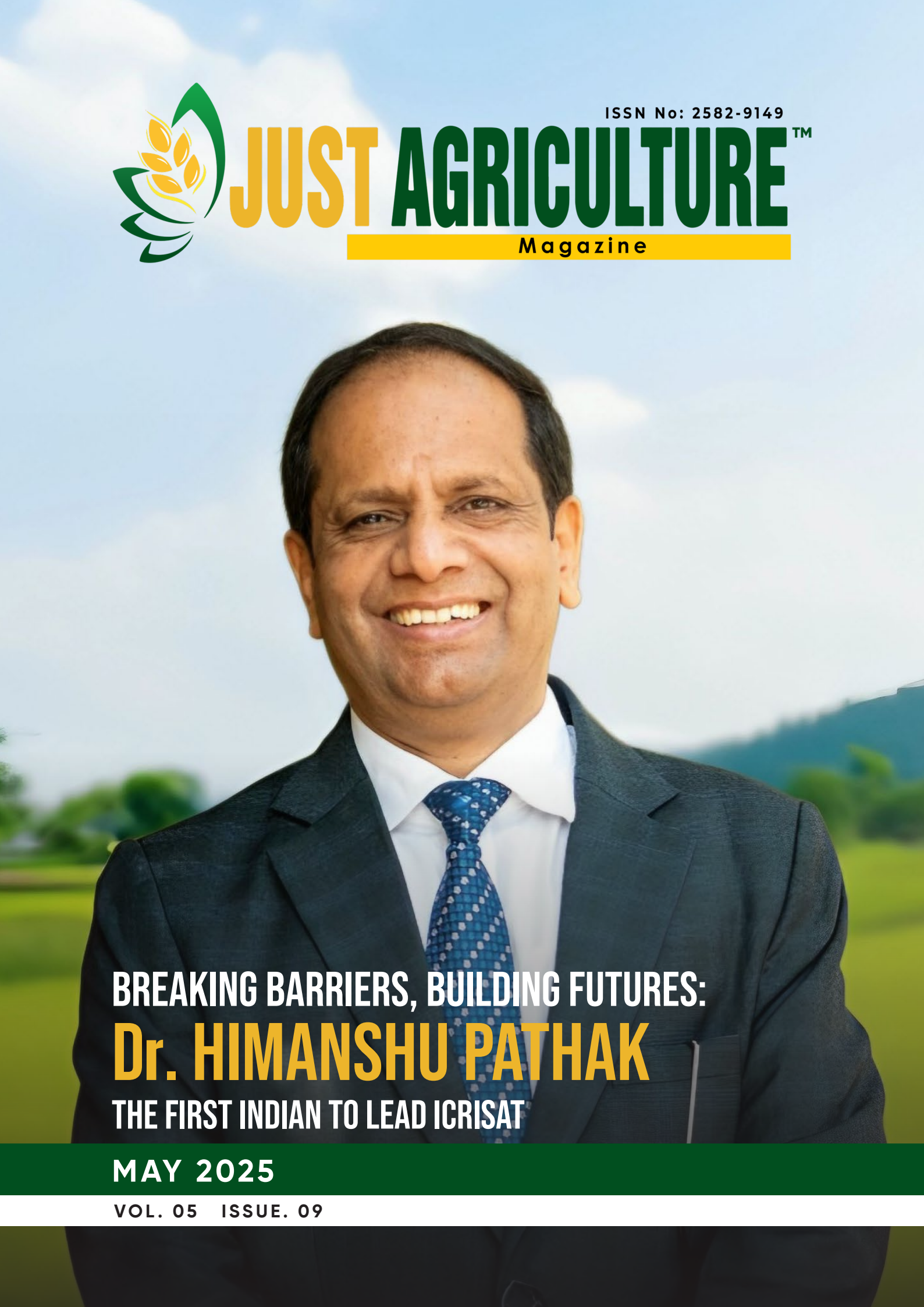
ISSN No: 2582-9149

JUST AGRICULTURE™

Magazine



BREAKING BARRIERS, BUILDING FUTURES:

Dr. HIMANSHU PATHAK

THE FIRST INDIAN TO LEAD ICRISAT

MAY 2025

VOL. 05 ISSUE. 09

FROM THE FOUNDER & CEO'S DESK

Dear Readers,

Welcome to the latest issue of Just Agriculture—a publication dedicated to empowering, informing, and inspiring the agricultural community. The landscape of agriculture continues to evolve, we are witnessing significant advancements in technology, sustainability practices, and global trends that are reshaping the way we produce, consume, and think about food, from precision farming to the integration of AI in crop management, innovation is at the heart of the agricultural revolution. However, alongside these opportunities, challenges like climate change, supply chain disruptions, and labor shortages remain pressing concerns that require our collective action and resilience.

