



ICAR- National Institute of Secondary Agriculture E-NEWSLETTER



Director's Desk

As our institute celebrates its 100th anniversary, we are expanding our focus to include secondary agriculture, while continuing R&D and extension activities on lac, natural resins, and gums. We are actively working on developing analytical tools for agro-biomass and exploring renewable resources from agricultural byproducts as alternative sources for valuable components. This quarter, we marked *National Lac-Insect Day* to raise awareness and promote improvements in the lac sector, which supports the sustainable livelihoods of tribal farmers in Jharkhand. Additionally, our institute has organized numerous capacity-building, training, and awareness programs for stakeholders, farmers, students, scientists, and staff. Our research continues to thrive, with an impressive output of papers, popular articles, book chapters, and active participation in scientific congregations. We have also signed several MoUs and transferred technologies to further strengthen our impact. I extend my heartfelt congratulations to our dedicated staff, whose tireless efforts drive our success. It is with great pride that I share this newsletter, celebrating our collective achievements and a promising future ahead.




(Abhijit Kar)

In this issue

- Research highlights
- Educational and capacity building programme
- Events
 - IRC meeting
 - World IP Day
 - Lac Insect Day
 - Int' Yoga Day
- Participation
- Patents
- Publication & publicity
- Visits
 - Hon'ble Union Agriculture Minister visits ICAR--NISA
- Miscellaneous
 - Technology transfer & MoU signing
 - Awards
 - Participation in seminar/conference
- HRD

RESEARCH HIGHLIGHTS

Development of suitable IPM practices for different systems of cultivation of lac

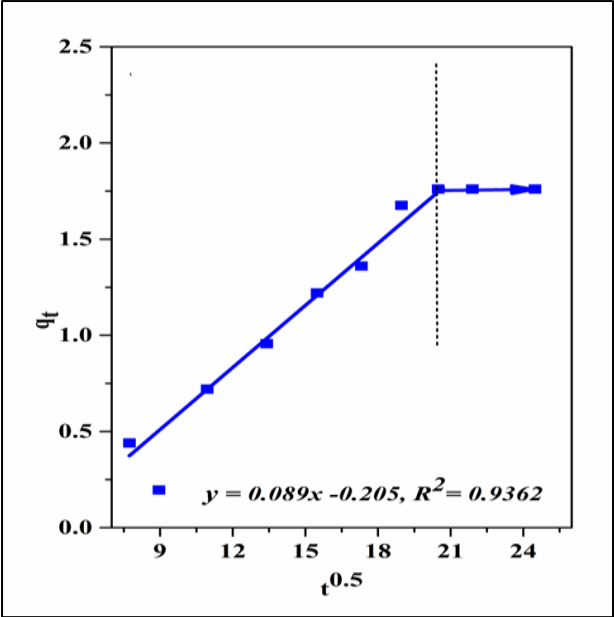
The spiralling whitefly (*Aleurodicus dispersus*) is a major pest of lac-inoculated *Flemingia semialata*, a host plant for the lac insect (*Kerria lacca*). Conventional systemic insecticides, such as imidacloprid, are ineffective due to their non-selectivity, which harms lac insects. This study has evaluated the efficacy of three biopesticides against spiralling whitefly while assessing their impact on natural enemies and lac insects. Biopesticides were found effective in managing spiralling whitefly (*Aleurodicus dispersus*) infestation on lac-inoculated *Flemingia semialata* while preserving natural enemies and minimizing harm to lac insects. Spraying *Metarrhizium anisopliae* @ 2 g/L emerged as the most effective and selective biopesticide option, followed by *Beauveria bassiana* @ 2 g/L and Azadirachtin 1500 ppm @ 2.5 mL/L. Imidacloprid @ 0.3 mL/L, while effective against whiteflies, was unsuitable due to its harmful effects on lac insects and natural enemies.



