



ICAR- National Institute of Secondary Agriculture E-NEWSLETTER



Director's Desk



It is with great pride and enthusiasm that I share the latest updates from ICAR-NISA in this edition of our newsletter. Our research initiatives continue to make remarkable progress, particularly in the development of smart packaging systems and the extraction of cellulose from alternative resources like water hyacinth & Lantana camara. These pioneering efforts are laying the foundation for sustainable solutions in packaging and various other industries, reinforcing our commitment to environmental responsibility and innovation. In addition to our research, ICAR-NISA has been actively engaged in capacity-building programs, empowering individuals and communities with crucial skills and knowledge in a variety of scientific and technical fields. We also recently celebrated Hindi Utsav, promoting the use of Hindi in scientific and technical domains, as well as Vigilance Awareness Week, which focused on ethics and integrity in the workplace. I am pleased to announce that ICAR-NISA has received ISO 9001:2015 certification, underscoring our dedication to maintaining the highest standards in quality management. Our research publications, radio talks, and active participation in scientific forums have further showcased our achievements in R&D, our scientists have been recognized with several awards for their outstanding contributions. Thank you for your continued support as we strive for excellence in research, education, and service to society.

(Abhijit Kar)

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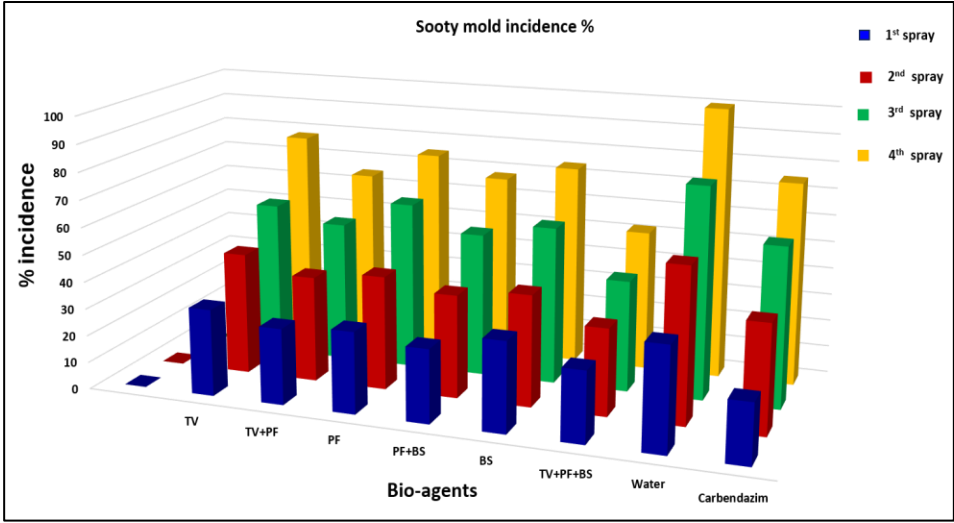
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RESEARCH HIGHLIGHTS

Eco-Friendly Management of Sooty Mold: Evaluation of Bio-Agents for Sustainable Control

Due to environmental risks of chemical pesticides, bio-agents have been tested as alternatives to chemical fungicides for controlling sooty mold. Three bio-agents—*Trichoderma viride*, *Pseudomonas fluorescens*, and *Bacillus subtilis*—were evaluated in eight different combinations against carbendazim (0.1%). The most effective treatment was sequential combination of bio-agents, reduced infestation to 52%, outperforming carbendazim (75%). Single bio-agent treatments were less effective, with infestation rates of 74-78%, while alternating bio-agent treatments showed moderate incidence. The negative control had 100% infestation, confirming the need for control measures. Hence, combination treatments proved to be more effective, emphasizing the potential of bio-agents for sustainable plant protection.