At Just Agriculture, we are committed to being a bridge between these emerging technologies and the farmers, agribusinesses, and stakeholders who will shape the future of agriculture. In this issue, we delve into topics that matter most: sustainable farming practices, the rise of agri-tech and the crucial role of policy in ensuring a thriving agricultural ecosystem. We also highlight success stories from across the globe,

demonstrating how adaptability and innovation are driving positive change.

I believe that the future of agriculture is bright, but it requires all of us—farmers, scientists, policymakers and consumers—to work together toward a common goal: ensuring food security, environmental sustainability and the well-being of future generations.

Thank you for your continued support and for being a part of this incredible journey. I hope this issue inspires you as much as it has inspired us to bring it to you.

Dr. D.P.S. BADWAL
Founder & CEO,
Just Agriculture-the Magazine

Publisher & Editor:
Dr. D.P.S. Badwal on behalf of Just Agriculture Communications Group & printed at Just Agriculture Publications, Jalandhar.

FROM THE CHIEF EDITOR'S DESK

BREAKING BARRIERS, BUILDING FUTURES

With great pride, we present this May Issue of Just Agriculture-the Magazine, spotlighting transformative breakthroughs and inspiring leadership shaping the future of agriculture.

Leading the charge is Dr. Himanshu Pathak, the first Indian to head ICRISAT—a proud moment that underscores India's growing global influence in agricultural research. This issue also celebrates India's milestone achievement in launching the world's first genome-edited rice varieties, a testament to our nation's innovation for climate-resilient and sustainable farming.

Explore game-changing solutions like hydroseeding, the quiet revolution turning barren land green, and the rise of industrial hemp cultivation in Uttarakhand, fueling a new wave of eco-industrial growth.

From black wheat, a nutritional marvel, to bold innovations redefining agri-science, this edition stands as a tribute to those breaking barriers and building a future rooted in sustainability, science, and wellness.

Let's grow forward—together.

Dr. Sushila
Chief Editor,
Just Agriculture-the Magazine

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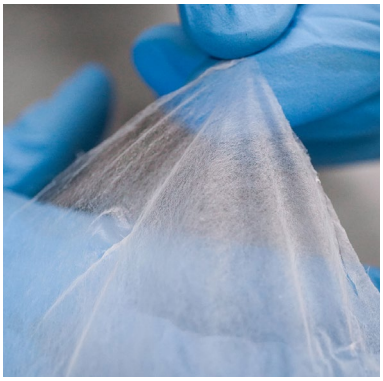


BREAKING BARRIERS, BUILDING FUTURES:

Dr. HIMANSHU PATHAK

THE FIRST INDIAN TO LEAD ICRISAT

In a defining moment for Indian agricultural science, **Dr. Himanshu Pathak has been appointed as the Director General of the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT)**—marking the first time an Indian has taken the helm of this globally significant research body. His appointment not only highlights his individual brilliance but also places India firmly at the center of global agricultural innovation.

A JOURNEY ROOTED IN THE SOIL

Dr. Pathak's journey is a testament to the transformative power of education, dedication, and vision. Hailing from a background deeply connected with Indian agriculture, he began his academic pursuit at Banaras Hindu University, completing his in 1986. He earned his and PhD in Soil Science and Agricultural Chemistry from the prestigious Indian Agricultural Research Institute (IARI) in 1988 and 1992, respectively.

Over the past three decades, he has held numerous key positions, including:

- Director, ICAR-National Rice Research Institute, Cuttack
- Director, ICAR-National Institute of Abiotic Stress Management, Baramati
- Secretary, DARE and Director General, ICAR, one of the world's largest agri-research systems

His global exposure includes research assignments in Germany, the UK, Ethiopia, Australia, and the Philippines, along with the prestigious Humboldt Fellowship.

ICRISAT: AT THE HEART OF DRYLAND INNOVATION

Headquartered in Hyderabad, ICRISAT is the only CGIAR institute based in India and a leader in dryland agricultural research. Since its founding in 1972, ICRISAT has focused on crops vital to smallholder farmers in semi-arid regions, such as millets, groundnut, chickpea, and pigeonpea. The institute has played a crucial role in advancing:

- The world's first hybrid pigeonpea
- Biofortified pearl millet in Africa
- Solutions for soil health, climate resilience, and sustainable water use

Now under Dr. Pathak's leadership, ICRISAT aims to expand its reach and impact across Asia and sub-Saharan Africa.

A VISION FOR RESILIENCE AND SUSTAINABILITY

Dr. Pathak's career reflects a strong commitment to climate-resilient agriculture, soil management, and sustainable systems. He has led over 50 research projects, authored 200+ scientific papers, and has actively aligned agricultural research with global sustainable development goals (SDGs).