White fly infestation in (a) untreated *F. semialata* leaf (b) after 5 days of treatment with *Metarrhizium anisopliae* @ 2 g/l

Synthesis of Gum Arabic based hydrogel for remediation of dye contaminated water

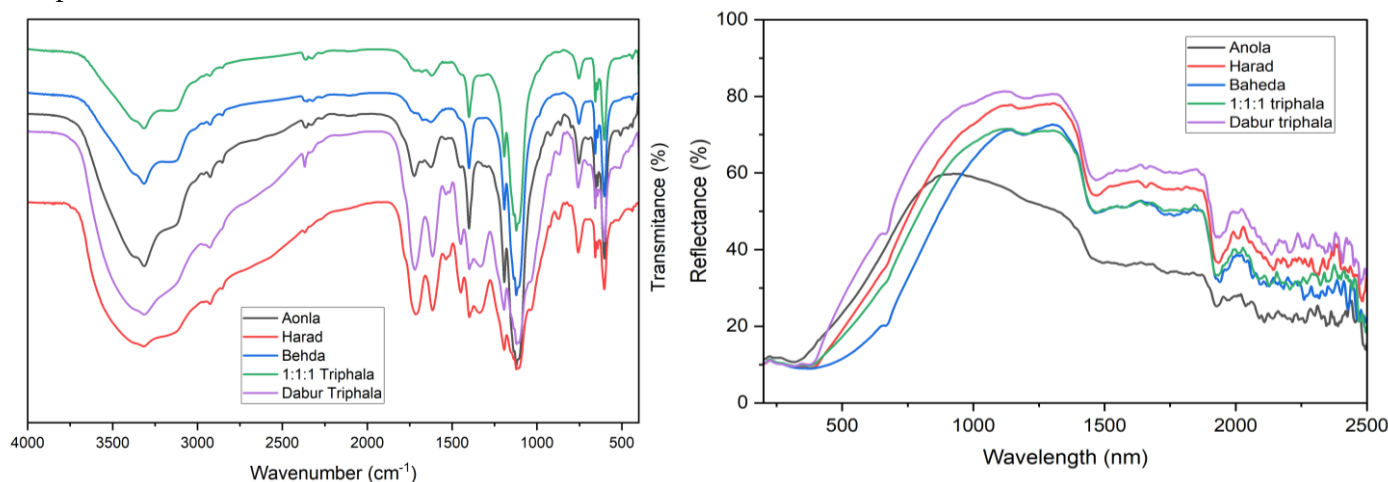
Batch adsorption studies have been carried out to investigate the effects of initial dye concentration, adsorbent dosage, pH, agitation time and temperature. Various adsorption isotherms were fitted to experimental data and the results were best fitted with Freundlich model ($R^2 > 0.99$). Kinetics studies revealed pseudo-second order as best fit in explaining adsorption process of brilliant green dye onto Arabic gum hydrogel. Thermodynamic studies confirmed that adsorption process was endothermic and non-spontaneous in nature indicating the adsorption process was not governed by dye itself but depends on the nature of adsorbent.



Intra-particle diffusion kinetic model of brilliant green dye adsorption onto Arabic gum-based hydrogel

Development of analytical techniques for identification and quality control of commercially important agri-bioproducts

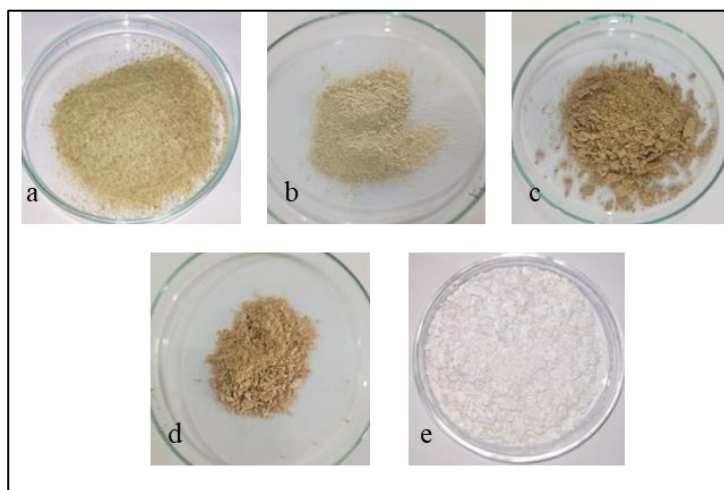
The research focused on the spectroscopic characterization of individual Triphala components, such as Aonla (*Phyllanthus emblica*), Haritaki (*Terminalia chebula*), and Bibhitaki (*Terminalia bellerica*), as well as their standard 1:1:1 mixture and a commercially available Triphala powder (Dabur). Samples were sun-dried, powdered, and analyzed using UV-Vis-NIR and FTIR spectroscopy. FTIR analysis revealed characteristic broad peaks between 3700–2800 cm^{-1} corresponding to –OH stretching, a peak at 2368 cm^{-1} due to aliphatic –CH and –CH₂ stretching, and a peak at 1719 cm^{-1} related to carboxylic acid groups, especially in Harad and Dabur Triphala. Ester groups were identified by peaks around 1120 cm^{-1} in all samples. UV-Vis-NIR spectra showed distinct patterns across the components. Aonla had a unique spectral curve, particularly with lower intensity peaks between 800–1400 nm, while Harad and Bibhitaki displayed similar spectra. Variations in spectral features were attributed to differences in texture and moisture content. The study offers insights into the spectral profiles of Triphala components, which can aid in quality control and standardization of this widely used agri-bioproduct.



