 genotypes for all the characters, and a wide range of mean values among the genotypes for different traits under study was observed. Higher magnitude of GCV and PCV was recorded for fruit length (cm), fruit width (cm) and yield per plant (Kg). A very low or insignificant difference between GCV and PCV was recorded because most of the traits indicated that the traits investigated were less impacted by the environment. High heritability with high genetic advance per cent of mean was recorded for days to first flowering bud, fruit length, fruit weight, fruit width, number of fruits per plant, yield per plant, total soluble solids, protein content and ascorbic acid content. The inter-character association at phenotypic and genotypic correlation coefficients suggested that yield per plant recorded a highly significant correlation with fruit width, average fruit weight and number of fruits per plant at both genotypic and phenotypic levels. Path coefficient analysis revealed highly positive direct contribution towards yield per plant with number of fruits per plant, fruit width and average fruit weight at both genotypic and phenotypic levels. On the other hand, vine length, days to first flowering bud, days to first fruit setting, days to first fruit picking and fruit length showed a negative direct effect on fruit yield per plant. Based on (D^2) statistics, thirty genotypes were grouped into five highly divergent clusters based on similarity in traits. Grouping genotypes into different clusters showed a considerable amount of diversity among the genotypes. Based on yield performance, Genotypes Hybrid Green Gold, followed by MAHY 8 and Pusa Samrudhi, were found to be the superior yielding genotypes.

Keywords

Bottle gourd, Genotypes, Heritability, Phenotypic, Genotypic

PEH-11

Crops at the Core of One Health: Linking Plant Systems to Human, Animals and Environmental Well-Being

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The One Health approach emphasizes the interconnectedness of human, animal, plant, and environmental health. Climate change poses significant threats to crop productivity through increased drought, heat, and salinity stress. Over-reliance on chemical inputs has led to soil degradation, water contamination, and loss of biodiversity. Post-harvest losses and contamination, such as aflatoxin accumulation, continue to pose health risks for humans and animals alike. These challenges highlight the urgent need for innovative strategies that integrate crop health into broader One Health initiatives. Recent advances in genomics and breeding have enabled the development of climate-resilient and disease-resistant cultivars using molecular tools and gene editing technologies. Microbiome engineering offers promising solutions by harnessing beneficial microbes to improve plant health and restore soil ecosystems. Agroecological practices, including crop diversification, conservation agriculture, and precision farming, can reduce environmental footprints while enhancing productivity. Digital agriculture, powered by artificial intelligence and IoT-based monitoring systems, provides real-time insights into crop health and resource optimization, ensuring efficient and sustainable production. Integrating crop health strategies within the One Health framework creates multiple benefits. Sustainable land use reduces zoonotic disease risks, while improved crop quality enhances nutritional security for humans and animals. Reducing agrochemical runoff helps preserve aquatic ecosystems, and carbon sequestration through healthy soils contributes to climate change mitigation. These synergies underscore the importance of interdisciplinary collaboration in addressing global health and sustainability challenges. Operationalizing One Health in agriculture requires collaboration among plant scientists, veterinarians, public health experts, and environmental specialists. Policy frameworks should incentivize sustainable crop production, support research investments in resilient varieties, and promote capacity building for farmers. Embedding crop health into One Health strategies will enable a holistic approach to sustainability, ensuring a future where food security, environmental integrity, and global health are harmoniously aligned.

Keywords

One Health and Crop Health Integration, Climate-Resilient Agriculture, Microbiome and Soil Restoration, Sustainable Agroecological Practices, Digital and Precision Farming, Food Safety, Nutritional Security

PEH-12

Integrated Pest Management of Brinjal Shoot and Fruit Borer (*Leucinodes orbonalis* Guenee) in South Andaman

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Brinjal shoot and fruit borer (*Leucinodes orbonalis* Guenée) is recognized as the most serious insect pest limiting brinjal production in tropical and subtropical regions, with particularly severe implications in ecologically fragile tropical island ecosystems. To understand the extent and severity of *L. orbonalis* infestation, a comprehensive baseline survey was conducted during 2024–25 in eight randomly selected villages, namely Guptapara, Chouldhari, Tushnabad, Mithakhari, Shoal Bay, Rangachang, V. K. Pur, and Ramnagar of South Andaman district. The survey revealed that pest incidence varied widely from 30% to as high as 70%, with an overall mean yield loss of 54%. The observed variability in infestation levels was closely associated with location-specific micro-climatic conditions, cropping patterns, and the predominance of non-IPM farmer practices, including indiscriminate use of chemical pesticides. In order to develop an eco-friendly and sustainable management strategy, on-farm field experiments were conducted during April to July 2025 at four farmers' fields across different Gram Panchayats. Three integrated pest management (IPM) modules were evaluated against the prevailing farmers' practice (control). The treatments included: Technical Option-I comprising pheromone traps combined with clipping and destruction of borer-infested shoots followed by neem oil application at 2%; Technical Option-II comprising pheromone traps and mechanical clipping integrated with *Bacillus thuringiensis* formulation applied at 1%; and Technical Option-III comprising pheromone traps and mechanical clipping integrated with *Beauveria bassiana* formulation applied at 1%. The experiment was laid out in a randomized block design with four replications. The results clearly indicated the superiority of Technical Option-II in managing brinjal shoot and fruit borer, recording the lowest shoot infestation (5.15%) and fruit infestation (6.40%), along with the highest fruit yield of 161.4 q ha^{-1}. Technical Option-III and Technical Option-I also resulted in significant reductions in pest infestation and yield improvement compared to the farmers' practice, which recorded as high as 54.5% fruit damage. The findings conclusively demonstrate that integration of mechanical control measures and pheromone trapping with microbial biopesticides, particularly *Bacillus thuringiensis*, provides an effective, environmentally safe, and economically viable IPM strategy for sustainable brinjal production in tropical island ecosystems.

Keywords

Integrated Pest Management, *Leucinodes orbonalis*, South Andaman, *Bacillus thuringiensis*, *Beauveria bassiana*, Pheromone Traps

PEH-13

The Agricultural Outlook of Andaman and Nicobar Farmers

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This study explores farmers' perceptions and attitudes towards agriculture in the Andaman and Nicobar Islands (ANI), where agriculture contributes 12.24% to the Real State GDP. Despite the increasing number of farmers, the average land area under cultivation per farmer has recently decreased from 1.99 to 1.09 hectares in ANI, and agriculture faces severe challenges due to climate change and inadequate infrastructure. The results from ordinal logistic regression show that farm size, income and social participation are found to impact farmers' attitudes towards agriculture significantly. These findings offer insights for policymakers to attract and retain farmers and promote sustainable agriculture in the islands.

Keywords

Farmers' attitude, Agricultural outlook, Farm size, Farm income, Climate change, Ordinal logistic regression, Sustainable agriculture

PEH-14

Culture Plating and Molecular Identification of *Volvariella volvacea* Using 18S rRNA Sequence

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Volvariella volvacea, commonly known as the paddy straw mushroom, is an economically important edible fungus widely cultivated in tropical regions. In this study, *V. volvacea* was isolated through culture plating to obtain a pure mycelial culture, followed by molecular identification using 18S rRNA sequencing. The cultured mycelium exhibited characteristic growth patterns consistent with *Volvariella* species. Genomic DNA extracted from the pure culture was analyzed through sequencing of a conserved fungal barcode region, and the obtained sequence was compared with reference sequences available in established databases. The results confirmed the identity of the isolate as *Volvariella volvacea* based on high sequence similarity and phylogenetic association. This study demonstrates that combining culture plating with molecular sequencing provides a reliable and accurate approach for the identification of *V. volvacea*, supporting its application in mycological research, strain authentication, and mushroom biotechnology.

Keywords

Volvariella volvacea, Culture plating, Phylogenetic tree, 18S rRNA sequence

PEH-15

Microbial Biosecurity and Ecosystem Resilience under One Health Framework: Emerging challenges and Integrated Pathways

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The accelerating intensification of food production systems, climate variability and expanding human-environmental interactions have heightened biosecurity risks across interconnected human, plant, and aquatic ecosystems. Microbial dynamics play a central, yet often underestimated, role in shaping ecosystem health, nutrient cycling, disease emergence and environmental resilience. Within the one health framework, addressing microbial threats requires an integral understanding that transcends sectoral boundaries and incorporates plant health as a foundational component of sustainable systems. Emerging evidence suggests that disruptions in ecological balance driven by excessive chemical inputs, habitat alteration and declining biodiversity can promote pathogenic microbial proliferation and microbial resistance and environmental contamination, affecting food safety and public health. Conversely, ecologically aligned microbial management strategies have demonstrated potential in stabilising nutrient flows, enhancing ecosystem services and reducing disease pressure without promising environmental integrity. This abstract emphasizes a need for ecosystem-based biosecurity approaches that integrate microbial monitoring, adaptive nutrient management and environmental surveillance across terrestrial aquatic interfaces. Strengthening microbial stewardship within one health strategies can support early detection of biological risks, improved resilience of agroecosystems, and mitigate downstream impacts on human and animal health. Advancing interdisciplinary collaboration, policy coherence and science-driven ecological interventions will be critical for safeguarding plant and environmental health while ensuring a sustainable food system for the future.

Keywords

One health, Biosecurity, Microbial dynamics, Ecosystem health, Sustainable Food Systems

PEH-16

One Health Synergy through Integrated Farming Systems: A Case Study of Human, Animal, Plant, Environmental Integration for Sustainable Livelihoods in Island Ecosystems

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The One Health approach emphasises the interconnectedness of human, animal, plant, and environmental health as a foundation for sustainable development. Integrated Farming Systems (IFS) represent a practical embodiment of this concept by promoting ecological balance, food and nutritional security, and economic resilience. The present study analyzes an Integrated Farming System adopted by a progressive farmer in Car Nicobar Island, Andaman and Nicobar Islands, India, with technical support from ICAR–KVK. The farming model integrates crop production, fruit cultivation, livestock enterprises (poultry, piggery, and goats), copra production, and beekeeping within a circular resource-use framework. Results indicate significant improvements in household nutrition, farm income, soil health, and biodiversity conservation following institutional interventions. Economic analysis revealed an increase in net returns from ₹14,000 before intervention to ₹2,43,450 after intervention, with an overall benefit–cost ratio of 2.55. The recycling of animal waste as organic manure reduced external input dependency, enhanced plant health, and minimized environmental pollution, thereby positively impacting human and animal health. The system also strengthens resilience against climate variability, particularly in fragile island ecosystems. The study concludes that Integrated Farming Systems serve as an effective One Health model by synergizing human well-being, animal welfare, plant productivity, and environmental sustainability. Scaling such models through policy support and extension services can significantly contribute to sustainable agriculture and rural livelihoods.