His roadmap for ICRISAT is rooted in innovation, collaboration, and inclusivity:

- Develop drought- and heat-tolerant crop varieties
- Integrate AI and data science into precision agriculture
- Enhance international partnerships and south-south cooperation
- Strengthen market access and livelihoods of smallholder farmers

ACCOLADES AND LEADERSHIP

Throughout his illustrious career, Dr. Pathak has earned numerous awards:

International Awards and Recognitions

1. Alexander von Humboldt Fellowship, Germany – 2004
2. BOYSCAST Fellowship, Department of Science & Technology, Govt. of India – 1996
3. Outstanding Administrative Support Award, International Rice Research Institute (IRRI), Philippines – 2007

National Awards and Recognitions

1. Rafi Ahmed Kidwai Award, Indian Council of Agricultural Research – 2019
2. Dr. N.S. Randhawa Memorial Award, National Academy of Agricultural Sciences (NAAS) – 2021
3. Dr. R.V. Tamhane Memorial Lecture Award, Indian Society of Soil Science – 2021
4. Platinum Jubilee Lecture Award, Indian Science Congress Association (ISCA) – 2018
5. Krushi Gourav Award, Orissa Krushak Samaj – 2017

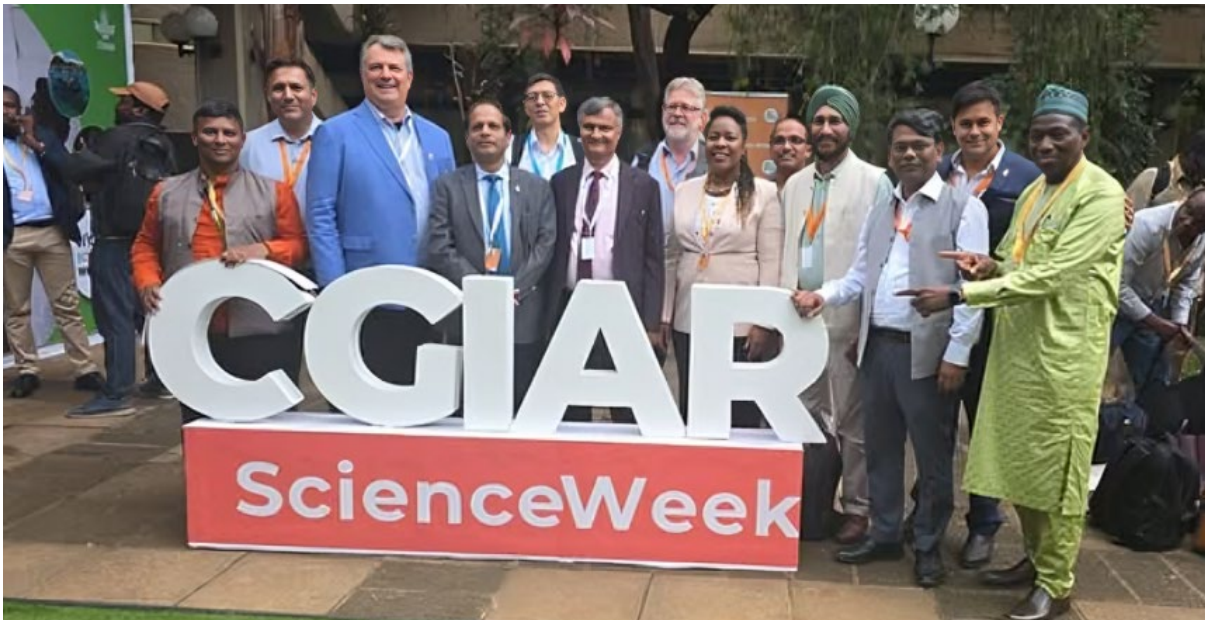
6. Silver Jubilee Commemoration Medal, Indian National Science Academy (INSA) – 2016
7. Society of Agricultural Professional Excellence Award – 2016
8. Prof. S.K. Mukherjee Commemoration Award, ISCA – 2012
9. Recognition Award, NAAS, India – 2011
10. Dr. B.C. Deb Memorial Award, Indian Science Congress Association – 2001

A HISTORIC MOMENT FOR INDIA

Dr. Pathak is the first Indian and only the second individual of Indian origin—after Dr. M.S. Swaminathan at IRRI—to lead a CGIAR institute. His appointment is a proud milestone for Indian agriculture, science diplomacy, and leadership on the global stage.

Prof. Pingali, Chair of ICRISAT's Governing Board, remarked:

"Dr. Pathak's strategic vision and proven leadership will help ICRISAT set new benchmarks in agricultural innovation and global food security. We look forward to working closely with him."



CONCLUSION: LEADING THE WAY FORWARD

In the face of rising climate challenges, food insecurity, and sustainability concerns, Dr. Himanshu Pathak's leadership at ICRISAT arrives at a critical juncture. His scientific acumen, global perspective, and deep understanding of India's agricultural landscape are poised to redefine dryland agriculture.