(a) FTIR and (b) UV-Vis-NIR spectra of the different components of triphala and its formulations

Green extraction of cellulose from bioproduct

Horticultural byproducts such as peels, pomace, and seeds typically make up 35-40% of the dry weight of the produce. Despite containing significant amounts of biopolymers e.g. cellulose, hemicellulose, lignin, xylose, ash, crude proteins, and phytochemicals, these byproducts are often discarded as waste.



Images of (a) dried pea pod powder, (b) hot water treated (c) acid treated, (d) after alkali treated, (e) freeze dried Cellulose

Extracting cellulose and other polymers from these biomass resources can transform them into valuable raw materials while addressing waste management issues. Extraction of cellulose from green pea peels has been carried out by conventional acid- alkali hydrolysis. Pea pods was dried by sun drying followed by hot air drying at 50° C and the ground to fine powder in a mixer grinder. The cellulose was isolated by conventional hydrolysis consisting of boiling, acid treatment, alkali treatment, bleaching and freeze drying. The yield of cellulose in the conventional acid- alkali hydrolysis was found to be 11.5%. In FT-IR study, peaks at 1192 cm⁻¹ in isolated cellulose from pea pods indicate an increase in the cellulose components and confirmed the removal of hemicellulose, and lignin from pea pods; resulting in chemically purified cellulose.

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”	05	187
2	On Campus one-day Exposure Visits/ Orientation Programme on Natural Resins and Gums	08	287
Total		13	474



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

EVENTS

Institute Research Council (IRC) Meeting

Institute Research Council (IRC) meeting of the Institute was held on April 24 and 25, 2024. The meeting was presided over by Dr. Abhijit Kar, Director, ICAR-NISA & Chairman, IRC. Progress of the work conducted under various approved research and extension programme during the last financial year 2023 –24 (April, 2023 to March, 2024) was presented by the programme leaders and reviewed. All the Heads of the Divisions/Units also presented new programme and projects aligning with the revised mandates, aspirations and priorities of the Institute.

During the meetings, the research progress of on-going projects (18), and new project proposals (12), under six core programmes and externally funded projects (06) were discussed thoroughly and approved/adopted by the house. Chairman, IRC also reiterated the urgent need and the collective wisdom for restructuring the research agenda of the institute in view of the revised mandates so as to remain relevant to the constantly evolving expectations from the institute in the area of secondary agriculture.

World IP Day celebration

On the occasion of World Intellectual Property Day 2024, ICAR-NISA, Ranchi organized a guest lecture on “Copyright protection in Digital Era: Issues and Challenges” on April 29, 2024. The lecture was delivered by Dr. M. R. Srineevasa Murthy, DPIIT-Chair Professor IPR, National University of Study and Research in law, Ranchi. Around 100 scientists, students and staff benefited from the program, gaining valuable insights into intellectual property rights in the digital age.



Guest lecture on World Intellectual Property Day

Lac Insect Day Celebration

ICAR-National Institute of Secondary Agriculture, Ranchi celebrated National Lac-insect Day on May 16, 2024 to create the desired impact on promotion and improvement of the lac sector. In his welcome address Dr. Niranjana Prasad, Head, ABA division & PC, NP-CLIGR highlighted the importance of lac for sustainable livelihood of tribal farmers of Jharkhand. The programme was followed by three expert lectures: “Lac cultivation” by Dr. Soumen Ghosal, “Lac Processing and different lac products” by Er. S. K. Pandey and “Value addition and application of Lac” by Dr. Fahim Ansari.

In his address, Dr. Abhijit Kar, Director, ICAR-NISA emphasized that ICAR- National Institute of Secondary Agriculture, Ranchi has played a pioneering role in maintaining the leadership position of India in lac sector through research and innovation in all aspect of lac cultivation, processing and application. The institute has played a key role in providing minimum support price for lac and declaring it as an agricultural commodity. However, strengthening of entire lac value chain through policy interventions like MSP and farmer-industry linkages through village level organizations, formation of FPOs, increased R&D support will be helpful to harness the full potential of available resources. He further suggested that effective management of the lac value chain involves coordination and collaboration among stakeholders at each stage, from farmers and harvesters to processors, manufacturers, and distributors. Throughout the value chain, quality control measures need to be implemented to ensure that the lac resin and shellac meet industry standards and customer requirements.