Effect of different treatments on Sooty mold incidence

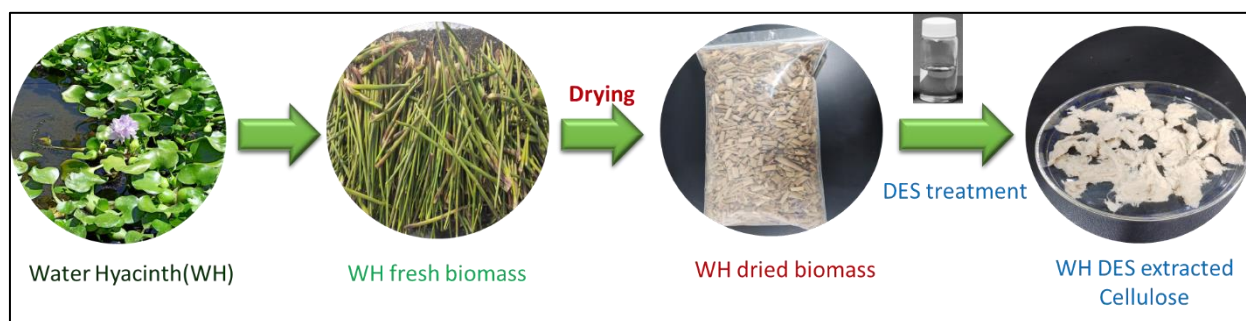
Extraction of Cellulose from *Lantana camara* agri-biomass

Lantana camara is an invasive alien species and considered as one of the world’s 100 most invasive species, and among the world’s 10 worst weeds by International Union for Conservation of Nature (IUCN) . In this study, *Lantana camara* stem biomass has been utilized for extraction of nanocellulose using green methodology. The chemical composition was found to be: Hemicellulose: 19.17%, Lignin: 23.90% and Cellulose: 37.00%. Moisture content and ash content of the plant material were determined and found to be 62.55% and 1.68% respectively. The biomass was collected from ICAR-NISA Ranchi campus, air dried, stems were cut in to small pieces and powdered and subjected to water prehydrolysis in autoclave at 100 °C for 30.0 min followed by alkali hydrolysis with 2% NaOH in autoclave to 120 °C for 60 min. The pulping of alkali hydrolysed chips was carried out with 20% NaOH at 160 °C for 90.0 min. followed by bleaching using hypochlorite (2.0%) and hydrogen peroxide (1.0%). The yield of cellulose obtained after bleaching was 23.4%.

Development of green process of extraction of nanocellulose from agri-bioproducts

Cellulose is the major component of lignocellulosic biomass, and efficiently using it in high-value applications could lead to significant advancements in biomass waste utilization. Cellulose has been extracted from banana pseudostem and water hyacinth biomass using alkali hydrolysis with an yield of 31.8%, 23.1% and 27.75% from banana pseudostem sheath, pith and water hyacinth, respectively.

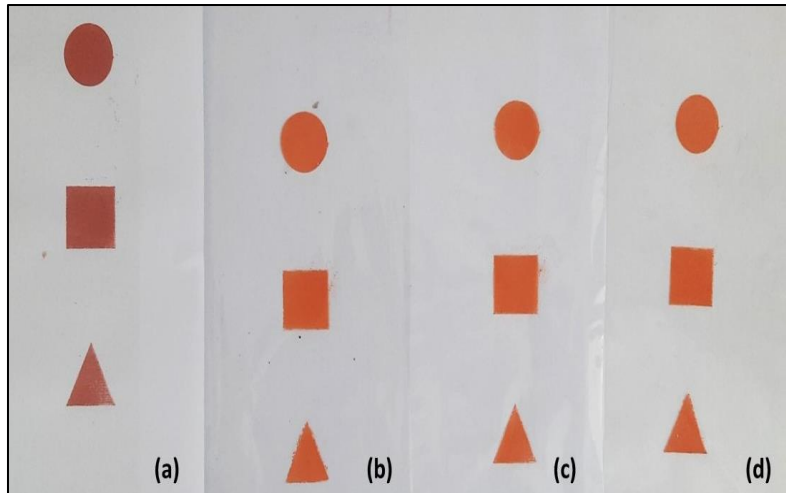
Chemical method is highly toxic and produces hazardous pollutants. Therefore, alkaline hydrolysis for cellulose extraction from lignocellulosic biomass should be replaced with greener alternatives. Green extraction of cellulose from water hyacinth using Oxalic acid- choline chloride based Deep Eutectic Solvents at different raw material: DES ratio (1:10, 1:8, 1:6 and 1:4) resulted in yield between 29.47% to 29.93%. The FT-IR spectra of the cellulose from water hyacinth using alkali hydrolysis as well as DES extraction were compared and showed similar absorption peaks representing that the cellulose allomorph was not altered after the acidic DES and alkaline hydrolysis. The DES-extracted cellulose has been converted to nanocellulose by ultrasonication treatment in an aqueous medium. The particle size of the ultrasonically treated cellulose gradually decreased with the treatment duration; from 712.6 nm to 271.9 nm after 60 minutes of ultrasonication treatment.