As he steps into this historic role, the world watches with anticipation and hope—confident that under his stewardship, ICRISAT will empower millions of farmers and shape a more food-secure future for generations to come.

Editor's Note: Dr. Pathak's vision embodies the spirit of "Atmanirbhar Krishi" (self-reliant agriculture) on a global scale—blending Indian values with world-class research and innovation.

INDIA LAUNCHES WORLD'S FIRST GENOME-EDITED RICE VARIETIES:

A BREAKTHROUGH FOR SUSTAINABLE AGRICULTURE

In a landmark achievement that places India at the forefront of agricultural innovation, Union Agriculture and Farmers Welfare Minister Shri. Shivraj Singh Chouhan announced the release of the world's first genome-edited rice varieties—DRR Dhan 100 (Kamala) and Pusa DST Rice 1. Developed by the Indian Council of Agricultural Research (ICAR), these climate-resilient and high-yielding varieties mark a significant leap toward sustainable food security and the second Green Revolution.

A GLOBAL FIRST IN GENOME-EDITING FOR RICE

India becomes the first country globally to successfully develop and release genome-edited rice varieties using CRISPR-Cas technology. Unlike traditional GMOs, this method edits native genes without introducing foreign DNA, ensuring enhanced traits such as higher yield, climate adaptability, reduced greenhouse gas emissions, and significant water savings.

"Under the leadership of Prime Minister Narendra Modi, India's vision of becoming a developed and self-reliant agricultural powerhouse is turning into reality," said Shri Chouhan during the launch at the Bharat Ratna C. Subramaniam Auditorium in New Delhi. "This breakthrough reflects a golden chapter in our research history and a major opportunity for Indian farmers."

THE SCIENTISTS BEHIND THE INNOVATION

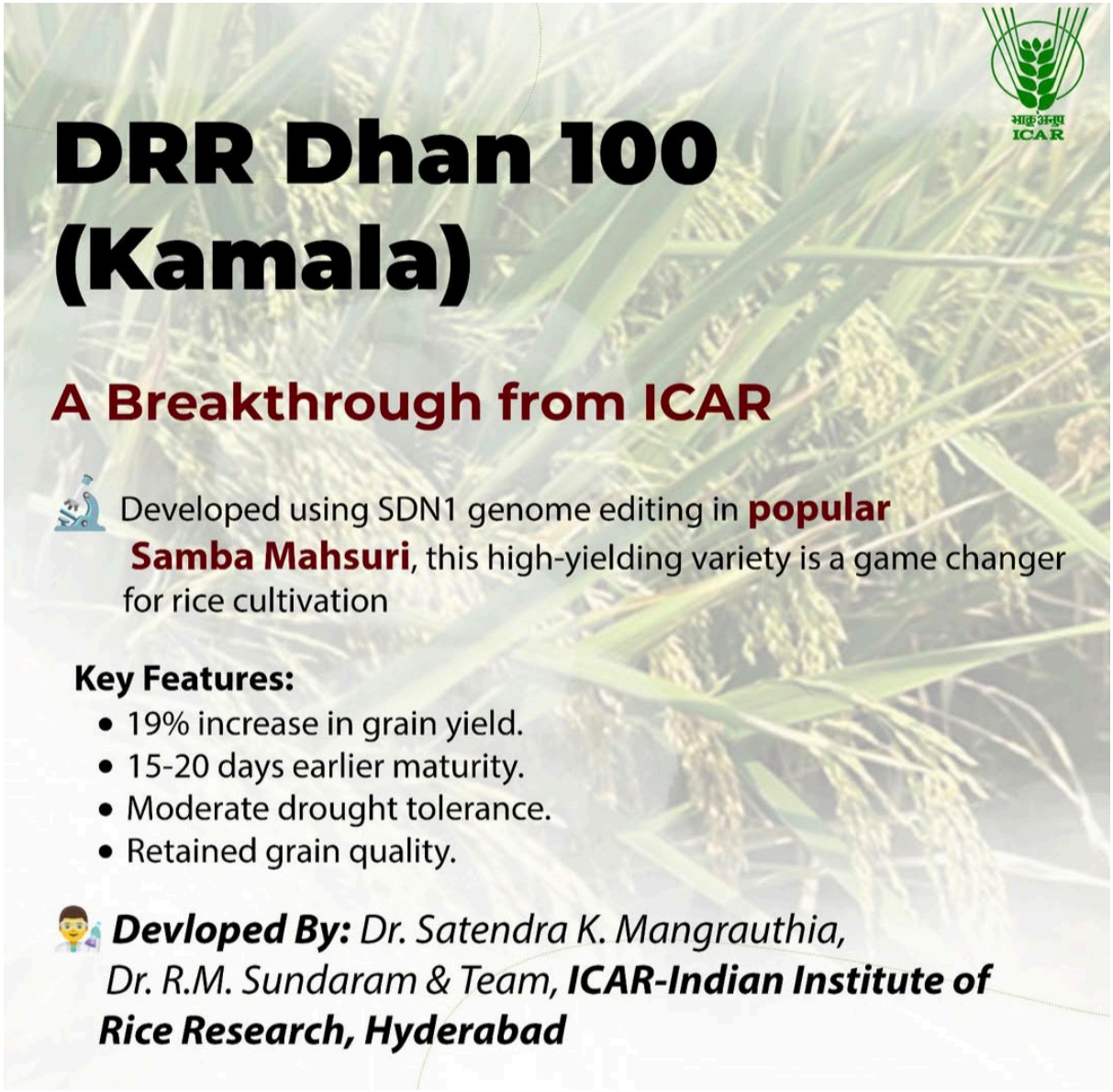
Two separate teams led the development of the new rice lines:

- DRR Dhan 100 (Kamala) was developed by ICAR-Indian Institute of Rice Research (IIRR), Hyderabad, based on the popular Samba Mahsuri (BPT 5204) variety. Contributing scientists include Dr. Satyendra Kumar Mangruthia, Dr. R.M. Sundaram, Dr. R. Abdul Fiyaz, Dr. C.N. Neerja, and Dr. S.V. Sai Prasad.
- Pusa DST Rice 1, based on MTU 1010, was developed by ICAR-Indian Agricultural Research Institute (IARI), New Delhi. The team includes Dr. Vishwanathan C, Dr. Gopal Krishnan S, Dr. Santosh Kumar, Dr. Shivani Nagar, Dr. Archana Vats, Dr. Soham Ray, Dr. Ashok Kumar Singh, and Dr. Pranjal Yadav.
- The Minister also acknowledged the leadership of Dr. M.L. Jat, Secretary (DARE) and Director General (ICAR), Dr. Devendra Kumar Yadava, DDG (Crop Science), and Dr. C.H. Srinivas Rao, Director, ICAR-IARI.

KEY BENEFITS OF THE GENOME-EDITED VARIETIES

The new rice lines offer transformative benefits:

- Yield Increase: Up to 19% increase in yields, particularly under stress conditions.
- Water Conservation: Savings of 7,500 million cubic meters of irrigation water due to shorter maturity (around 130 days).
- Environmental Impact: 20% reduction in greenhouse gas emissions, especially methane.
- Stress Tolerance: Enhanced resistance to drought, salinity, and other climate stresses.
- Quality Retention: Maintains the grain quality of the original parent varieties.



NATIONAL AND REGIONAL IMPACT

These varieties are recommended for cultivation across key rice-growing regions, including Andhra Pradesh, Telangana, Tamil Nadu, Karnataka, Kerala, Odisha, Chhattisgarh, Maharashtra, Madhya Pradesh, Uttar Pradesh, Bihar, Jharkhand, and West Bengal.

By cultivating the new rice lines on five million hectares, India can expect an additional 4.5 million tons of paddy annually—helping to meet domestic demand and reinforce its role as a major rice exporter. The varieties are expected to be available to farmers within two years, pending IPR finalization and seed multiplication.

TOWARDS A SUSTAINABLE FUTURE

Minister Chouhan also introduced the "Minus 5 and Plus 10" strategy: reduce rice cultivation by 5 million hectares while increasing production by 10 million tons in the same area—freeing land for pulses and oilseeds.

"This innovation isn't just about rice—it's about India's journey to becoming the food basket of the world while preserving our natural resources," said Chouhan. He also emphasized the importance of involving young farmers and scientists in adopting advanced techniques.

ICAR's 2018 initiative under the National Agricultural Science Fund laid the foundation for this milestone. With ₹500 crore allocated in the 2023–24 Union Budget for genome editing, similar innovations are now underway in oilseeds and pulses, signaling a broader transformation of Indian agriculture.

CONCLUSION

India's pioneering work in genome-edited rice is not only a scientific milestone but also a strategic stride toward food security, climate resilience, and sustainable farming. As the world grapples with increasing food demands and climate unpredictability, India's innovation sets a precedent for global agricultural transformation.

ROLE OF BENEFICIAL INSECTS IN AGRICULTURE

Dr. Meenakshi Devi[1], Dr. Surendra Singh Shekhawat[2] and Ishika[3]

[1,2]Assistant Professor, Faculty of Agricultural Sciences, SGT University, Gurugram

[3]Student, Faculty of Agricultural Sciences, SGT University, Gurugram

There are many insects found on agricultural land that are not a threat to crop production but beneficial to the farmers in different aspects, such as natural enemies, pollinators, productive insects, scavengers, weed killers, and soil builders. In the present scenario, the motive of the farmers is single-sided, to gain only maximum profit, ignoring the impact on the beneficial insects, environment, and human health. Insecticides can be an important crop production tool to maximize yield, but heavy and indiscriminate use of chemicals also exposes farmers to serious health risks, resulting in negative consequences for the insects that are beneficial to the farmers.