Further awareness campaign, field day for students and expert lectures on lac cultivation, lac-based value-added products and lac processing machinery was organized in different states of India at Centers of Network Project on Conservation of Lac Insect Genetic Resources. The program was also attended by 20 progressive lac farmers from different districts of Jharkhand.



National Lac-insect Day at ICAR-NISA

10th International Yoga Day Celebration

A one-day Yoga training and practice program was organized at ICAR-National Institute of Secondary Agriculture, Ranchi, on the occasion of the 10th International Yoga Day, held on June 21, 2024. During the program, Er. Ujjwal Bhashkar, Yoga instructor from the Art of Living Foundation, along with his team, guided the staff through various asanas, pranayama, and mudras, explaining their benefits for maintaining good health and happiness in daily life. A meditation session was also conducted. After the practice session, an interaction was held where the Yoga instructor addressed various queries from the participants. The event saw active participation from all ICAR-NISA staff, including scientists, technical, administrative, and contractual employees.

Dr. Abhijit Kar, Director of ICAR-NISA, emphasized the importance of yoga in our lives, while Dr. Nandkishore Thombare, Convener of the program, highlighted the physical and mental health benefits of yoga and delivered the vote of thanks.



International Yoga Day celebrated at ICAR-NISA

PARTICIPATION IN EVENTS

Dr. Niranjana Prasad, Head, ABA Division, Mr. Anup Kumar, Technical officer, ABD Unit, Mr. Dinesh Kumar, Technician, ABD Unit participated in the 60th Foundation of CSB- Central Tasar Research & Training Institute, Ranchi on June 19, 2024 and exhibited the institute technologies, products for the benefit of farmers. Padma Bhushan Shri Kariya Munda, Former Deputy Speaker, Lok Sabha graced the occasion as Chief guest and Shri P. Sivakumar, IFS, Member Secretary & CEO, Central Silk Board; Dr. S.C. Dubey, Vice Chancellor, Birsa Agricultural University Ranchi; Shri Dharendra Kumar, IFS Ret. Director Sericulture, Jharkhand; Shri S. Jainandu, Ex-Chairman, Jharkhand State Khadi and Village Industries Board & Dr. N. B. Chowdary, Director, CSB-CTRTI, Ranchi visited the institute stall.



Delegates visiting the stall of ICAR-NISA

PATENT

Ansari M. F., Thombare N., Roy Chowdhury A. and Kar A. Provisional patent filed on ‘A natural resin-based eco-friendly adhesive for application in disposable dining utensils and method of preparation thereof’ (Application No. 202431043306, June 04, 2024)

PUBLICATION AND PUBLICITY

Research papers

Mahapatra, A., Dhakane-Lad, J., Patil, S., D’Souza, C., Kumar, M., Bharimalla, A. K., & Saxena, S. (2024). Amelioration of sodium alginate-CNC edible coating with thyme and/or clove essential oil for post-harvest quality of guava. *Journal of Food Measurement and Characterization*, 18(7), 5281-5296. (NAAS Score: 9.0)

Sinha, S., Anwar, T., Lohot, V. D., & Kandasamy, T. (2024). Effect of different density of lac insect (*Kerria lacca*) infestation on host plant *Flemingia macrophylla* growth and photosynthetic pigments. *International Journal of Advanced Biochemistry Research*, SP-8(7), 250-256.

Jena, S., Sanyal, R., Jawed, D. Md., Sengupta, K., Pradhan, B., Sinha, S. K., Sarkar, B., Kumar, S., Lenka, S. K., Naskar, S., Bhadana, V. P., & Bishi, S. K. (2024). Spatio-temporal expression of polyphenol oxidase unveils the dynamics of L-DOPA accumulation in faba bean (*Vicia faba* L.). *Physiology and Molecular Biology of Plants: An International Journal of Functional Plant Biology*. <https://doi.org/10.1007/s12298-024-01449-2>

Popular articles

प्रियंका साकरे, नंदकिशोर ठोंबरे, अर्चना महापात्र. 2024. प्राकृतिक खाद्य रंगों का उपयोग, खेती, मई-2024, पृष्ठ 32-34.