Cellulose extraction from water hyacinth using DES extraction

Natural dye-based intelligent indicators for real-time freshness monitoring of packaged perishable food products

Intelligent screen-printing ink formulation has been developed using ethyl cellulose as binder, different pH sensitive natural dyes as pigment, ethanol as solvent, and titanium dioxide as fillers. The formulated ink exhibited a non-Newtonian, shear-thinning behavior. Additionally, it demonstrated excellent printability and strong adhesion on paper, as well as LDPE, HDPE, and PP films.



Printing of developed formulation on different surface
(a) copy paper (b) PP film (c) LDPE (d) HDPE

Membrane filtration system for lac-dye recovery from lac wash water

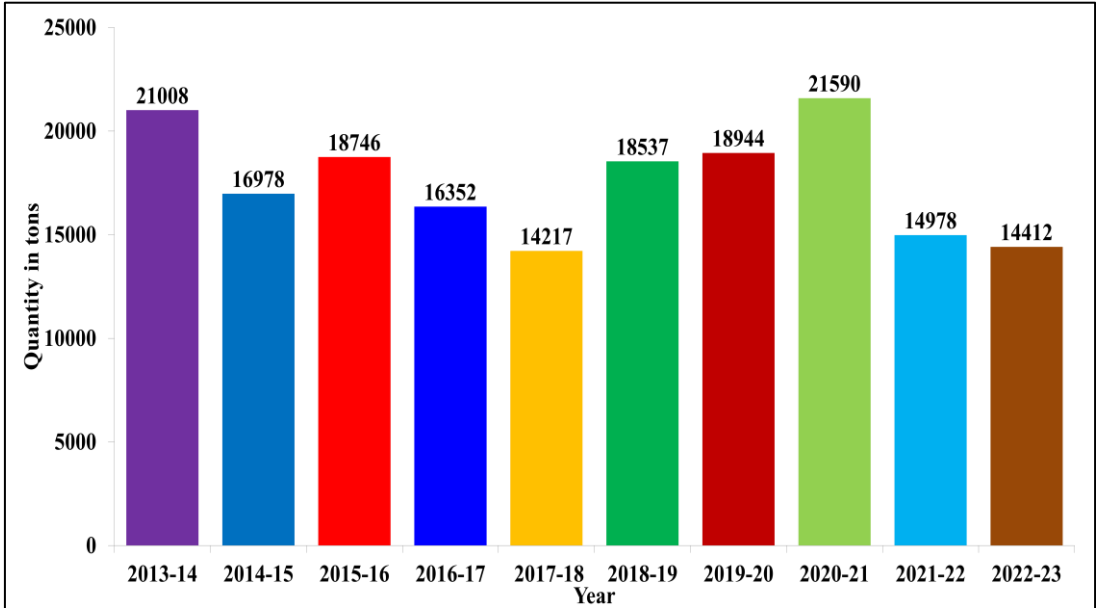
A Feasibility study on membrane filtration system for lac-dye recovery has been conducted using ultrafiltration unit developed at Central Tasar Research and Training Institute, Ranchi. Five-liter lac wash water of pH 7.5, total dissolved solids 217 and turbidity above 800 NTU, was filtered using sand filter followed by an Ultrafiltration membrane. The permeate was treated with acid for coagulation of waxy substances and lac dye was recovered by rotary evaporator. Amount of crude lac-dye extracted from 5 liters of wash water was nearly 5 g (i.e. 1000 ppm).