HOW ARE INSECTS CONSIDERED BENEFICIAL?

- Beneficial insects are the insects that play significant roles in reducing and controlling populations of both plants and insect pests by acting as both predators and parasites to these detrimental organisms.
- They pollinate plants, contribute to the decay of organic matter and the cycling of soil nutrients, and attack other insects and mites considered pests, completely preventing or greatly limiting pest problems.

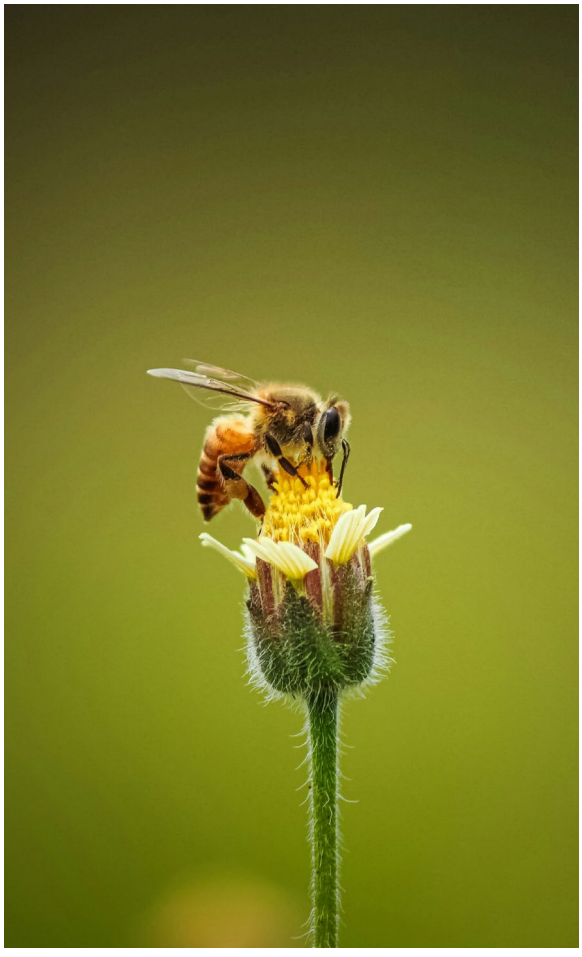
IMPORTANCE OF INSECTS:

1. Use as Commercial Products

Honey and Beeswax - Honey is used extensively as a food and in the manufacture of many products. The industry uses beeswax extensively in making candles, sealing wax, polishes, certain types of ink, models or various kinds, dental impressions, cosmetics, and other products.

Silk- Silk, spun by larvae of the silkworm moth, was the "ultrasheer" fabric, used primarily for hose and a wide array of garment materials.

Shellac -Shellac is produced from the secretions of the lac insect, a type of scale insect occurring on fig and banyan.



2. Use as a Pollination

Insects such as bees, butterflies, and beetles are integral in pollinating flowering plants and enhancing fruit and seed production. Insect-mediated pollination is an essential step in reproduction for most of the world's flowering plants, including numerous cultivated plant species. Approximately 75% of the world's flowering plants and about 35% of global food crops depend on animal pollination, making this group indispensable to agriculture. It has been estimated that roughly one-third of the World's agricultural production relies directly or indirectly on insect pollination.

3. As Entomophagous insects

Entomophagous insects feed upon other insects, destroying our crops and stored grains. They constitute the greatest single factor in preventing phytophagous insects from gaining overwhelming predominance over other animals. Entomophagous insects can be divided into two groups: predators and parasitoids.

Predators: Many insects feed on pest species that threaten crops. Ladybugs, lacewings, and spiders are natural predators controlling populations of aphids, caterpillars, and other harmful insects.

Parasitoids: A parasitoid is an organism usually much smaller than its host and a single individual that may or may not kill the host. The majority of the parasitoids utilized in the biological control of insect pests belong to two orders, namely Hymenoptera

(Ichneumonidae,Braconidae, Eulophidae, Trichogrammatidae) and Diptera (Tachinidae).

Weed killers Insects can indeed play a significant role in weed management through a method known as biological weed control. Here are some examples of insects used as weed killers:

Cactus Moth: Targets prickly pear cactus

Lantana Fly and Lace Bug: Control common lantana

Chrysomelid Beetle: Manages Congress grass

Water Hyacinth Beetles: Manage water hyacinth

Flea Beetles: Target alligator weed

Beetles: Control water ferns

4. Soil builders

Some beneficial insects, including certain beetles and ants, help aerate the soil, improving water infiltration and root growth. Soil is enriched by the addition of insect saliva and decomposition of exuviae and dead bodies of the insects.