Keywords

One Health, Integrated Farming System, Sustainable Agriculture, Livelihood Security, Human–Animal–Plant Health, Island Ecosystems

PEH-17

Phytochemical Profiling and Antioxidant Potential of Wild Loquat (*Eriobotrya angustissima* Hook.f.) Collected from the Garo Hills of Meghalaya

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Underutilized fruit crops represent a valuable yet largely untapped resource for improving dietary diversity, nutritional security, and sustainable food systems, particularly in biodiversity-rich regions. *Eriobotrya angustissima* Hook.f., a wild and endemic minor fruit species of the central to eastern Himalayan region, is traditionally consumed by local communities but remains poorly characterized in terms of its nutritional and phytochemical potential. The present study aimed to evaluate the biochemical composition and antioxidant properties of *E. angustissima* fruits collected from the village Umphrew in east garo hills and Nonglum, in districts of Meghalaya, India, during August 2025. Fresh fruit samples were analyzed for proximate biochemical constituents, including protein, ash, total sugars, and vitamin C, using standard analytical procedures. Antioxidant activity was assessed through the Ferric Reducing Antioxidant Power (FRAP) assay, while total phenolic content and other phytochemical constituents were quantified using spectrophotometric methods. The results revealed considerable variation between the two collection sites, reflecting environmental influences on fruit quality attributes. Fruits exhibited appreciable levels of total sugars and vitamin C, alongside substantial phenolic content and strong antioxidant capacity. The FRAP values demonstrated notable reducing power, which was positively associated with phenolic concentration, indicating the presence of bioactive compounds with potential health benefits.

Keywords

Eriobotrya angustissima, Underutilized fruit crops, Antioxidant activity (FRAP), Phytochemical composition, Nutritional quality

PEH-18

Dweep Agricultural Information System - A Geo Portal

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In the context of global food security and climate change, optimum utilisation and sustainable management of agricultural resources assume a greater importance in achieving some of the Sustainable Development Goals (SDGs) like no poverty, zero hunger and life on land as proposed by the United Nations. The emerging geoportal platforms and web-based applications have redefined the efficient planning, management, monitoring and implementation of agricultural land use plans at different levels. Geoportals have emerged as a significant source of spatial information for users. In line with this, ICAR-Central Island Agricultural Research Institute has taken the initiative to create the Dweep geoportal. This platform enables the sharing and dynamic display of data pertaining to political and administrative boundaries, natural resources, demography, agro and socio-economy, and more, through the Web Map Service (WMS). An open-source web GIS application was developed using Geoserver, Openlayer, and PostgreSQL. The application includes various basic functionalities such as pan, zoom, home, info window, measure, legend button, geo-location, search bar, layer selection, mini map, attribution, and mouse position. Dweep geoportal platform, developed by ICAR-CIARI, provides comprehensive information of the Andaman and Nicobar Islands, featuring road names, populated islands, village boundaries, and maps illustrating geomorphology, lithology, elevation, and slope. In addition, a map has been developed to indicate the production regions of essential crops such as cereals, oilseeds, pulses, sugar crops, spices, plantation crops, root crops, and fruits, utilising secondary data, along with livestock statistics for cattle, pigs, goats, sheep, and buffaloes. Moreover, floriculture maps, information on water bodies, a Land Use/Land Cover (LULC) map, a detailed representation of the forests and mangroves of the Andaman and Nicobar Islands, and soil maps for all the islands have been prepared and updated within the Dweep Geo-portal.

Keywords

Dweep Geoportal Platform, Web GIS and Spatial Planning, Agricultural Resource Management, Land Use and LULC Mapping, Natural Resource and Soil Information Systems, Sustainable Development Goals Support

PEH-19

Assessment of Suitable Long-Duration Rice Variety for North and Middle Andaman District

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Rice is the most important cereal crop in India, contributing more than 149 million tonnes annually with an average productivity of about 2900 kg ha^{-1}. In the Andaman and Nicobar Islands, rice cultivation is predominantly rainfed and limited to 4557 ha, which accounts for nearly 19.2% of the total cultivable area. Rice is the staple food of the island population; however, local production of about 14,361 tonnes meets only a small share of the demand, resulting in the import of nearly 45,639 tonnes from mainland India. This large production gap underscores the need to identify high-performing rice varieties suitable for the fragile island ecosystem. An on-farm trial was conducted during the Kharif seasons of 2024 and 2025 to evaluate the performance of selected long-duration rice varieties Rangat, Mayabunder and Diglipur block of North and Middle Andaman districts. The trial compared improved varieties CARI Dhan 9 and ANR 40 with the local farmer's variety. In addition, ANR 40, a high-yielding variety developed by ICAR–CIARI, was assessed for its productivity and economic potential. Among the tested varieties, ANR 40 recorded a 23.6% higher grain yield over the farmer's practice and 16.6% higher yield than CARI Dhan 9, mainly due to superior growth and yield attributes. Adoption of ANR 40 also resulted in a 26.11% increase in net returns to farmers. Overall, the study identifies CARI Dhan 9 and ANR 40 as suitable long-duration rice varieties for North and Middle Andaman districts, while highlighting the strong yield and profitability potential of ANR 40. The findings provide a sound basis for varietal recommendations, extension planning, and sustainable rice production in island ecosystems.

Keywords

Rice, Long-duration, CARI Dhan 9, ANR 40, Andaman Islands, Yield

PEH-20

Morphometric and Phytochemical Analysis of Traditional Rice Rakthasali

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Traditional rice varieties are developed through selective breeding methods for high yield; improve human health, and tolerance for various climatic conditions. The Thanjavur Cauvery delta is famous for its rice cultivation and comprises various traditional rice varieties. So many rice varieties have medicinal and high-yielding properties. In this research, various morphometric characters were observed in traditional rice Rakthasaali, and various qualitative and quantitative analyses of bioactive compounds in two different solvents, such as aqueous and ethanol, were evaluated for antimicrobial activities. Rakthasaali is a short, pigmented grain, plant maturation period 140-160 days, anthocyanin colour of leaf is absent, the height of paddy grain is 60-65 mm and width of the paddy grain is 20-25mm; In the Indian system of medicine, this rice improves the iron content of the human body and so it reduced blood related disorders. 15 phytochemical compounds were analysed on these extracts: in the aqueous extract, positive results occurred in 7 tests, and in the ethanolic extract, positive in 10 tests. Proximate analysis is conducted on carbohydrates, proteins, lipids and crude fibers were measured in addition the carbohydrate content of rice bears 78%. Antimicrobial activity of Rakthasaali rice extracts against various clinical microbes, which includes five fungal and five bacterial strains (two gram-positive and three gram-negative); rice extracts were used in four different concentrations 25, 50, 75 and 100µl were treated, and the zone of inhibition was predominantly shown in the ethanolic extract.

Keywords

Rakthasaali, Morphometric Characters, Iron, Fiber, Antimicrobial

PEH-21

Phytochemical-Based Investigation of Anti-Inflammatory Activity in Selected Traditional Medicinal Plants

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Inflammation is a complex biological response implicated in the progression of various chronic and metabolic disorders. The exploration of plant-derived phytochemicals as safer and more effective anti-inflammatory agents has gained considerable scientific interest. The present study aimed to evaluate the in vitro anti-inflammatory activity of selected traditional medicinal plants, namely *Aloe vera*, *Asparagus racemosus*, *Terminalia chebula*, *Vetiveria zizanioides*, and *Chamaecostus cuspidatus* (Insulin plant). Ethanolic extracts of the selected plants were prepared and subjected to preliminary phytochemical screening. Anti-inflammatory activity was assessed using the heat-induced bovine serum albumin (BSA) protein denaturation assay at concentrations ranging from 100–500 µg/ml. Diclofenac sodium was employed as the standard reference drug. The percentage inhibiting protein denaturation was calculated spectrophotometrically at 660 nm. All experiments were performed in triplicate to ensure accuracy and reproducibility. The results revealed significant and concentration-dependent inhibition of protein denaturation by all plant extracts. Among the tested samples, *Terminalia chebula* and *Aloe vera* exhibited comparatively higher anti-inflammatory activity. The observed effects may be attributed to the presence of bioactive phytoconstituents such as flavonoids, tannins, phenolics, saponins, and terpenoids, which are known to stabilize proteins and inhibit inflammatory mediators. In conclusion, the selected medicinal plants demonstrate promising anti-inflammatory potential and may serve as natural therapeutic candidates for managing inflammation-related disorders. Further in vivo investigations and molecular studies are recommended to validate their pharmacological efficacy.

Keywords

Anti-inflammatory Activity, Protein Denaturation Assay, Medicinal Plants, Phytochemicals, Natural Therapeutics

PEH-22

On-Farm Evaluation of a Mango-Based Integrated Farming System in Waterlogged Ecosystems of North-Bihar

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Flood-prone regions of North Bihar, particularly East Champaran district, face serious constraints in mango-based production systems due to recurrent waterlogging, declining health, irregular bearing-spaced plantation, and poor economic returns from conventional monocropping. To address these challenges, a three-year (2024–2027) location-specific mango-based Integrated Farming System (IFS) model is being developed under participatory on-farm conditions. The present study reports preliminary findings from the first year of implementation. During 2024–25, extensive field surveys were conducted across six flood-prone blocks in East Champaran to identify suitable orchards for farmers. Two well-established mango orchards were selected for on-farm experimentation. The IFS model integrated low-cost goat (Black Bengal) and poultry (Vanraja and Sonali) units along with shade-tolerant intercrops such as turmeric, ginger and guinea grass within mango orchards. Livestock housing structures were constructed using locally available materials to minimize investment costs. Animal performance, feed utilization, manure generation and egg production were monitored to evaluate system efficiency and resource recycling. First-year results indicated effective utilization of orchard space and biomass. Goats and poultry efficiently utilized mango leaves, orchard grazing and crop residues, reducing dependence on external feed inputs. Livestock and poultry components together generated approximately 171 kg of fresh manure, enhancing nutrient recycling potential. Poultry birds attained first lay at 25 weeks of age and produced 810 eggs over 45 days, with an average production of 18 eggs per day, 30.0% hen-day egg production, and a mean egg weight of 42 g under free-range orchard conditions. Goats exhibited steady weight gain ranging from 1.7 to 2.1 kg over two months. Introduction of shade-loving intercrops further improved land-use efficiency without affecting mango orchard operations. These preliminary findings demonstrate that mango-based IFS is a promising, climate-resilient approach for flood-prone ecosystems. Continued evaluation over the remaining project period will generate comprehensive evidence on productivity, profitability and sustainability.

Keywords

Integrated Farming System, Mango orchard, Waterlogging, Livestock integration, Resource recycling

PEH-23

A Study of Phytochemical Evaluation from *Ficus benghalensis* L. and *Ficus religiosa* L Fruits Extract by FT-IR and GC-MS Methods

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The present study aimed to compare ethanol- water and methanol, the solvent-dependence of the extract and composition in bioactive molecules was studied by FT-IR and GC-MS methods**.** FT-IR analysis of *Ficus benghalensis* fruits has identified key functional groups like carboxyl, hydroxyl, and C-H stretching, confirming the presence of various phytochemicals. Based on the FT-IR peaks from 8 regions, for each plant extract, the region between 900 and 1500 cm-1 has been determined and the specific functional groups. Studies on *Ficus benghalensis* (Banyan) and *Ficus religiosa* (Peepal) fruit extracts using GC-MS methods confirm they are rich in bioactive phytochemicals, including flavonoids, tannins, terpenes (like phytol, lupeol), phenolic compounds (gallic acid, quercetin), sugars, and steroids, revealing significant antioxidant potential and validating traditional medicinal uses, with specific compounds like 2,2,2-Trichloroethyl 8-Iodo-1-Naphthylenecarboxylateoften dominant in *F. benghalensis*. Specialised organic compounds are primarily used as intermediates in organic synthesis. Organic synthesis is a reagent or intermediate in producing pharmaceuticals, agrochemicals or other organic compounds. GC-MS separates and identifies specific volatile and non-volatile compounds, highlighting their complex chemical profiles for potential therapeutic applications. Overall, the solvent-dependent extraction significantly influenced the phytochemical profile and yield of bioactive constituents, demonstrating the importance of solvent selection in phytochemical investigations. The integrated FT-IR and GC-MS analyses substantiate the rich therapeutic potential of *Ficus benghalensis* and *Ficus religiosa* fruits, supporting their further exploration for pharmacological and nutraceutical applications.