Lac dye recovery using ultrafiltration

Trend analysis and export performance of Natural resins and Gums from 2013-14 to 2022-23

The production and export performance of natural resins and gums (NRGs) in India from 2013-14 to 2022-23 has shown a declining growth trend, with the exception of "other resins and gums." Most types, including Dhawda gum, experienced negative growth, while Lac production saw the least decline. The national production of sticklac in 2022-23 was estimated at 14,412 tons, with Jharkhand, Chhattisgarh, and Madhya Pradesh contributing over 93 per cent of the output. The disparity in production across states highlights the need for targeted interventions. India’s Revealed Comparative Advantage (RCA) in NRG exports has fallen from 14.58 in 2014 to 8.56 in 2023, indicating decreased global competitiveness, though RCA above 1 still signals a comparative advantage. Export Unit Value (EUV) has risen steadily from 2013 to 2023, while Import Unit Value (IUV) remained stable, widening the gap between the two. The export dynamics analysis shows that Nepal and Bangladesh displayed strong interlinkages with probabilities of 0.73 and 0.37 respectively, highlighting their role as consistent markets. Notably, the UAE’s exports show significant diversion to other markets, emphasizing the need for diversification in export destinations. This highlights the evolving challenges and opportunities in India’s NRG export sector.



Lac Production Scenario in India Over 10 Years (2013-14 to 2022-23)

EDUCATIONAL AND CAPACITY BUILDING PROGRAMMES

Sl. No.	Name of programme	No. of batch	No. of beneficiaries
1	Five days Farmers training programme on “Scientific method of lac cultivation, primary processing and utilization”	03	189
2	On Campus one-day Exposure Visits/ Orientation Programme on Natural Resins and Gums	09	519
Total		12	708



Training and exposure visit for school students and farmers at ICAR-NISA

EVENTS

Hindi Utsav celebration at ICAR-National Institute of Secondary Agriculture

On October 25, 2024, ICAR-National Institute of Secondary Agriculture (ICAR-NISA), Ranchi, organized a vibrant celebration of the Hindi Utsav. The event was graced by Dr. Pankaj Mitra, Program Executive, All India Radio, Ranchi, who attended as the esteemed Chief Guest. The event commenced with a warm welcome by the Director of ICAR-NISA, who presented Dr. Mitra with a bouquet and delivered the welcome address. The Director emphasized the institute’s commitment to promoting Hindi in both scientific and technical fields, with the vision of ensuring that Hindi receives recognition not only within India but also on an international platform.



Celebration of Hindi Utsav at ICAR-NISA

Dr. Mitra delivered an insightful keynote lecture titled "Hindi Moving Towards Becoming a Global Language." In his address, he provided a detailed analysis of the origin, development, and global significance of Hindi. He traced the evolution of Hindi from its roots in Sanskrit to the present day Kharībolī, highlighting its journey from the era of the Mahabharata to modern times, and discussed the crucial role language plays in shaping human civilization. Shri Binod Kumar, In-charge of the Official Language Unit, presented the Hindi Review Report for 2023-24. He elaborated on the various official language programs and activities conducted by the institute, underscoring their importance in promoting Hindi. The event also included the distribution of awards and certificates to winners in eight categories of competitions. Special honors were conferred to the best article authors of "Lākṣā-2023." In a gesture of appreciation, the Director presented a memento to Dr. Pankaj Mitra. Dr. Saroj Kumar Giri, Chairman of the Hindi Pakhwada Organizing Committee, delivered the vote of thanks, expressing heartfelt gratitude for Dr. Mitra's esteemed presence and valuable contributions to the event.

ICAR- NISA celebrates Vigilance Awareness Week

ICAR- NISA, Ranchi, organized a specialized program in observance of the *Vigilance Awareness Week* from October 28 to November 3, 2024. On this occasion, all employees took integrity pledge to maintain cleanliness and uphold awareness and integrity in their daily lives. A lecture on the theme "Culture of Integrity for Nation's Prosperity" was organized at ICAR-NISA on October 29, 2024. Mr. Bibhuti Bhusan Pradhan, Retired IPS graced the occasion as chief guest. In his welcome address, Dr. Abhijit Kar, Director emphasized on the significance and importance of integrity to safeguard ourselves from unethical practices.