5. Scavangers

Many insects feed on dead and decaying animal and plant matter and thus accelerate the return of elements from the earth's surface to the dead and decaying bodies, which would otherwise be a health hazard; they are referred to as scavengers. There are two groups of insects (coleopteran and Diptera) that perform the major duties of scavengers. In addition, termites (Isoptera) feed upon dead wood, and ants live upon dead animals and decaying vegetable matter.

6. Insects as food

Human ancestors were used to get nutrition from Insects. Even today, insects are used as food by people in many

countries. High in protein and low in fat, dried grasshoppers are sold in village markets in Mexico. Insects are mixed with flour to make tortillas and can be fried or ground into meals. Wood-boring beetle larvae can be boiled or roasted over a fire. E.g., Ants, bees, termites, water grubs, caterpillars, flies, crickets, katydids, beetle larvae, and nymphs of dragonflies are among them. In Thailand, the pupa of silkworms are used as food for human beings.

7. Educational and Scientific value

Because of their simple food and other requirements, short duration time, and high fecundity, many insects can be reared cheaply and easily under laboratory conditions. Studies on insects have given us much basic animal and cell physiology knowledge, such as fruit flies (Drosophila melanogaster – in advanced genetic research).

8. Medicinal value

Several insects and their products have found their use in medicine. The bee venom of honey bees has remedial value in treating arthritis and rheumatism. A specific medicine (Homeopathic), "Apis' is extracted from the honey bees by digesting the excited bees in alcohol and is used against certain diseases like urinary irritations, diphtheria, etc.

9. Cantharidin

Cantharidin is a substance found in the blister beetle, *Lytta vesicatoria,* and is useful internally in treating certain urinary diseases and externally as a vesicant and counter-irritant. It is also probably the world's best-known and

most widely abused aphrodisiac.
Caterpillar fungus, prepared from caterpillars of Cordyceps sinensis, is used as a tonic by Chinese athletes to strengthen and rejuvenate the body, relieve stress, protect the lungs, and strengthen the immune system.

10. Maggot therapy,

Maggot therapy, i.e., using maggots of certain flies to clean wounds and promote healing, has been used for centuries in some societies. Allantoin is a substance isolated from the secretions of fly maggots that can heal deep wounds.

11. Source of dyes:

The dead and dried bodies of certain insects and the galls produced by certain insects are a source of natural dyes. The beautiful carmine red dye "Cochineal" is obtained from the dried and powdered bodies of cactus scale insects ((also called the cochineal insects), Dactylopius coccus and tomentous, which thrive on Opuntia spp.

12. Aesthetic value

Insects have catered to the aesthetic needs of man for a long time. Some insects are extremely beautiful and rivel flowers and birds in this respect. Their shapes, wing color, and patterns have been models for artists, florists, textile designers, and interior decorators. Because of their beauty, certain groups, especially butterflies, moths, and beetles, are sometimes collected as a hobby. Some insects are embedded in clear materials from which jewelry, placemats, paper weights, etc., are made.

HOW BENEFICIAL INSECTS ARE BOON ?

1. **Pest Control:** Utilizing beneficial insects for biological pest control can greatly reduce the reliance on chemical sprays. This not only lowers the cost of pest management for farmers but also mitigates the risks associated with pesticide exposure for humans and non-target organisms.
2. **Increased Crop Yields:** Pollination services provided by beneficial insects can lead to higher yields. For instance, crops such as almonds, blueberries, and tomatoes show significant yield increases with proper pollinator activity.
3. **Sustainable Practices:** Incorporating beneficial insects aligns with sustainable agriculture practices, which focus on ecological balance, conservation of biodiversity, and soil health. Farmers can create a more resilient agricultural system by fostering a habitat for these insects.
4. **Environmental Health:** Reducing pesticide use benefits biodiversity and reduces the risk of chemical runoff into local waterways, thereby protecting aquatic ecosystems and improving water quality.
5. **Cost-Effectiveness:** Investing in beneficial insects can lead to long-term savings. Biological control can provide a lasting solution to pest problems, reducing the need for costly pesticide programs and their associated application costs.

CONCLUSION

The intricate relationship between agriculture and beneficial insects underscores the importance of fostering these invaluable allies. As the agricultural community pivots towards sustainable practices, harnessing the power of beneficial insects offers an effective means of pest control, improved crop yields, and enhanced environmental health. By recognizing the significance of these small creatures, farmers can take substantial steps toward building a sustainable and resilient agricultural future, ultimately benefiting not just their crops, but the broader ecosystem.

HYDROSEEDING:
A Revolutionary Approach to Sustainable Agriculture

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INTRODUCTION

Hydroseeding, also known as hydraulic mulch seeding or hydro-mulching, is an innovative method of planting that is gaining traction in the agricultural sector. Traditionally used for erosion control and landscape rehabilitation, hydroseeding is now being explored for large-scale agricultural applications. This method offers numerous advantages, including cost-effectiveness, rapid germination, and enhanced soil stabilization. This article delves into the principles of hydroseeding, its benefits, applications in agriculture, and challenges it presents.