Keywords

FT-IR,GC-MS, Phytochemical, *Ficus benghalensis* and *Ficus religiosa*

PEH- 24

Horticulture-Based Integrated Farming System under Mera Gaon Mera Gaurav Programme: A Sustainable Path for Hill Villages of Uttarakhand

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A horticulture-based Integrated Farming System (IFS) was implemented under the *Mera Gaon Mera Gaurav* (MGMG) programme during 2016–2018 in Sunkiya village of Nainital district, Uttarakhand, to enhance farm productivity, income diversification, and livelihood security in hill agriculture. Baseline information on existing farming practices was collected through surveys and farmer interactions, followed by the systematic dissemination of location-specific scientific interventions in horticulture, protected cultivation, animal husbandry, poultry, fisheries, beekeeping, vermicomposting, and rainwater harvesting, etc. Impact assessment was carried out through a comparative analysis of pre- and post-intervention productivity and economic indicators. The results demonstrated substantial improvements across multiple components of the IFS model. Fruit crop productivity increased by 2.9–88.9%, while vegetable productivity improved by 8.9–137.3% over baseline levels. Protected cultivation significantly enhanced the yield of high-value vegetables, with the tomato cv. VL-4 recording the highest productivity (4.42 kg plant^{-1}), while capsicum cv. Bharat yielded 1.62 kg plant^{-1} under open field conditions. Intercropping of garden peas and onions in apple orchards proved effective in optimizing orchard interspaces. The establishment of rainwater harvesting ponds increased the net irrigated area by approximately 10%, resulting in a 15% expansion of the vegetable cultivation area. Among allied enterprises, fisheries recorded the highest fish yield (55–60 kg per 100 m^2), while poultry farming generated returns of ₹250–300 per kg of live bird and ₹6–8 per egg. Vermicomposting provided additional income through sales at ₹500 per quintal, and beekeeping contributed indirectly through enhanced crop pollination and yield improvement. Overall, the horticulture-based IFS under the MGMG programme significantly improved farm productivity, profitability, and benefit-cost ratios, establishing its economic and ecological viability for hill farming systems.

Keywords

Horticulture-Based Integrated Farming System, Mera Gaon Mera Gaurav Programme, Hill Agriculture Productivity Enhancement, Diversified Farm Enterprises

PEH- 25

Challenges and Technological Options for Improving the Vegetable Scenario in Tropical Islands for Nutrition, Livelihood, and Self-Reliance: A Case Study of Andaman Islands, India

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The Andaman and Nicobar Islands in the Bay of Bengal face challenges such as climate change, geographical isolation, invasive species, fragile topography, limited water resources, low technological adoption, stresses favouring local climate, insufficient market integration, post-harvest storage and transit infrastructures, evolving landscapes and land use patterns, and marginalized communities with inadequate technological history. Over the past four decades, ICAR-CIARI, Port Blair, has significantly contributed to the island vegetable sector through technological innovation, refinement, dissemination, human resource development, technology support, and resolving emerging challenges. Employing biodiversity, developing enhanced cultivars from indigenous germplasm, advocating for protected cultivation, reconfiguring land use patterns, implementing multi-storey cropping, utilising micropropagation for local resources, nutritious and tourist-driven introduction of exotic crops, engaging in bioprospecting, processing, and value addition represent gradual yet consistent advancements in vegetable crops. The regional biodiversity has also enriched the national gene bank for breeding purposes. Nonetheless, local production systems continue to encounter significant challenges that must be prioritised to guarantee high-quality vegetable crops for year-round supply using sustainable technological solutions, including protected cultivation, modern sensor-based methodologies, customized farming and marketing systems, high-quality seeds and grafting techniques to benefit the producers, consumers, and the environment. Educating farmers on these technologies and linking them to local, national and international markets can create sustainable livelihoods. Weather, pest, and market data can be digitally connected to enhance decision-making and productivity. Implementing a combination of climate-smart agricultural technologies tailored for tropical islands can enhance the local vegetable scenario.

Keywords

Horticultural Crops, Improved Varieties, Local Biodiversity, Nutritional Security, Climate Change, Import Reduction

PEH- 26

Biocontrol Activity and Plant Growth Promotion by Sunflower-Associated Native *Bacillus* spp. Against Alternariaster Blight

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A total of 108 morphologically distinct bacterial isolates were obtained from the rhizosphere, phyllosphere, and endosphere regions of sunflower plants collected from major sunflower-growing districts of South India. Thirty heat-tolerant isolates surviving 80 °C treatment were screened for antagonistic activity against *Alternariaster helianthi*, the causal pathogen of sunflower Alternariaster blight. Eighteen isolates exhibited more than 40% mycelial growth inhibition, among which isolate SRH-7 showed the highest antifungal activity (80.00% and 63.33% inhibition), followed by SER-3 (60.00% and 78.80%) and SRH-4 (64.44% and 75.55%) in dual culture and volatile assays, respectively. BOX-PCR and 16S rDNA analyses revealed fifteen genetically distinct isolates representing *Bacillus* and *Lysinibacillus* species, including B. *subtilis*, B. *amyloliquefaciens*, B. *velezensis*, B. *stercoris*, and B. *firmus*. Most isolates exhibited strong plant growth-promoting (PGP) traits such as siderophore production, zinc solubilization and potassium solubilization. In-planta pot culture experiments confirmed that seed and foliar application of isolate SRH-4 significantly improved germination, growth, and reduced disease severity by 81.82%, followed by SRH-7 (30.00%) and SES-1 (28.57%) when applied as combined seed and foliar treatments. The results demonstrate the dual biocontrol and growth-promoting efficiency of native *Bacillus* isolates, supporting their potential deployment as eco-friendly bioinoculants following large- scale field validation in sunflower cultivation.

Keywords

Bacillus; Sunflower, Endophytes, Dual culture; In-planta assays

PEH-27

Individual and Synergistic Neuroprotective Potential of Amla (*Emblica Officinalis*) and Tamarind (*Tamarindus indica L.*) Seed Extracts Against Bisphenol-Induced Parkinson's Disease in Zebrafish Model

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Neurodegenerative disorders such as Parkinson's disease are strongly associated with oxidative stress and impaired cognitive function, highlighting the need for safe, plant-based neuroprotective agents. This study examined the phytochemical composition and neurobehavioral effects of aqueous seed extracts of *Emblica officinalis* (Amla) and *Tamarindus indica* L. (Tamarind). Preliminary qualitative phytochemical screening was carried out to identify major groups of bioactive compounds, followed by Gas Chromatography–Mass Spectrometry (GC–MS) analysis to characterize specific chemical constituents. Neurobehavioral performance was evaluated using the T-maze assay in zebrafish (*Danio rerio*), an established model for neurological research. Phytochemical screening showed that both seed extracts contain important secondary metabolites, including flavonoids, phenolics, tannins, saponins and alkaloids, suggesting strong antioxidant potential. GC–MS analysis further revealed several bioactive compounds known for antioxidant, anti-inflammatory and neuroactive properties, supporting their possible role in neuroprotection. Behavioural assessment using the T-maze demonstrated noticeable improvements in spatial learning, memory retention and locomotor coordination in treated groups compared to the neurotoxic control group, indicating reduced neurobehavioral deficits. These behavioural improvements may be linked to the combined action of the phytochemicals and bioactive molecules identified through GC–MS. Overall, the results underline the therapeutic value of Amla and Tamarind seed extracts and suggest their potential as natural sources of neuroprotective agents.

Keywords

Phytochemical Screening, GC–MS, T-maze, Neurobehavior, *Emblica officinalis*, *Tamarindus indica* L., Zebrafish

PEH- 28

Harnessing Banana as a Wonder Crop for Nutritional Security and Prosperity Under the One Health Paradigm

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Banana (*Musa* spp.) is a cornerstone of food and livelihood security across the tropics, offering year-round availability, high productivity, and exceptional versatility. Under the One Health paradigm, which integrates human, animal, and environmental health, the banana emerges as a "wonder crop" capable of addressing malnutrition, promoting sustainable agriculture, and fostering inclusive prosperity. Nutritionally, bananas contribute readily digestible carbohydrates, dietary fibre, potassium, magnesium, vitamin B6, and bioactive compounds, supporting gut health, energy metabolism, and cardio-metabolic well-being. Beyond fruit pulp, edible by-products such as flower, pseudostem, and peel provide minerals and antioxidants, enabling the development of functional foods, nutraceuticals, and low-glycaemic products. From a production perspective, bananas' adaptability to diverse agro-climates and high productivity enhances food availability and farm income. Climate-smart cultivation, improved varieties, and integrated pest and disease management reduce chemical dependence, safeguarding the ecosystem and human health. Circular bio-economy approaches like valorising pseudostem fibre, peel biomass, and processing residues to generate animal feed, natural fibres, bio-composites, briquettes, and value-added products, minimizing waste and environmental footprints while creating rural enterprises. Economically, banana-based value chains support smallholders, women, and youth through on-farm processing, post-harvest innovations, and market diversification. Strengthening cold chains, minimal processing, and quality standards reduces losses and enhances export competitiveness. Importantly, banana systems intersect human and animal health through safe feed resources and reduced exposure to agro-toxins, aligning with One Health goals.

Keywords

Nutritional Security, Sustainable Agriculture, Circular Bioeconomy, Value-Added Products, Market Diversification

PEH- 29

Iron Fortified Banana Millet Malt for Improved Nutritional Security

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Banana malt is a nutrient-dense functional food prepared using unripe banana flour blended with malted grains. Unripe bananas are rich in resistant starch, dietary fibre, essential minerals, and bioactive compounds, making them a promising base ingredient for health-oriented malt formulations. The present study aimed to develop an iron-enriched banana-based millet malt by incorporating nutrient-dense ingredients such as unripe banana flour, millets, and natural iron sources, and to evaluate its physico-chemical properties, nutritional composition, and consumer acceptability. Two commercial banana varieties (Red banana and *Nendran*) and three GI-tagged variants (*Virupakshi, Matti,* and *Sirumalai)* were analysed for their physical and physico-chemical characteristics. Banana flour prepared from these varieties were evaluated for functional properties, including water absorption capacity, swelling index, and solubility. Malt formulations were developed using different combinations of unripe banana flour (30%), three millets (finger millet, pearl millet, and barnyard millet; 25%), *moringa* leaf powder (3%), curry leaf powder (2%), and powdered jaggery (40%). Ten treatments were standardized using 5% and 7% malt concentrations. Nutritional profiling revealed that banana malt samples exhibited significantly higher values of carbohydrates, protein, crude fibre, and iron content compared to the respective banana flours. The incorporation of *moringa* and curry leaves substantially enhanced the iron content of the final malt, with *Sirumala*i-based malt recording the highest iron content (109.20 mg), followed by *Matti* (99.40 mg), while *Virupakshi* showed the lowest (66.50 mg). Sensory evaluation indicated that red banana–based malt was the most preferred treatment, achieving the highest scores for taste (7.85), appearance (7.55), colour (7.40), and overall acceptability (7.55), followed by *Nendran* (6.86). *Sirumalai* scored highest for aroma and aftertaste. The study concludes that the developed iron-enriched banana-based millet malt is a high-quality, nutritious functional food with good consumer acceptance, suitable for all age groups and particularly effective in addressing iron deficiency among vulnerable populations.