Perna Nath and Sakharam J. Kale. 2024. Bael (*Aegle marmelos*): Processing possibilities. *Marumegh Kisaan E- Patrika*, 9(2), 1-5.

Book Chapters

Udaykumar M. S. (2024) Implementing Circular Economy Principles Across Entire Food Supply Chains. In *Environmental Sustainability and Food Security*. (pp. 120-143). ND Global Publication House, UP, India. (ISBN No.: 978-81-972002-6-7)

Manpreet Kaur, Manjunatha P. Paled, Rakesh N., Udaykumar M. S., Sharath S. Yeigar, Pavithra K. N., Tavva Srinivas and N. Sivaramane (2024) Harnessing the Power of Agriculture: Advancing Research and Policy Innovations for India's Growing Potential. In *Research and Technology Advancements in Agriculture* (pp. 413-439). ICAR-NAARM, Hyderabad. (ISBN No.: 978-93-340-3808-8)

V. Phani, T. K. Dutta, A. Pramanik, and J. Halder (2024) Impact of Climate Change on Agriculturally Important Insects and Nematodes. In *Climate Change Impacts on Soil-Plant-Atmosphere Continuum* (pp. 447-483). Springer Nature, Singapore.

Sandeep Kumar, Dinesh K. Yadav, Mahesh Kumar Samota, Minnu Sasi and Chandrika Das (2024) Grape seed as a reservoir of high-quality oil with important biological activities. In *Valorization of Fruit Seed Waste from Food Processing Industry* (pp. 135-156). Academic Press.

VISIT

Honourable Union Agriculture Minister Shivraj Singh Chouhan's Visit to ICAR-NISA, Ranchi

Honourable Union Minister for Agriculture and Farmers' Welfare, Sri Shivraj Singh Chouhan, visited ICAR-National Institute of Secondary Agriculture, Ranchi on June 25, 2024. The institute's director, scientists, and staff extended a warm and cordial welcome to the Minister during his visit. His visit started with tree plantation in the campus followed by interaction meeting with scientist and staff of ICAR- NISA, and scientists of ICAR- IIAB, Ranchi and ICAR- RCER Research Centre, Ranchi.



Visit of Hon'ble Union Agriculture Minister to ICAR-NISA

In his address, the Union Minister appreciated the institute's ongoing research and innovations, emphasizing the significant contribution it is making to the field of agricultural processing. He noted that the institute's work could play a crucial role in increasing farmers' incomes and enhancing the agricultural value chain. He urged the scientists to focus on making their research more practical so that the benefits could reach a larger number of farmers. Dr. Abhijit Kar, Director, ICAR-NISA provided a detailed overview of its key achievements and ongoing research projects. He explained that ICAR-NISA is actively working on the processing, value addition, and marketing of various agricultural products to ensure farmers receive better prices for their produce. The Minister praised the institute's efforts and acknowledged its vital contribution to the ongoing advancements in the agricultural sector. He assured the institute of the government's full support to continue its remarkable work in empowering farmers and enhancing agricultural practices.

MISCELLANEOUS

Technology Transfer and MOU signed by ICAR-NISA, Ranchi

- MoU has been signed between ICAR-NISA and Guru Gobind Singh Educational Society, Technical Campus, Chas Bokaro, Jharkhand for developing potential relationship for working towards mass adoption of innovation in serviceable secondary agro-industries
- MoU has been signed between ICAR-NISA and Mansa Enterprises, Chandigarh for commercial production of lac colour index analyzer.
- Dr. SKS Yadav transferred technology on Isoambrettolide from Aleuritic acid through training during September 23-October 07, 2024 to two persons Mr. Mahesh Sharma and Mr Sanjay Kumar from M/s Vedik Lac Foundation, Bundu, Ranchi sponsored by Mukhyantri Laghu kutir Udyam Vikas Board, Jharkhand.



MoU sharing with M/s Mansa Enterprises, Chandigarh

Awards/Honors

Dr Priyanka Sakare received the Young Women Scientist Award-2024 conferred by the Agricultural Technology Development Society (ATDS), UP, India, during 7th International Conference on Global Approaches in agricultural, biological, environment and Life Sciences for sustainable future held on June 8-10, 2024 at D.A.V. College, Kathmandu, Nepal.