Following this, Mr. Rishav Dev, FAO introduced the chief guest and highlighted the importance of Integrity Week, connecting it to the birth anniversary of Sardar Vallabhbhai Patel. Mr. Pradhan, chief guest, then elaborated on the concept of 'Integrity' and explained the difference between 'Integrity' and 'Unity.' He spoke about how Sardar Patel’s efforts contributed to the unification of India, emphasizing the need for social, political, spiritual, and ethical integrity. He further stressed that upholding integrity could help eliminate social injustices. Mr. Pradhan underscored that integrity is not only critical in official matters but should also be an integral part of our daily actions. The program concluded with a vote of thanks by Dr. Niranjana Prasad. A quiz competition was also organized for the administrative staff on October 30, 2024.



Guest lecture during Vigilance Awareness Week- 2024 at ICAR-NISA

PUBLICATION AND PUBLICITY

Research papers

Udaykumar, M. S., Vaishnavi, M. P., & Suman, L. (2024). The Effect of Urban Sprawl on Agriculture: A Study of Land Use Dynamics in Bengaluru. *Indian J Econ Dev*, 20(3), 243-251. DOI:10.35716/IJED-24198

Vaishnavi, M. P., Udaykumar, M. S., Patil, Manojkumar, & Suman, L. (2024). Vertical farming: Way for urban food security. *International Journal of Environment and Climate Change*, 14(07), 529-539. DOI: 10.9734/ijecc/2024/v14i74290

Sakare, P., Giri, S. K., Mohapatra, D., Kar, A., & Modhera, B. (2024). Addressing spoilage monitoring in packaged paneer (Indian cottage cheese): Lac dye-based intelligent indicator as an innovative solution. *Food Bioscience*, 61, 104967

Paul, A., Dutta, A., Kundu, A., Ghosh, A., Chawla, G., & Saha, S. (2024). Adsorption-guided purification of rose petal anthocyanins. *Biomass Conversion and Biorefinery*, 1-16, DOI: <https://doi.org/10.1007/s13399-024-06331-5>.

Gupta, S. K., Mandal, A., Ghosh, A., Kundu, A., Saha, S., Singh, A., & Dutta, A. (2024). Evaluating the insecticidal potential of alkaloids for the management of Thrips palmi: in vivo and in silico perspectives. *Scientific Reports*, 14(1), 28045. DOI: <https://doi.org/10.1038/s41598-024-77236-6>.

Lalchawimawia, B., Banerjee, T., Dutta, A., Choudhury, P. P., Singh, N., Mukhopadhyay, R., Sahoo, D., Dixit, M., & Mandal, A. (2024). Removal of tricyclazole residues from water by sorption on metal organic frameworks (MOFs): A theoretical insight of the experimental data. *Surfaces and Interfaces*, 54, 105080. DOI: <https://doi.org/10.1016/j.surfin.2024.105080>

Ali, M., Naiya, H., Mohanasundaram, A., Mishra, R., Sharma, K.K., Kaprakkaden, A., & Kandasamy, T. (2024). Comprehensive study on extractable aleuritic acid variability in lac resins: Species, host plant, and seasonal effects with storage impact for optimum and sustainable utilization of lac resins: Extractable aleuritic acid variability in lac resins. *Journal of AgriSearch*, 11(3), 179-186.

Kumar, Y. B., Ali, M., Patra, S., Moirangthem, P., Singh, N. U., Devi, M. B., Sharma, P. M., Sangma, R., Umakanta, N., Singh, N. R., & Singh, H. J. (2024). Degradation pattern and safety evaluation of azoxystrobin in tomato fruit. *European Journal of Nutrition & Food Safety*, 16(10), 120- 128.

Mohanasundaram, A., Sharma, K. K., Kandasamy, T., Lohot, V. D., Ghosh, J., & Das, P. (2024). Assessment of lac diversity and indigenous technical knowledge in North East Region of India. *Indian Journal of Ecology*, 51(2), 427-433.

Sharma, S. C., Prasad, N., Pandey, S. K., & Singh, R. (2024). Mechanization in processing commercially significant natural resins and gums: A review. *Industrial Crops and Products*, 222, 119630.