Keywords

Malt, Iron Enrichment, Traditional Varieties, Geographical Indications, Sensory Evaluation

PEH- 30

Surveillance of Pesticide Residues in Fruits and Vegetables: A One Health Perspective Under MPRNL

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The extensive use of pesticides in agriculture has improved crop productivity. However, their improper application poses serious risks to human health, environmental safety and ecosystem stability. The Monitoring of Pesticide Residues at National Level (MPRNL) programme functions as a nationwide surveillance system to ensure food safety and regulatory compliance. This study highlights the field-level implementation of MPRNL at ICAR–Central Island Agricultural Research Institute (CIARI), Sri Vijaya Puram, with a focus on systematic sampling from the Andaman and Nicobar Islands. Under the programme, fruits and vegetables are collected monthly from both market and farmgate sources following standardised protocols. The collected samples are handled under strict cold-chain conditions to preserve integrity and are transported to designated testing laboratories for multi-residue analysis using validated analytical techniques. Residues are evaluated against Maximum Residue Limits (MRLs), which generally range from 0.01 to 0.5 mg/kg depending on pesticide-commodity combination. Monitoring includes a wide range of pesticide molecules, including those that are banned or restricted under national regulations. The field operations generate region-specific baseline data on pesticide residue occurrence in commonly consumed commodities. Preliminary observations reveal variability in residue patterns across commodities and sources, emphasising the need for continuous surveillance and increased awareness among farmers regarding judicious pesticide use. Detection of residues exceeding permissible limits, particularly of restricted or banned pesticides, initiates confirmatory procedures and regulatory follow-up, thereby strengthening the food safety framework. Within the One Health paradigm, MPRNL integrates plant health, environmental protection, and human well-being. By ensuring compliance with Maximum Residue Limits, the programme safeguards consumers, promotes environmentally responsible farming practices, and supports sustainable agriculture. The implementation of MPRNL in ecologically sensitive island ecosystems holds particular importance in maintaining public health and environmental resilience.

Keywords

MPRNL, Pesticide Residues, Fruits and Vegetables, Food Safety, One Health, Sustainable Agriculture

PEH- 31

Morphological Characterization of Sesame Dry Root Rot Pathogen in Andhra Pradesh and Telangana

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Sesame (*Sesamum indicum L.*) is a widely cultivated oilseed crop valued for its high-quality edible oil and nutritional properties. In India, it is grown over approximately 18.0 lakh hectares, producing about 8.5 lakh tonnes annually. Among biotic constraints, Dry Root Rot is caused by *Macrophomina phaseolina* (Tassi) Goid. is a major soil-borne disease, responsible for yield losses ranging from 5 to 100% under favourable conditions. Characteristic symptoms, including wilting, foliar yellowing, root blackening, and microsclerotia formation, were observed in sesame fields. Eighteen *M. phaseolina* isolates were collected from major sesame-growing areas of Andhra Pradesh and Telangana. The isolates exhibited variability in mycelial growth (submerged, fluffy, and cottony), colony colour, and sclerotial shape (oblong, irregular, and round) and distribution (scattered and uniform). Submerged growth was characteristic of WGMP-3, which also exhibited the most rapid mycelial expansion, as it takes 2 days to grow completely, whereas SLR-3 showed the slowest growth, as it takes 13 days to grow completely. Seed germination was evaluated using *M. phaseolina* to determine isolate virulence. Pathogenicity assays indicated low virulence in SLR-1, SLR-2, and SLR-3, while WGMP-3, MbN-3, Nd-2, Nd-3, and VZMP-1 were highly virulent. Among them, WGMP-3 (Warangal) was the most aggressive, showing maximum sclerotial formation per microscopic field, whereas SLR-3 was the least virulent isolate.

Keywords

Sesame, Dry Root Rot, *Macrophomina phaseolina*, Morphological variability, Pathogenicity, Virulence, Microsclerotia

PEH- 32

Role of Underutilized Vegetable Crops in the One Health Approach

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Antimicrobial resistance (AMR) and zoonotic diseases are increasing problems around the world. These problems affect human health, animal health and the environment. Since these three are connected, they need to be addressed together through the One Health approach. Underutilized vegetable crops, which are often ignored in modern farming systems, can support One Health strategies because of their nutritional, medicinal and environmental value. Many underutilized vegetables contain high amounts of vitamins, minerals and antioxidants that help improve human immunity and overall health. Some of these vegetables also have natural antimicrobial and medicinal properties, which may help reduce the overuse of chemical antibiotics. In addition, these crops grow well under local climate conditions and need fewer fertilisers and pesticides. This makes them environmentally friendly and suitable for small and marginal farmers. Including underutilized vegetable crops in farming systems can increase diet diversity and improve nutritional security. Sustainable and diverse cropping systems can also reduce environmental pollution and help limit the spread of resistant microorganisms through soil, water and food. Moreover, promotion of these crops can support rural livelihoods and help conserve agricultural biodiversity. This abstract emphasizes the need to include underutilized vegetable crops in One Health programmes through research, awareness and policy support. Better coordination among agriculture, health and environmental sectors can increase the role of these crops in reducing antimicrobial resistance, lowering zoonotic disease risks and improving both human and ecosystem health. Promoting underutilized vegetable crops provides a simple and sustainable solution for long-term public health and environmental protection.

Keywords

One Health, Underutilized Vegetable Crops, Nutritional Security and Sustainable Agriculture

PEH- 33

Characterization and Variability of *Alternaria* spp. Inciting Sunflower Leaf Blight in Andhra Pradesh

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Sunflower leaf blight, primarily caused by *Alternaria* species, significantly adversely affects sunflower cultivation by reducing yield and quality. The present study was conducted at the Department of Plant Pathology, S.V. Agricultural College, Tirupati and the ICAR–Indian Institute of Oilseed Research, Hyderabad, to evaluate the prevalence of Alternaria leaf blight in major sunflower growing areas of Andhra Pradesh and to assess morphological, pathogenic and molecular variability among 25 isolates. A roving survey was conducted during the Rabi season of 2023–24 in five districts of Andhra Pradesh, namely Ananthapuramu, Chittoor, Kurnool, Kadapa and Nandyal. To recorded percentage disease incidence (PDI), ranging from 49.6% in Tirupati village (Chittoor) to 18.5% in Mudigubba village (Ananthapuramu). PDI varied significantly by hybrid, soil type and crop stage, 'NDSH 1012' was highly susceptible, while 'Advanta' and 'Kaveri' hybrids showed comparatively better resistance, suggesting their suitability for disease management. Underscoring the need for resistant hybrids and management at flowering, especially in black soil regions. Cultural and morphological variability among 25 *Alternaria* isolates revealed significant differences in colony growth, pigmentation, aerial mycelium, and radial growth on PDA, OMA, and CZD media, highlighting the pathogen's adaptive nature. Pathogenicity testing on sunflower variety KBSH44 showed marked variation in virulence, with 10 isolates classified as highly virulent, thirteen as less virulent and two as moderately virulent. Molecular characterization of 11 highly virulent isolates using ITS, *Alt a1* and *rpb2* gene markers confirmed their identity as *Alternaria* species. Five isolates were identified as *A. alternata*, five as *A. burnsii* and one as *A. tenuissima*. Phylogenetic analysis using MEGA 11 clearly differentiated *A. burnsii* from the *A. alternata* group, emphasizing the genetic diversity among *Alternaria* spp. infecting sunflower in Andhra Pradesh.

Keywords

Sunflower Leaf Blight, *Alternaria* spp., Cultural, Morphological, Pathogenic Variability and Molecular Characterization

PEH- 34

Eco-Friendly Biopolymeric Hydrogel Composites as Prototypes for Agri-Input Development: Effect of Synthesis Parameters on Swelling and Visco-Elastic Properties

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The development of sustainable carrier materials for agri-inputs such as fertilizers and soil conditioners is essential to reduce environmental burden and improve resource-use efficiency. In this study, eco-friendly biopolymeric hydrogel composites were developed as potential agri-input prototypes using two biopolymers, gum katira (Gk) and carboxymethyl cellulose (CMC), cross-linked with citric acid as an environmentally benign cross-linker and reinforced with bentonite clay. The objective was to evaluate the effect of key synthesis parameters on their equilibrium swelling and visco-elastic behaviour, which are critical for controlled release and soil moisture retention applications. Citric acid cross-linked Gk–CMC-bentonite-intercalated hydrogel composites were synthesized using a cross-linking method. The influence of reaction parameters, namely water content, cross-linker concentration, biopolymer ratio, and biopolymer-to-filler ratio, on equilibrium swelling ratio (ESR) was systematically assessed. Further, visco-elastic properties were evaluated through dynamic rheological studies, including storage modulus (G'), loss modulus (G"), and complex viscosity, under constant shear application. Results demonstrated that ESR was strongly governed by cross-linking density and filler content. ESR decreased with increasing citric acid concentration and reduced reaction water volume, indicating formation of a denser polymer network. Incorporation of bentonite increased swelling up to an optimum biopolymer-to-filler ratio, beyond which water uptake declined. Rheological analysis revealed a dominant elastic behaviour (G' > G") for all composites, with significantly improved mechanical strength observed in Gk–CMC–bentonite systems due to network formation along with the clay intercalation. The study concludes that citric acid cross-linked Gk–CMC–bentonite hydrogel composites possess tunable swelling and improved visco-elastic properties, making them promising eco-friendly prototypes for agri-input carrier systems.

Keywords: Composites, Cross-linking, Equilibrium Swelling Ratio, Complex viscosity, Carriers

PEH- 35

Promoting Sesame (*Sesamum indicum* L.) Cultivation in Paddy Fallow Lands of Andaman Islands: A One Health Approach

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The Andaman Islands have 4,989 ha under paddy cultivation, of which only 539 ha is utilized for pulses during summer, leaving substantial paddy fallow areas underexploited. Sesame (*Sesamum indicum* L.), a hardy, low-input oilseed crop with minimal pest and disease incidence, offers a sustainable alternative for crop diversification. Despite its ecological suitability, sesame cultivation remains negligible on the islands. Promoting sesame aligns with the One Health approach by enhancing nutritional security, reducing pesticide load, and improving ecosystem resilience. To identify suitable varieties for island conditions, twenty-three sesame genotypes sourced from diverse agro climatic regions of India were evaluated during Summer 2025 (January–April) at ICAR-CIARI, Sri Vijaya Puram. The experiment was conducted in 4 × 2 m plots, and observations were recorded on plant height, days to 50% flowering, branching pattern, number of capsules per plant, and yield per plot. Significant variability was observed among the varieties. Plant height ranged from 69.6 to 127.25 cm (mean 99.43 cm), and days to 50% flowering averaged 35.74 days, indicating suitability for short-duration summer cultivation. Capsules per plant varied from 37.8 to 91.8, and yield ranged from 647.47 g to 1532.13 g per plot (mean 1102.37 g). Varieties such as Thilarani, JCS-2454, SVPR-1, TKG-22, GT-11, RT-372, Thilathara, CUMS-17, Unnat Rama, and TKG-308 showed superior adaptability and productivity. The study demonstrates the potential of sesame to transform underutilized paddy fallows into productive, low-risk systems, contributing to farmer income, local edible oil production, environmental sustainability, and overall, One Health outcomes.