Participation in Seminar/Symposia/Workshop/Conference

- Dr. M. F. Ansari presented 'Value addition and Applications of Lac' on the occasion of Lac Insect Day on May 16, 2024, organized in ICAR-NISA Ranchi.
- Dr. Archana Mahapatra presented a paper on 'Isolation and Characterization of Cellulose from Pea Pods: Towards Sustainable Biomaterials' at VIIth International Conference on "Global approaches in agricultural, biological, environment and life sciences for sustainable future" during June 8-10, 2024 at Kathmandu, Nepal.

- Dr. Priyanka Sakare participated and presented paper titled ‘Lac dye based intelligent colorimetric indicators for real-time freshness monitoring of packaged perishable food products, in VIIth International Conference on Global approaches in agricultural, biological, environment and life sciences for sustainable future held during June 8-10, 2024 at D.A.V. College, Kathmandu, Nepal.
- Dr. Nandkishore Thombare presented a paper on ‘Development of an electronic device for color analysis of lac: Quality assurance for sustainable farming and trade’ in the VIIth International Conference on Global approaches in agricultural, biological, environment and life sciences for sustainable future, held at D.A.V. College, Kathmandu, Nepal on June 8-10, 2024.
- Dr. M. S. Udaykumar, participated in the consultative learning workshop on ‘Unleashing the potential of lac in addressing rural livelihoods: Status, Constraints and Strategies’ organized by ICAR-NISA in collaboration with PRADAN and Partner CSOs on June 18 and 19, 2024.

HRD

- Dr. SKS Yadav participated in a five-day pedagogy training program at the NASC Complex, organized by the National Academy of Agricultural Sciences (NAAS) in New Delhi from April 01-05, 2024
- Dr. Mohd. Ali underwent four days training on Laboratory Quality Management System and Internal Audit as per IS/ISO/IEC 17025:2017 at NITS, Noida between June 4-7, 2024

Other

- Dr. Niranjana Prasad, Head, ABA Division acted as expert (Agricultural Engineering) for assessment of scientists of ICAR-IARI, Jharkhand under Career Advancement Scheme on April 29, 2024.
- Dr. J. Ghosh Pr. Scientist served as an expert in tree breeding as a member of the Research Advisory Committee of the Indian Council of Forestry Research and Education (ICFRE), Dehradun, and reviewed six projects under the All India Coordinated Research Project during the six-monthly progress review held from May 22 to 24, 2024. The projects are on genetic improvement of *Gmelina arborea* Roxb. (Khamer or Gamhar), *Azadirachta indica* A. Juss. (Neem), *Madhuca longifolia*, Quality Teak Production, Eucalyptus, *Casuarina*.

Joining

- Shri Rishav Dev, F&AO 22.04.2024
- Shri Dinkar Kumar, Technician 23.04.2024
- Shri Bhupendra Sahu, Technician 23.04.2024
- Shri Sonu Kumar, Technician 25.04.2024
- Shri Prince Kumar, Technician 26.04.2024
- Shri Dinesh Kumar, Technician 29.04.2024
- Shri Amarjeet Bharti, Technician 01.05.2024
- Shri Prabhat K. Singh, Technician 01.05.2024
- Shri Indrajeet Kumar, Technician 03.05.2024



Newly joined Technicians with Dr. Abhijit Kar, Director, ICAR-NISA

- Shri Jai Prakash Kumar, Technician 07.05.2024
- Shri Shravan K. Mandal, Technician 09.05.2024
- Shri Ashwini Kumar, Technician 20.05.2024
- Shri Himanshu Dwivedi, AO 20.05.2024
- Shri Brij Raj Sharma, SMS 03.06.2024
- Shri Om Prakash, SMS 07.06.2024
- Shri Pardeep Kumar, SMS 10.06.2024
- Shri Nikhil Raj M, SMS 20.06.2024
- Dr. Mir Muneeb Rafiq, SMS 24.06.2024

Promotion

Shri Krishna Murari Kumar was promoted to Assistant Administrative Officer w.e.f. June 10, 2024

Retirements



Shri Radha Kishun Toppo
Assistant
May 31, 2024



Er. Sunil Kumar Srivastava
Scientist
June 30, 2024

Editor-in-chief

Dr. Debabandya Mohapatra

Editor

Dr. Archana Mahapatra

Administrative Assistance

Mr. Indrajeet Kumar

Published by

Dr. Abhijit Kar, Director

ICAR-National Institute of Secondary Agriculture, Namkum, Ranchi - 834 010, Jharkhand

Phone: 0651-2260117, 0651-2261156 (Director)

Fax : 0651-2260202

E-mail: director.nisa@icar.gov.in, director.icar.nisa@gmail.com

URL : <https://nisa.icar.gov.in>