Popular articles

Sakare P, Thombare N, Dutta A, Mahapatra A. 2024. Nature's Rainbow Natural food colourants for a healthy diet, *Science Reporter*, 60(10): 40-43.

TV/ Radio talks

Dr. N. K. Sinha, Pr. Scientist delivered a radio talk at Akashvani, Ranchi on November 25, 2024 on ‘Nursery raising and management of lac host plants’.

Dr. S. Ghosal, Pr. Scientist delivered a Radio talk on ‘Lakh utpadan me poshak vriksh ka poustik tatv ka mahtav’ on November 26, 2024 for Kisan vani programme of Doordarshan Ranchi.

Dr. Nandkishore Thombare, Sr. Scientist delivered a radio talk on ‘Livelihood possibilities through Lac processing and value addition’ at Aakashvani, Doordarshan Ranchi, on December 12, 2024.

Dr. Achintya Pramanik, Scientist delivered a TV talks for DD Kisan, Ranchi on “कुसुमी अगहनी लाख फसल में बिहान परिपक्वता का आकलन” on December 30, 2024.

PG CELL CORNER

As IARI PG school has grown into IARI mega University, with several hubs at different places in India, ICAR-NISA also joined the IARI Ranchi hub as one of the participating institutes. Thus, apart from research activity, the faculty is engaged in teaching activities, making a holistic approach of amalgamating basic and applied research. ICAR-NISA is offering post graduate courses in two disciplines, namely Process and Food Engineering (PFE) and Agricultural Chemicals (AC). In this academic year, the 2nd batch of 6 Master’s students have joined our institute.

We encourage the young minds to improve their vision, and quality of research through practical learning which was accomplished through visits to industries and sending the students on specialized training to have better learning exposure.



Sateesh K. Gaharwariya
PFE



Fahmidha
PFE



Debargha Dey
AC



Nirmal Uttam Ajgekar
AC



B Naresh
AC



Aishik Sadhukhan
AC

Newly joined Master’s students of ICAR-NISA

VISIT

Visit of Parliamentary Official Language Committee

The Second Sub-Committee of the Parliamentary Official Language Committee conducted an inspection of ICAR-NISA, Ranchi on October 21, 2024, based on the prescribed Hindi questionnaire. The inspection meeting was chaired by Honorable Member of Parliament and Sub-Committee Convenor, Sri Ujjwal Raman Singh. The meeting was attended by the honorable members of the sub-committee and officials from the committee's secretariat. During the inspection, Dr. Abhijit Kar, Director, ICAR-NISA briefed the Parliamentary Committee about the language-related activities and research activities conducted by the institute. On this occasion, Honorable MPs Sri Ujjwal Raman Singh and Sri Ziaur Rahman discussed in detail the constitutional obligations related to the official language and issued instructions to ensure that the institute's official language activities are carried out to the required standard.

Dr. K. P. Singh, ADG, Process Engineering, Mr. Omprakash Joshi (Chief Technical Officer, Official Language), and other officials from ICAR Headquarters were present. Dr. S. C. Sharma, Senior scientist and Mr. Binod Kumar, In-charge, Official Language, Mr. Rishabh Dev, Accounts and Finance Officer, Mr. Krishna Murari Kumar, AAO and Mr. Indrajeet Kumar, Technician from ICAR-NISA were also present on this occasion. Dr. Abhijit Kar, Director of ICAR-NISA expressed gratitude towards the second sub-committee of the Parliamentary Committee. With this, the inspection meeting concluded.



Members of the 2nd Sub-Committee of the Parliamentary Official Language Committee with officials from ICAR HQ and ICAR-NISA at Ranchi

Field Visits

Field visits were conducted on December 13 and 19, 2024 in Jharkhand and West Bengal to promote scientific lac cultivation. Dr. Udaykumar M. S., scientist along with Er. S. K. Pandey, scientist; Dr. Soumen Ghosal, Pr. scientist and Dr. J. Ghosh, Pr. scientist were engaged with farmers in Purulia and Ranchi, disseminating knowledge on pruning techniques, host plant management and sustainable lac production. Key discussions covered Calliandra, Semialata, and ber plantations, intercropping, and integrated pest and nutrient management. Data on host plant availability was collected to enhance productivity. The initiative aimed at improving livelihoods through scientific interventions and value addition in lac cultivation.