Keywords

Sesame, Paddy Fallow, Crop Diversification, One Health, Island Agriculture, Sustainable Intensification

PEH- 36

Role of Epigeic Earthworm Species in Optimizing Vermicomposting Efficiency and Vermicompost Quality

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Vermicomposting efficiency is largely determined by the appropriate selection and systematic preparation of earthworm species, as supported by experimental evaluations of earthworm growth, organic waste degradation efficiency, and vermicompost quality. Epigeic earthworms such as *Eudrilus eugeniae, Eisenia fetida,* and *Perionyx excavatus* are extensively employed in vermicomposting systems due to their high organic matter ingestion rate, rapid biomass accumulation, and efficient reproduction under controlled conditions. Experimental observations reveal that *E. eugeniae* exhibits a waste conversion efficiency of 60–70%, accompanied by a rapid increase in biomass of up to 2.5-fold within a 60-day composting period. In contrast, *E. fetida* demonstrates superior adaptability and resilience, with survival rates exceeding 90% across a wide range of organic substrates. Proper acclimatization of earthworms for 24–48 hours in partially decomposed cow dung significantly reduces stress-induced mortality and enhances vermicast production. Pre-decomposition of organic waste for 10–15 days effectively reduces substrate temperature from approximately 45°C to below 30°C, thereby eliminating thermal stress and creating favorable conditions for earthworm activity. Maintenance of optimal environmental parameters, including temperature (25–30° C), moisture content (60–70%), and pH (6.5–7.5), promotes efficient microbial–earthworm interactions and results in nutrient-enriched vermicompost. Under these optimized conditions, the final product contains higher concentrations of essential macronutrients, particularly nitrogen (1.5–2.0%), phosphorus (0.8–1.2%), and potassium (1.0–1.5%). Furthermore, maintaining an optimal stocking density of 1–2 kg of earthworms per 100 kg of organic waste reduces composting duration by 40–50% and yields a well-stabilized vermicompost with a significantly lower C:N ratio (12–15:1) compared to raw organic waste (30–35:1). Collectively, these experimentally validated findings emphasize the critical importance of earthworm species selection, acclimatization, and preparation for producing high-quality vermicompost suitable for sustainable agricultural and environmental applications.

Keywords

Vermicomposting, *Eudrilus eugeniae*, *Eisenia fetida*, *Perionyx excavates*, Acclimatization

PEH- 37

A Multidimensional Assessment of Hygam Wetland Integrating Water Sediment Nutrient Fluxes, Eutrophication Drivers and Total Economic Value for Management

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This study examines seasonal and spatial variations in water and sediment quality within Hygam Wetland, a declining temperate Ramsar ecosystem in the Kashmir Valley. Seasonal and spatial analyses of Hygam Wetland revealed pronounced variability in water and sediment chemistry across the functional sites. Water temperature ranged from 8.5–9.7°C in winter to 23.3–25.5°C in summer, while dissolved oxygen declined inversely from 10.11 mg/L at S2 in winter to 5.04 mg/L at S2 in summer. BOD and COD peaked in summer, reaching 37.9 mg/L (S1) and 45.94 mg/L (S5), indicating intensified microbial respiration. Ammonium and nitrate showed exceptionally high concentrations, with ammonium reaching a maximum of 431 µg/L at S5 in winter and nitrate peaking at 527 µg/L at S3 in spring, both lowest at S6 in summer. Total phosphorus (0.59 mg/L at S5) and orthophosphate (0.76 mg/L at S3) exhibited strong enrichment at macrophyte-dominated and inlet–mixing sites. Sediment characteristics also varied markedly: organic carbon ranged from 0.16% at S5 in winter to 2.86% at S5 in summer, total nitrogen reached 0.35% at S4, and total phosphorus peaked at 14.68 mg/kg at S3 in summer. Clear spatial gradients distinguished inlet zones (mineral-rich), central sites (biogeochemically active), and macrophyte regions (nutrient-enriched). Overall, Hygam exhibits seasonally intensified eutrophication driven by external inflows, internal nutrient recycling and reduced hydrological flushing. The findings underscore the urgent need for integrated wetland management strategies focused on nutrient load reduction, catchment-level regulation, and restoration of hydrological connectivity. Without timely intervention, continued eutrophication may further compromise the ecological integrity and Ramsar status of Hygam Wetland.

Keywords

Hygam Wetland, Seasonal Variability, Water Sediment Interactions, Nutrient Enrichment, Eutrophication Dynamics

PEH- 38

The Impact of Enriched Organic Manure Source on Productivity, Nutrient Use Efficiency and Profitability of Rice

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Sustainable nutrient management with enriched organic manures is increasingly recognized as a feasible approach to enhancing crop productivity, nutrient use efficiency, and farm profitability. A field study was conducted to assess the impact of different enriched organic manure sources on growth, yield attributes, productivity, and nutrient use efficiency of rice. An on-farm trial was conducted during the *Kharif* season of 2020-2021 at the farmers' field in South Andaman. The field experiment consists of five treatments, *viz*., T_1-Farmers practice, T_2-Enriched FYM, T_3-Enriched neem cake, T_4-Enriched vermicompost, and T_5-Enriched goat manure. The experiment was laid out in a randomized block design with four replications. The results showed that enriched organic manure treatments significantly improved yield components and productivity compared to the control. The highest number of productive tillers (248 m^{-2}), grains per panicle (112.5), test weight (22.2 g), nutrient use efficiency (30.9%), and grain yield (41.5 q ha^{-1}) were recorded with enriched goat manure, representing a yield increase of 32.2% over farmer practice. Economic analysis showed that enriched organic manure also generated the maximum gross return (₹83,976 ha^{-1}), net return (₹36,926 ha^{-1}), and benefit-cost ratio (1.78), indicating superior profitability. Enhanced vermicompost and neem cake enhanced yield characteristics, but their higher cultivation expenses led to relatively lower economic benefits. Thus, it can be concluded that enriched goat manure serves as an effective organic nutrient source for improving rice productivity, nutrient use efficiency, and profitability.

Keywords

Rice, Organic Nutrient Sources, Productivity, Profitability

PEH- 39

ISSR Marker-Based Assessment of Jackfruit Germplasm for Ecosystem Resilience and Sustainable Utilization

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Jackfruit (*Artocarpus heterophyllus* Lam.) exhibits wide phenotypic and genetic variability across diverse ecological regions of Tamil Nadu, which plays a crucial role in determining its resilience to biotic and abiotic stresses. Molecular characterization of this variability is essential for safeguarding plant health, conserving agro-biodiversity, and supporting sustainable crop improvement strategies. In the present study, twenty jackfruit genotypes collected from seven major districts of Tamil Nadu were analysed for genetic diversity using ten Inter Simple Sequence Repeat (ISSR) markers. Genomic DNA was extracted using the CTAB method, and clear, reproducible banding patterns were scored to generate a binary data matrix. All primers produced amplification, with polymorphism ranging from 9.50 (UBC 836) to 63.87 ($(GA)_9AC$) and an average polymorphism of 40.10 per cent. Primers UBC 827, UBC 808, and $(GA)_9AC$ exhibited higher polymorphism, indicating their effectiveness for jackfruit diversity assessment. UPGMA cluster analysis grouped the genotypes into four major clusters, with AHV-3 forming a distinct and highly divergent cluster. The observed genetic relationships provide insights into the population structure and genetic resilience of jackfruit across agro-ecological regions of Tamil Nadu. The study demonstrates the utility of ISSR markers as molecular tools for germplasm identification, conservation, and biosecurity-oriented management of plant genetic resources, thereby contributing to ecosystem monitoring and integrated One Health approaches through sustainable utilization of nutritionally and economically important fruit crops.

Keywords

Jackfruit (*Artocarpus heterophyllus*), ISSR Markers, Genetic Diversity, Molecular Characterization, Germplasm Conservation, Agro-Biodiversity Management

PEH- 40

Engineering Coconut for One Health: Mechanization in Processing for Sustainable Island Development

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Coconut is a key crop in island ecosystems, providing nutrition, income, and environmental benefits. Traditional processing methods often compromise product quality, nutrient content, and safety, limiting their contribution to human health and livelihoods. This study demonstrates the application of modern processing technologies in Car Nicobar, specifically solar hybrid copra drying, cold-pressed virgin coconut oil (VCO) production, and hygienic coconut jaggery processing, to enhance coconut value addition. The solar hybrid copra dryer ensured uniform drying, optimized moisture content, and reduced contamination, improving copra quality and oil yield. The cold-pressed VCO technique preserved bioactive compounds, medium-chain fatty acids, and antioxidant activity, producing safe and nutritious edible oil. Hygienically prepared coconut jaggery exhibited improved purity, reduced microbial load, and extended shelf life. Mechanized and semi-automated processing also reduced labour intensity, increased operational efficiency, and enhanced economic returns for farmers. Adoption of these technologies strengthens island agro-processing systems, promotes food safety, and supports environmentally friendly production practices. Engineering coconut through solar hybrid copra drying, cold-pressed VCO, and hygienic jaggery production provides a practical and scalable strategy that integrates nutrition, livelihoods, and environmental sustainability, exemplifying the One Health principle in island agriculture.

Keywords

Solar Hybrid Copra Dryer, Cold-Pressed VCO, Coconut Jaggery, One Health, Sustainable Livelihoods, Island Agriculture, Value Addition

PEH-41

Integrated Crop Management in Coconut for Enhanced Productivity and Profitability in the Nicobar Islands

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Coconut is a major perennial plantation crop supporting livelihood security and nutritional needs of farming communities in the Nicobar Islands. However, its productivity in the region remains low due to poor nutrient management, declining soil fertility, high incidence of insect pests, particularly rhinoceros beetle, and limited adoption of scientific management practices. To address these constraints and promote sustainable coconut production under fragile island ecosystems, a Front-Line Demonstration (FLD) on Integrated Crop Management (ICM) in coconut was conducted by ICAR–Krishi Vigyan Kendra, Nicobar during the year 2024-25 under farmers' field conditions. The demonstrated ICM package comprised basin mulching for moisture conservation, application of organic manures for improving soil health, and installation of rhinoceros beetle pheromone (rhinolure) traps for eco-friendly pest management. The performance of the ICM technology was evaluated against prevailing farmers' practice across three locations in the Nicobar Islands. Yield and economic parameters were systematically recorded and analyzed. The results revealed a marked improvement in coconut productivity under ICM. Demonstration plots recorded an average yield of 50 nuts per tree per year, compared to 37 nuts per tree per year under farmers' practice, registering an approximate yield increase of 26 per cent. Economic analysis further indicated superior profitability of ICM, with a net return of ₹1,60,000 ha^{-1} $year^{-1}$ and a benefit–cost ratio of 3.66, as against ₹1,15,300 ha^{-1} $year^{-1}$ and a B:C ratio of 3.42 under farmers' practice. In addition, ICM plots showed better soil moisture retention, enhanced soil organic carbon status, and effective suppression of rhinoceros beetle infestation, contributing to yield stability. The FLD conclusively demonstrates that adoption of ICM practices (mulching + organic manuring + rhinolure traps) in coconut delivers *triple wins* in the Nicobar Islands: higher yields through improved soil health and pest control; lower environmental footprints by reducing water and other inputs while enhancing soil organic carbon; and long-term resilience by promoting sustainable farming systems suited to fragile island agro-ecosystems.

Keywords

Coconut, Integrated Crop Management, Front Line Demonstration, Nicobar Islands, Profitability

PEH-42

Systematic Review of Policy for Food and Nutritional Security in Island Regions

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Island regions face distinctive challenges to achieving food security and nutrition due to geographic isolation, limited natural resources, dependence on food imports, vulnerability to climate change and natural hazards, and socio-economic constraints. Effective policy frameworks in these contexts are critical for ensuring resilient and sustainable food systems that can support equitable access to adequate, safe, and nutritious diets. This systematic review examines the choice, coherence, and implementation of policies aimed at enhancing food security and nutrition in island regions, drawing on international, national, and subnational policy documents, peer-reviewed research, and grey literature. Following PRISMA guidelines, relevant policies from diverse island contexts, including Small Island Developing States (SIDS) in the Caribbean, Pacific, and Indian Ocean, and other island territories in the Mediterranean and Southeast Asia, were identified, screened, and critically analysed. The review synthesizes objectives, strategic priorities, governance mechanisms, policy integration, and monitoring frameworks related to food security and nutrition outcomes. Key areas assessed include agricultural development, fisheries and marine resources, trade and import regulation, nutrition and public health, disaster risk reduction, climate adaptation, and social protection. The insights from the study provide a foundation for enhancing policy development and implementation to better support sustainable and nutritive food systems in island regions. The review highlights that policy effectiveness in island regions depends not only on sectoral strength but on cross-sectoral coherence, local contextualization, and robust monitoring frameworks. Strengthening integrated, climate-responsive, and nutrition-sensitive governance mechanisms is essential for building resilient and self-reliant island food systems.

Keywords

Island Food Systems, Policy Coherence, Food Security and Nutrition, Small Island Developing States (SIDS), Climate Resilience, Sustainable Agriculture and Fisheries

PEH-43

Safeguarding Plant and Environmental Health: Addressing Biosecurity Risks, Microbial Threats and Ecosystem Monitoring through Integrated One Health Approaches

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Safeguarding plants and environmental health are increasingly critical in the face of accelerating biosecurity risks, emerging microbial threats, and ecosystem degradation driven by globalization, climate change, and intensified land use. Plants form the foundation of terrestrial ecosystems and food systems, yet they remain highly vulnerable to invasive pests, pathogenic microorganisms, and environmental stressors that can rapidly propagate across ecological and geopolitical boundaries. This abstract explores the application of integrated One Health approaches to address these interconnected challenges by recognizing the intrinsic links between plant, animal, human, and environmental health. By combining biosecurity surveillance, microbial risk assessment, and ecosystem monitoring, One Health frameworks enable early detection of threats, improved risk prediction, and coordinated response strategies. Advances in molecular diagnostics, remote sensing, and data integration support real-time monitoring of plant health and environmental change, while cross-sector collaboration enhances preparedness and resilience. Emphasis is placed on preventative biosecurity measures, adaptive management of microbial risks, and the incorporation of ecological indicators to inform sustainable decision-making. Adopting integrated One Health approaches strengthens the capacity to mitigate biosecurity threats, protect biodiversity, and sustain ecosystem services essential for food security, public health, and environmental stability. This holistic perspective is essential for developing resilient systems capable of responding to complex, trans boundary challenges in a rapidly changing world.

Keywords

Plant health, Environmental health, Biosecurity, Microbial threats, One Health approach, Ecosystem monitoring, Invasive species, Plant pathogens, Sustainable agriculture, Food security

PEH-44

Comparative Growth Dynamics of *Grewia optiva* and *Morus alba* in Agroforestry Farming Systems of Doon Valley of Uttarakhand

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Tree–crop interactions strongly influence productivity and soil functioning in Himalayan agroecosystems, yet comparative evaluations of dominant multipurpose tree species remain limited. This study quantified growth dynamics, biomass production, and soil physical responses of *Grewia optiva* Drummond and *Morus alba* L. under diversified agroforestry systems in the Doon Valley, Uttarakhand, India. Ten agroforestry treatments comprising sole tree stands and tree–crop combinations with turmeric, ginger, mung bean–toria, and cowpea–toria were evaluated under a randomized block design with three replications. Growth parameters (height, diameter at breast height, crown spread), above-ground biomass, and soil bulk density (0–45 cm) were assessed. *Morus alba* consistently outperformed *G. optiva* across all growth attributes ($p \leq 0.05$). Sole *M. alba* recorded the highest height (9.4 m), DBH (99.0 cm), crown spread (10.2 m), and biomass yield (3.6 t ha^{-1}), followed closely by *M. alba* + cowpea–toria systems. In contrast, *G. optiva* biomass ranged from 0.5 to 1.0 t ha^{-1}, with cowpea–toria intercropping enhancing biomass by ~25% over sole stands. Legume-based intercrops significantly improved tree growth in both species, whereas ginger-based systems showed comparatively lower performance, indicating higher below-ground competition. Agroforestry systems significantly reduced soil bulk density compared to sole cropping, with the lowest surface bulk density (1.19 g cm^{-3} at 0–15 cm) observed under sole *M. alba*. Soil bulk density increased with depth across treatments but remained lower under tree-based systems, reflecting improved soil structure and porosity. Overall, the results demonstrate that *Morus alba*–based agroforestry systems, particularly when integrated with leguminous intercrops, offer superior biomass production and soil physical improvement in the Himalayan foothills. The study highlights species selection and intercrop compatibility as critical determinants of agroforestry performance and supports the wider adoption of *M. alba*–legume systems as a climate-smart, productivity-enhancing land-use strategy for the Doon Valley and similar Himalayan landscapes.

Keywords

Agroforestry Systems, *Grewia optiva, Morus alba*, Tree Crop Interactions, Biomass Production, Intercropping, Soil Bulk Density, Himalayan Foothills

PEH-45

Traditional Ethnomedicinal Practices of Nicobari Tribes and Scientific Validation of Selected Medicinal Plants

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The Nicobar Islands of the Andaman and Nicobar archipelago are known for their rich plant diversity and well-preserved ethnomedicinal knowledge practiced by the Nicobari tribes. The present study focuses on documenting the diversity of medicinal plants used by the Nicobari tribes and highlights indigenous knowledge associated with the treatment of various ailments. Ethnobotanical information was collected through field surveys and direct interactions with tribal healers to understand traditional preparation methods and therapeutic applications. Selected medicinal plants were subjected to phytochemical analysis to identify bioactive compounds and to evaluate their biological activities. In vitro studies were carried out to assess cytotoxic properties, providing scientific validation for traditional medicinal claims. The preparation of traditional herbal formulations and their efficacy in the management of various diseases were also documented. Special emphasis was given to *Strobilanthes andamanensis* Bor., *Semecarpus kurzii* Engl., and *Calamus andamanicus* Kurz. *Strobilanthes andamanensis* exhibited antimicrobial activity against human pathogenic bacteria and fungi, along with anti-inflammatory, antioxidant, antidiabetic, anti-allergic, anticancer, and wound-healing properties. *Semecarpus kurzii* and *Calamus andamanicus* were traditionally used for treating inflammatory, digestive, and skin-related disorders. The study highlights the therapeutic potential of Nicobari medicinal plants and emphasizes the importance of conserving indigenous knowledge and biodiversity, while encouraging further pharmacological research.

Keywords

Ethnomedicinal plants, Nicobari tribes, Andaman and Nicobar Islands, Phytochemical analysis, In vitro cytotoxicity, Traditional herbal medicine

PEH-46

Role of Native Fruits in Food Security and Ecosystem Sustainability in the Nicobar Islands

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The Nicobar Islands harbour a rich diversity of indigenous fruit crops such as coconut, pandanus, breadfruit, papaya, and banana, which are integral to the local diet, culture, and ecosystems. These native fruits not only provide essential nutrients, including vitamins, minerals, dietary fibre, and bioactive compounds, but also serve as a cornerstone for food security in the islands' fragile and remote agro-ecosystems. Promoting indigenous fruits enhances nutritional health, supports sustainable livelihoods, and reduces dependence on imported or exotic crops that may be less adapted to local environmental conditions. From an ecological perspective, these fruit crops play a vital role in maintaining biodiversity and ecosystem resilience. Coconut and pandanus trees protect coastal areas from erosion and storm surges, while breadfruit and other native trees contribute to carbon sequestration, soil fertility, and habitat provision for pollinators and wildlife. Preservation of traditional varieties ensures the survival of locally adapted genotypes with resistance to pests, diseases, and climatic stresses, thereby contributing to resilient agricultural landscapes. Ethnobotanical knowledge, passed down through generations, provides insights into crop selection, cultivation practices, and utilisation, forming an essential link between human health and environmental stewardship. Integrating this knowledge with modern agronomic practices, sustainable harvesting, and community-based conservation strategies can enhance the productivity, quality, and availability of indigenous fruits. Strategic promotion and conservation of these crops not only safeguard the islands' unique plant heritage but also ensure sustainable food systems, healthier communities, and resilient ecosystems in the face of climate change and environmental pressures. Collectively, strengthening the conservation and value addition of indigenous fruit crops in the Nicobar Islands offers a viable pathway toward climate-resilient agriculture and nutrition security. A balanced integration of traditional ecological knowledge with scientific management can ensure long-term sustainability of island agro-ecosystems and community well-being.

Keywords

Indigenous Fruit Crops, Nicobar Islands, Food and Nutrition Security, Agro-Biodiversity Conservation, Traditional Ecological Knowledge, Climate-Resilient Agriculture

PEH-47

Integrated One Health Approaches for Safeguarding Plant and Environmental Health: Addressing Biosecurity Risks, Microbial Threats and Ecosystem Monitoring

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Plant and environmental health form the foundation of global food security, ecosystem stability, and sustainable development. In recent years, increasing globalization, climate change, and intensive agricultural practices have significantly heightened biosecurity risks, leading to the spread of invasive pests, emerging plant pathogens, and harmful microbial populations. These challenges not only threaten crop productivity and biodiversity but also have cascading impacts on animals and human health. Addressing such complex and interconnected risks requires a holistic and interdisciplinary framework, which is effectively provided by the One Health approach. This highlights major biosecurity threats affecting plant and environmental health, with particular emphasis on microbial risks such as phytopathogenic bacteria, fungi, viruses, and antimicrobial-resistant environmental microbes. The importance of ecosystem monitoring is emphasized as a proactive strategy for early detection, surveillance, and risk assessment of biological threats. Advances in molecular diagnostics, remote sensing technologies, and digital surveillance platforms are discussed as valuable tools for strengthening monitoring systems and improving response capacity. By integrating plant health management with environmental and public health perspectives, the One Health approach promotes coordinated action across sectors and disciplines. Such integration enhances preparedness, supports sustainable agricultural practices, and contributes to resilient ecosystems capable of withstanding emerging biological challenges. The adoption of integrated One Health strategies is essential for effective biosecurity governance, long-term environmental sustainability, and the protection of plant resources under changing global conditions.