MISCELLANEOUS**ISO Certification obtained for the Institute**

Institute received ISO 9001-2015 certificate on November 06, 2024 from Correct Certification, Varanasi, issued by Saara Management System Private Limited, New Delhi.

Technology Transfer and MoU signed by ICAR-NISA, Ranchi

MoU has been signed between ICAR-NISA, Ranchi and Directorate of Cinchona and Other Medicinal Plants (DCOMP), West Bengal for Facilitation of technological backstopping for production and processing system of DCOMP products including cinchona on October 30, 2024

MoU has been signed between ICAR-NISA, Ranchi and Dass Group Mechanical Engineering Consultant, Ranchi, Jharkhand for Fabrication of Cinchona tree uprooting equipment on November 13, 2024

MoU has been signed between ICAR-NISA, Ranchi and Life Line Mission Trust (LLMT), H.O.-Patna B.O.-Netarhat, Jharkhand for technical guidance & support regarding agriculture and horticulture-based farming system, processing, value addition & product utilization on December 13, 2024

Awards/ Honors

Dr. Priyanka Sakare, scientist won gold medal in ICAR- Inter-Zonal Sports Tournament-2023 held at ICAR-CAZRI, Jodhpur during October 14-17, 2024 for Table Tennis

Dr. Nandkishore Thombare, Sr. Scientist received 'Best Oral Presentation Award' and a cash prize of Rs. 1500/- for a paper on '*A simple, convenient, and statistically optimized method to determine the solubility of polysaccharide gums: Guar gum and beyond*' in the International Conference on Advances in Materials and Chemical Sciences held between Dec 18-20, 2024 at BIT, Mesra, Ranchi.

Participation in Seminar/ Symposia/ Workshop/ Conference

Dr. Sandeep Kumar, Scientist attended the 5th International Electronic Conference on Foods between October 28-30, 2024 (online) organized by MDPI and Foods

Dr. Archana Mahapatra, Scientist presented a paper titled '*Green Recovery of Lemongrass Essential Oil with Hydrogen-Bonded Supramolecular Eutectic Solvents*' at the 58th Annual Convention of ISAE on "Engineering Innovations for Next-gen Digital Agriculture" & International Symposium on "Agricultural Engineering Education for Aspiring Youth in Transforming Agriculture" held between November 12- 14, 2024 at VNMKV, Parbhani, Maharashtra.

Dr. Priyanka Sakare, Scientist presented a paper titled '*Impact of Immobilization Matrix on the Sensing Performance of Freshness Indicators: A Comparative Analysis*' in International Conference on Advances in Materials and Chemical Sciences held between Dec 18-20, 2024 at BIT, Mesra, Ranchi.

Dr. Nandkishore Thombare, Sr. scientist presented a paper titled '*A simple, convenient, and statistically optimized method to determine the solubility of polysaccharide gums: Guar gum and beyond*' in the International Conference on Advances in Materials and Chemical Sciences held between Dec 18-20, 2024 at BIT, Mesra, Ranchi.

HRD

Dr. Niranjan Prasad, Head, ABA Division & Vigilance Officer attended training on “Vigilance Perspectives for ICAR Officers” between November 06-08, 2024 at ICAR-NAARM, Hyderabad

Dr. Nawalesh Kumar Sinha, Principal Scientist attended 8th Institute Management Committee Meeting of ATARI, Patna (Zone IV) as a Member on November 26, 2024.

Other

Dr. Soumen Ghosal, Pr. Scientist participated in the Institute Management Committee Meeting of ICAR-Indian Institute of Agricultural Biotechnology, Garhkhatanga on November 14, 2024.

Dr. Jyotirmay Ghosh, Principal Scientist acted as expert of tree breeding as Research Advisory Committee member of Indian Council of Forest Research Institute (ICFRE), Dehradun and reviewed All Indian Coordinated Research Project of six projects for the six-monthly review of progress during November 5, 2024.

Joining

Shri Singhray Majhi, STO joined on October 16, 2024

Retirements

Shri Binod Kumar
ACTO

November 30, 2024

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