Keywords

One Health, Environmental Health, Biosecurity, Microbial Threats, Ecosystem Monitoring

PEH-48

Somatic Embryogenesis, In Vitro Propagation and Bioactive Potential of Madagascar Periwinkle (*Catharanthus roseus)*

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Catharanthus roseus (Madagascar periwinkle) is a medicinally valuable plant well known for the production of important anticancer alkaloids such as vincristine and vinblastine. The present study aimed to develop an efficient *in vitro* propagation protocol using nodal and leaf explants cultured on Murashige and Skoog (MS) medium supplemented with different concentrations of plant growth regulators, including 6-benzylaminopurine (BAP), indole-3-butyric acid (IBA), and indole-3-acetic acid (IAA). The explants were surface-sterilized and inoculated under aseptic conditions, and the cultures were maintained under controlled temperature and photoperiod. Among the various treatments tested, MS medium supplemented with 2.0 mg/L BAP and 1.5 mg/L IBA resulted in the highest shoot induction from shoot tip explants within 3–4 weeks of culture. The established protocol provides a reliable method for mass propagation and conservation of *C. roseus*, thereby supporting the sustainable production of pharmaceutically important compounds. As the species is considered endangered due to excessive exploitation for medicinal purposes, conservation through micropropagation is essential. Furthermore, *Catharanthus roseus* has been widely used in traditional systems of medicine, including Ayurveda, Chinese medicine, and African traditional medicine. Indigenous applications include the treatment of diabetes, hypertension, menstrual disorders, malaria, and various skin diseases, highlighting the need for its extensive medicinal exploration and conservation. The optimized micropropagation protocol facilitates rapid clonal multiplication and long-term conservation of elite genotypes of *Catharanthus roseus*. Such biotechnological interventions are crucial for ensuring sustainable supply of anticancer alkaloids while reducing pressure on natural populations.

Keywords

Catharanthus roseus, Micropropagation, Plant Growth Regulators, Vincristine and Vinblastine, Medicinal Plant Conservation, In Vitro Culture

PEH-49

Assessment of Rainfall Variability and Its Influence on Coconut Yield in the Andaman Islands Using the Standardized Precipitation Index

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Long-term rainfall records (1981–2025) for Sri Vijaya Puram were analyzed to compute SPI at annual time scales. Annual SPI revealed substantial interannual variability, with several years experiencing moderate to severe drought conditions (1982, 1984, 1991, 1993, 2014) and an extreme drought in 2023, while distinctly wet conditions were observed during years such as 1998, 1999, 2007, 2011, 2018 and 2020. To assess agricultural implications, coconut yield (nuts ha^{-1}) for the South Andaman district (1981–2023) was examined in relation to annual rainfall and annual SPI. Pearson correlation analysis was conducted for contemporaneous and lagged conditions (up to two years) to account for the extended reproductive cycle and climatic memory of coconut palms. Negligible same-year associations were observed between coconut yield and both annual rainfall and SPI, indicating that immediate rainfall conditions exert limited influence on yield realisation. In contrast, weak to moderate positive correlations emerged at a two-year lag for annual rainfall ($r = 0.27$, $p < 0.10$) and annual SPI ($r = 0.28$, $p < 0.10$), suggesting that wetter-than-normal conditions tend to be followed by higher yields, whereas drier conditions suppress productivity. The positive lagged association reflects the long-term physiological processes governing coconut yield formation, including inflorescence initiation, floral differentiation and nut development, which are influenced by antecedent moisture availability over preceding years rather than by current-year rainfall alone. While these correlations do not imply that rainfall is the sole determinant of yield or that excess rainfall is universally beneficial, they indicate a net positive influence of adequate moisture conditions in a high-rainfall island ecosystem. Overall, the findings demonstrate that coconut productivity in the Andaman Islands is weakly coupled with immediate rainfall variability but exhibits sensitivity to cumulative and lagged moisture anomalies, underscoring the importance of incorporating delayed climatic effects when assessing climate–yield relationships for perennial plantation crops in humid tropical regions.

Keywords

SPI, Rainfall variability, Coconut yield, Andaman Islands, Lagged climate response

PEH-50

Coconut-Based Integrated Farming System: Boosting Productivity and Sustainability in Andaman Hilly Uplands

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Coconuts are the cornerstone of the Integrated farming system (IFS), providing a pivotal source of income and primary crop functionality in the Islands. These coconut plantations are strategically intercropped with a diverse array of spices, including clove, nutmeg and black pepper. Additionally, the IFS system incorporates various tuber crops such as tapioca, colocasia and elephant foot yam, all of which flourish in the available ecological niches. Further, diversification of the cropping system includes the introduction of pineapple, a variety of vegetables, marigolds and fodder crops, alongside strategically planted fodder trees such as Subabul, Chakurmanas, and Jackfruit, which contribute to both fodder availability and soil health. On the livestock side, the system manages a herd of 21 Andaman local goats, known for their adaptability in challenging terrains, and 50 Nicobari/Vanaraja poultry birds that are raised in a rotational system across two production cycles each year. Integrated fish ponds complement the livestock component, creating a multifunctional farming environment. The study emphasizes successful nutrient recycling within this IFS through the strategic utilization of crop residues and animal manure. To address the vital issue of water security, the establishment of a rainwater harvesting pond, with a capacity of 230 cubic meters crucial for supporting irrigation needs, sustaining fish culture, and meeting various demands during the dry season. The approach of intercropping on coconut terraces has proven to be highly effective, significantly reducing runoff and preventing soil erosion relative to traditional monocrop coconut cultivation on non-terraced slopes. Financially, the integrated farming system has delivered an impressive net return of ₹1.94 lakh per hectare per year. It achieves a coconut equivalent yield of 21.22 tons per hectare, creating employment opportunities that amount to 205 person-days annually. In conclusion, the integrated farming system is a robust and resilient agricultural model designed for the hilly tropics. It not only enhances income and employment opportunities but also promotes significant improvements in environmental health and sustainability.

Keywords

Integrated Farming System, Andaman Islands, Hilly Uplands, Nutrient Recycling, Vermicomposting, Coconut Equivalent Yield, Soil Conservation

PEH-51

Molecular Detection of Sunflower Powdery Mildew Pathogen and Screening of R Lines for Identification of Resistant Sources

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Sunflower (*Helianthus annus* L) is one of the important oilseed crops grown throughout the world, which is a short-season crop belonging to the family *Asteraceae*. Powdery mildew is one of the important diseases causing economic losses in recent years. The loss due to powdery mildew is proportionate to disease intensity and varies considerably depending on the stage of the plant growth at which diseases occur. Hence, a roving survey was conducted during *rabi* 2023 in major sunflower growing districts of North Karnataka to assess disease severity and the powdery mildew-infected leaf samples collected from different fields during the survey were subjected to molecular detection using IGS (intergenic spacer) genes. The sequence results revealed that IGS gene primers could specifically amplify the powdery mildew pathogen in field-collected samples, which recorded the prevalence of distinct species, *Golovinomyces latisporus* comb. nov (*Oidium latisporum*) among all the districts surveyed. During Rabi 2023, an experiment on screening for resistant sources was conducted at two different field conditions *viz*., Raichur and ICAR-IIOR, Hyderabad locations, to identify the resistant sources against powdery mildew. Results revealed that the genotypes *viz*., PM-3, PM-4 and RSLP-98 were found resistant at Raichur and PM-3 and RHA-275 were resistant at ICAR-IIOR, Hyderabad. The study confirms the predominance of *Golovinomyces latisporus* as the causal agent of powdery mildew in North Karnataka and validates IGS-based molecular detection as a reliable diagnostic tool. Identification of resistant genotypes such as PM-3 provides a promising foundation for developing durable disease-resistant sunflower cultivars.

Keywords

Sunflower (*Helianthus annuus*), Powdery Mildew, *Golovinomyces latisporus*, IGS Gene Detection, Disease Resistance Screening, Resistant Genotypes

PEH-52

Bridging Indigenous Knowledge and Digital Technology: NICMIS Android App for Coastal Biodiversity Monitoring in Car Nicobar

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The Nicobar Coastal Management Information System (NICMIS) encourages citizen science activities such as turtle tracking, tracing poachers, tideline monitoring, debris tracker, coral reef monitoring, etc., so that the tribal people can be engaged in sustainable management of coastal resources. Post development in 2024, about 05 training and awareness programs were initiated. NICMIS played a pivotal role in training and exposing 54 tribal fishers & aspiring youths, 130 students, and 20 teachers to ICT tools through hands-on capacity-building programmes conducted at the Coastal Fisheries Information Hub in Car Nicobar and Port Blair. The app facilitated community-led documentation and sharing of ecologically sensitive information, particularly sea turtle nesting sites, turtle diversity, and associated coastal habitats, capitalizing on their close interaction and association with turtles. 45 (34 fishers and 11 teachers) participants downloaded the app. Through the Turtle Tracker and biodiversity modules, tribal citizen scientists shared nesting locations of Olive Ridley and Hawksbill turtles, also identified a new nesting site, recorded turtle sightings, uploaded photographic evidence, and reported threats such as ghost fishing nets. Approximately 83 turtle-related records were shared through the platform. This participatory approach contributed directly to the protection of over 1,000 turtle hatchlings and the rescue of a critically endangered Hawksbill turtle, while also generating the first spatially referenced community database on turtle nesting ecology in Car Nicobar. Overall, the NICMIS app demonstrates how context-specific digital tools, when embedded within culturally sensitive training frameworks, can empower indigenous communities as active knowledge holders and co-managers of fragile coastal ecosystems while strengthening ICT adoption in remote tribal regions.

Keywords

Nicobar Coastal Management Information System (NICMIS), Information and Communication Technology (ICT), Citizen Science, Sea Turtle Conservation, Indigenous and Traditional Ecological Knowledge, Coastal Biodiversity Management

PEH-53

Coconut and Pandanus Leaf Cups: Sustainable Plastic-Free Nursery Alternative in Andaman and Nicobar Islands

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A standardized technique has been developed to create leaf cups from coconut leaflets, which can be utilized as planting containers for horticultural and agroforestry species. Research indicates that these cups are suitable for raising vegetable seedlings, which can be transplanted into the main field without the necessity of removing the cups after 25 to 30 days. Leaf cups crafted from both Pandanus and coconut leaves provide sustainable, biodegradable alternatives to plastic nursery bags in plant propagation. While pandanus leaves generally offer a longer shelf life, enhanced durability, and increased strength compared to coconut leaves, both materials effectively promote environmentally friendly seedling growth. These natural leaf cups decompose harmlessly in soil, thereby mitigating environmental waste associated with synthetic containers. Their fibrous structure retains moisture and nutrients, fostering healthy root development without the risk of chemical leaching. In terms of durability, Pandanus exhibits greater strength than the comparatively moderate strength of coconut leaves; however, both types of leaves are environmentally friendly and fully biodegradable, rendering them excellent choices for nursery applications. Farmers and nurseries in tropical regions are increasingly weaving or folding these leaves into cups for saplings, thereby promoting sustainability in agricultural practices. This method aligns with principles of zero-waste farming, which is particularly beneficial in areas such as the Andaman and Nicobar Islands, where there is a robust local supply of these materials. Cups constructed from coconut and pandanus leaves have been employed to cultivate vegetable and tree seedlings in place of plastic bags. These leaf cups are dimensioned at 8 cm x 8 cm x 8 cm and 12 cm x 12 cm x 12 cm and are filled with a mixture of decomposed coir dust, soil, and farmyard manure in equal proportions before the planting of sweet potato cuttings. The study of the durability and handling of these leaf cups revealed that 80% of them remained intact for up to 62 days after planting, and they were easy to manage within the nursery environment. Furthermore, rooted cuttings can be planted directly into the main field without the need to remove the cups. Therefore, these eco-friendly cups, derived from coconut leaves, represent a viable option for effective commercial nursery management.

Keywords

Pandanus, Coconut, Leaflets, Cup, Horticulture Nurseries, Alternative to Plastic

PEH-54

Improving Bottle Gourd Breeding through Integrative Analysis of Combining Ability and Heterosis

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The study was conducted to investigate the nutritional properties and yield of bottle gourd [*Lagenaria siceraria (*Molina) Standl.] across various genotypes and hybrid combinations. The research took place during 2023-24 and 2024-25 at the Main Experimental Station, Department of Vegetable Science, Acharya Narendra Deva University of Agriculture and Technology, Ayodhya, Uttar Pradesh. The study analyzed the traits such as dry matter (%), total soluble solids (^{0}B), reducing sugar (%), non-reducing sugar (%), total sugar (%), ascorbic acid (mg/100 g), moisture content (%) and fruit yield per plant (kg). Parent genotypes NDBG-7, Pant Lauki-3 and Arka Bahar emerged as superior performers with respect to qualitative traits under per se evaluation. The cross Narendra Rashmi × Narendra Pooja demonstrated remarkable heterotic expression, encompassing relative heterosis, heterobeltiosis, and standard heterosis. Moreover, Narendra Rashmi and Pant Lauki-3 were distinguished by their robust general combining ability (GCA) across several traits. Additionally, specific combining ability (SCA) analysis highlighted NDBG-619× Arka Bahar and Narendra Kamna × Narendra Rashmi as notable hybrids with potential for improvement in multiple traits. The predominance of specific combining ability variance suggests the importance of non-additive gene action, underscoring the effectiveness of hybrid breeding in improving both nutritional content and productivity in bottle gourd. The study emphasizes the importance of nutrient quality in bottle gourd and presents strategies for utilizing hybrid breeding to improve these traits. The prevalence of dominant gene action suggests the potential of hybrid breeding for genetic enhancement in bottle gourd.

Keywords

Bottle Gourd, Combining Ability, Gene Action, Heterosis, Nutritional Quality, Yield

PEH-55

Optimization of Panchamrit-Mediated Silver Nanoparticles for Broad-Spectrum Antimicrobial Applications under the One Health Framework

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The One Health framework recognizes the intrinsic linkages among human, animal, plant, and soil health and highlights the urgent need for sustainable strategies to address rising global challenges such as antimicrobial resistance and environmental toxicity. In alignment with this approach, the present study optimized the green synthesis of silver nanoparticles (AgNPs) using Panchamrit, a traditional bio-formulation composed of milk, curd, honey, and basil. This bio-mixture is enriched with polyphenols, phenolic acids, microbial metabolites, milk proteins, and organic acids, which act as natural reducing and stabilizing agents. The biogenic synthesis involved the reaction of Panchamrit extract with 0.1 N silver nitrate, evidenced by a characteristic colour change from translucent to brownish red, confirming the formation of AgNPs with particle sizes ranging from <1 nm to 200 nm. Process optimization was performed using a Central Composite Design (CCD) under Response Surface Methodology (RSM), assessing the interactive effects of temperature, Panchamrit extract concentration, reaction time, and pH, each evaluated at three different levels, on UV–visible absorbance. The optimized conditions, temperature of 75.84 °C, pH 6.7, reaction time of 7.02 hours, and extract concentration of 85.28% resulted in maximum nanoparticle synthesis efficiency. The green-synthesised AgNPs exhibited significant antimicrobial activity against a broad spectrum of pathogens, including bacterial and fungal species relevant to human health, veterinary infections, plant diseases, and aquatic ecosystems.

Keywords

One Health, Green Synthesis, Silver Nanoparticles, Panchamrit, Antimicrobial Activity, Sustainable Nanotechnology

PEH-56

Entomopathogens from *Mucuna Pruriens* (L.) DC. Leaf Litter: A Novel Approach to Biological Control

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The increasing use of chemical pesticides has led to environmental pollution, health hazards and the development of pesticide-resistant pests. Biological control using entomopathogens is a promising alternative approach. This study aimed to isolate and characterize entomopathogens from *M. pruriens* (L.) DC., leaf litter, a leguminous plant known for its medicinal and agricultural importance. The leaf litter was collected, processed and screened for entomopathogenic fungi using standard methods. The isolated fungi were identified based on morphological and molecular characteristics. The pathogenicity of the isolates was tested against the larvae of a model insect pest. Our results showed that the leaf litter harbored a diverse range of entomopathogenic fungi including *Beauveria bassiana, Metarhizium anisopliae* and *Isaria fumosorosea*. These isolates exhibited significant pathogenicity against the insect larvae, causing high mortality rates. The study highlights the potential of *M. pruriens* leaf litter as a novel source of entomopathogens for biological control. The use of these entomopathogens could provide a sustainable and eco-friendly approach to pest management, reducing the reliance on chemical pesticides and promoting a healthier ecosystem. This approach aligns with one health framework which emphasizes the interconnectedness of human, animal, plant and environmental health. Our findings suggest that *M. pruriens* leaf litter could be a valuable resource for the development of novel biopesticides. The study demonstrates the potential of entomopathogens from *M. pruriens* leaf litter as a promising alternative to chemical pesticides contributing to a more sustainable and ecofriendly approach to pest management. This approach has implications for human, animal and plant health and can contribute to a healthier ecosystem.

Keywords

Entomopathogens, *Mucuna pruriens*, Biological Control, Leaf Litter, Sustainable Agriculture

PEH-57

Degrading Heavy Metals from Wastewater in the Presence of Efficient Cyanobacteria

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The current study illustrates the degradation of heavy metals in the presence of cyanobacteria by different types of wastewater. The wastewater samples were collected and cyanobacteria also isolated and identified. Totally, there were 22 isolates of cyanobacteria such as *Arthrospira jenneri, Aphanocapsa koordersi, A. platensis, Gloeocapsa crepidium, G. gelatinosa, G. livida, G. punctata, G. samoensis, G. sanguine, Hyella caespitose, Oscillatoria acuminate, O. amoena, O. homogenea, O. laetevirens, O. minimus, O. pseudogeminata, O. schultzii, O. subbrevis, O. trichoides, Spirulina laxissima, S. meneghiniana* and *S. subtilissima.* The cyanobacteria incorporate with wastewater to interrupt and degrade the heavy metals in various wastewater treatments such as dairy wastewater, kitchen wastewater, fish pond discharge and municipal wastewater. Screening and effect of cyanobacterial treatment of wastewater of BOD, COD, TN and TP were analyzed. The maximum percentage of degradation was determined in the kitchen wastewater and fish pond discharge, whereas biochemical oxygen demand, chemical oxygen demand, total nitrogen, and total phosphorus by the selected potential cyanobacteria like *Oscillatoria trichoides* and *Spirulina laxissima*. The degradation of heavy metals such as Cu2+, Fe2+, Zn2+ and Pb2+. The maximum degradations were recorded at 99.88% and 99.84% for Zn2+ *O.trichoides and S. laxissima* in kitchen wastewater and fish pond discharge respectively. The significance of variance at a confidence level of $p<0.05$ and $p<0.01$ is recorded. The use of cyanobacteria performs a variety of tasks in the assembly of excess food, the treatment of wastewater, and the production of valuable biomass, all of which have a variety of uses. For the cyanobacteria *O. trichoides* and *S. laxissima* were suitable candidature for the healthy environment and future enduovurs.

Keywords

Cyanobacteria, Screening, Degradation, Biomass, Wastewater treatments, Heavy metals, Environment

PEH-58

Biocontrol Potential of Seaweed-Associated Bacterial Endophytes Revealed through Polyphasic Approaches

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A total of 63 bacterial endophytes were isolated from 10 different seaweed species collected from five locations in the South Andaman Islands and were evaluated for *their in vitro* plant growth–promoting (PGP) traits and broad-spectrum antagonistic activity against multiple plant pathogens. The results revealed that most isolates exhibited good broad-spectrum antagonistic activity against one or more of the tested pathogens. Notably, *Bacillus siamensis* strain isolated from the seaweed *Gracilaria* spp. demonstrated consistent and broad-spectrum antagonism against all tested plant pathogens under in vitro conditions. To elucidate the volatile compounds responsible for the antimicrobial activity of this strain, headspace gas chromatography–mass spectrometry (HS-GC–MS) analysis was performed. A total of 20 volatile organic compounds (VOCs) were identified, of which nine namely oxalic acid, phenylephrine, (–)-norephedrine, cyclobutanol, silanediol (dimethyl-), octodrine, actinobolin, and cyclotrisiloxane (hexamethyl-) were reported in preliminary literature surveys to possess direct antimicrobial properties. In parallel, to identify the secondary metabolites contributing to the broad-spectrum *in vitro* antagonism, ultra-performance liquid chromatography–tandem mass spectrometry (UPLC–MS/MS) analysis was conducted. The resulting data were processed using the GNPS LC-MS/MS platform, which identified approximately 61 compounds in the *B. siamensis* Bs_Rg7 strain. Preliminary analysis revealed the presence of seven antimicrobial lipopeptides, including surfactin B, surfactin C, surfactin A, surfactin C13, surfactin C15, plipastatin, and maribasin B. In addition, other antimicrobial compounds such as pheophytin, sarmentoside B, and baccatin III were also detected. Overall, the findings of this study confirm the multipotential nature of the endophytic *Bacillus siamensis* strain isolated from the marine seaweed ecosystem, highlighting its promising potential for further evaluation under field conditions.

Keywords

Seaweed endophytes: PGP, Biocontrol potential, *Bacillus sp*

PEH-59

Multi-Commodity-Based Backyard Intensive Farming System for Augmenting Household Nutrition

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Nearly one-third of the Indian population presently follow vegetarian diet, which has been encouraged for its nutritional and health benefits since ancient times. However, the limited bioavailability of nutrients from plant-based sources may result in inadequate intake of protein, vitamins and minerals, particularly iron and zinc. In India, micronutrient deficiencies are primarily associated with inadequate dietary diversity, poor dietary habits and insufficient intake of nutrient-dense foods. In comparison to the Recommended Dietary Allowance (RDA) of 400g/capita/day for normal health, average vegetable consumption of the country is significantly lower. Vegetables, including bio- fortified tuber crops, are an essential part of a balanced diet and a treasure trove of micronutrient and nutraceutical compounds. The food-based approach is the most practical, economical, and long-lasting way to enhance the nutritional quality of the diet, and women are primarily responsible for maintaining the nutritional status of the family members. Women are primarily responsible for the nutritional condition of their family members, and they can improve household nutrition by incorporating a variety of nutrient-rich crops into their regular meals. Therefore, a gender-inclusive approach is urgently needed for enabling substantial dietary shifts, achieving nutritional security and income of the rural household. The multi-commodity-based intensive farming system developed in ICAR-CIWA, Bhubaneswar, Odisha, is a resource-efficient and climate-resilient approach for ensuring dietary diversity, regular availability and accessibility of a nutritionally diverse diet to the farm families. This approach improves household nutrition by integrating diverse crops and enterprises such as vegetables, bio-fortified tuber crops, vermicomposting, mushroom farming, beekeeping and poultry farming in the limited area of the homestead backyard. Implementation of the system with a systematic layout and proper scientific management practices will significantly improve the availability and consumption of nutrient-dense, diverse produce and ensure dietary diversity and subsidiary income to the farm families.

Keywords

Multi-Commodity, Intensive Farming System, Gender-inclusive, Dietary Diversity, Nutrition

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