UNDERSTANDING HYDROSEEDING

Hydroseeding involves spraying a slurry mixture of seeds, mulch, water, fertilizers, and other additives onto prepared soil. The slurry is typically applied using specialized hydroseeding equipment, which ensures an even distribution of seeds and soil amendments. The mulch component of the mixture retains moisture, promotes seed germination, and protects against erosion.

The composition of a hydroseeding slurry varies depending on the target crop and environmental conditions. Key components include:

Seeds:

The selection of seeds depends on various factors such as climate, soil type, intended crop, and resistance to pests and diseases. Seeds used in hydroseeding include grasses (such as fescue, ryegrass, and bluegrass), legumes (like clover and alfalfa), and cover crops (such as mustard, radish, and oats). Some row crops, including wheat and barley, are being explored for hydroseeding applications. Additionally, custom seed blends can be developed to suit specific soil conditions and agricultural needs.

Mulch:

The mulch used in hydroseeding serves multiple purposes, such as moisture retention, erosion control, and temperature regulation. It is available in various forms, including:

- **Wood Fiber Mulch:** Made from shredded wood fibers, this mulch is highly absorbent and retains water effectively, promoting seed germination.
- **Paper Mulch:** Derived from recycled paper products, this mulch is cost-effective and biodegradable, though it may decompose faster than wood mulch.
- **Straw Mulch:** Commonly used in agricultural settings, straw mulch provides a protective layer that minimizes soil disturbance and retains moisture.

- **Bonded Fiber Matrix (BFM):** A high-performance mulch that combines fibers and binders to create a strong, erosion-resistant layer.
- **Synthetic Mulches:** These are used for specialized applications and may include biodegradable or polymer-based materials to enhance moisture retention and stability.

Fertilizers:

Fertilizers in hydroseeding provide essential nutrients that support early plant growth and development. The most commonly used fertilizers include:

- **Nitrogen-based fertilizers:** Promote leafy growth and overall plant vigor.
- **Phosphorus-based fertilizers:** Encourage strong root development, crucial for establishing a stable plant structure.
- **Potassium-based fertilizers:** Improve disease resistance and stress tolerance.
- **Organic fertilizers:** Derived from compost, manure, or bio-based products, they enhance soil fertility and microbial activity.
- **Slow-release fertilizers:** These ensure a steady nutrient supply over an extended period, reducing the need for frequent applications.

Tackifiers: Tackifiers are binding agents that help the hydroseeding slurry adhere to the soil surface, reducing erosion and runoff. Common types of tackifiers include:

- **Guar gum:** A natural, biodegradable tackifier derived from guar beans, commonly used for its strong adhesive properties.
- **Plant-based tackifiers:** Made from natural sources such as starches and resins, these are environmentally friendly options.
- **Polymer-based tackifiers:** Synthetic binders that provide superior adhesion and longevity, suitable for extreme weather conditions.
- **Hydrophilic tackifiers:** These binders absorb and retain moisture, improving seed germination and soil stability.

Water-Retaining Polymers: Water-retaining polymers play a crucial role in improving moisture retention, especially in arid regions. These polymers absorb water and slowly release it to the seeds, reducing the need for frequent irrigation. Common types include:

- **Superabsorbent polymers (SAPs):** These synthetic polymers can hold large amounts of water relative to their weight, providing extended hydration to seeds and soil.
- **Natural hydrogel polymers:** Made from plant-derived materials, these polymers offer an eco-friendly alternative while enhancing soil water-holding capacity.
- **Cross-linked polyacrylamides:** These water-storing agents provide long-term moisture retention and prevent rapid drying of the soil.
- **Biodegradable moisture retention agents:** Developed from organic materials, these break down over time, enriching the soil while conserving water.

BENEFITS OF HYDROSEEDING IN AGRICULTURE

- **Faster Germination:** The combination of moisture-rich mulch and fertilizers accelerates seed germination compared to conventional dry seeding methods. The moisture-retaining properties of hydroseeding allow seeds to remain hydrated and absorb nutrients more efficiently, leading to quicker root establishment and robust early growth.
- **Erosion Control:** Hydroseeding effectively stabilizes soil by binding the mulch and tackifiers to the ground, reducing runoff and preventing the loss of topsoil in sloped and erosion-prone areas. This helps maintain soil fertility and protects against wind and water erosion, especially in fragile landscapes.
- **Uniform Coverage:** The spraying mechanism ensures an even distribution of seeds, leading to more consistent crop stands and higher yields. Unlike traditional broadcast seeding, which can result in patchy growth, hydroseeding minimizes gaps and optimizes land use efficiency.
- **Cost-Effectiveness:** Hydroseeding requires less labor and time than traditional planting methods, making it a viable option for large-scale applications. By reducing the need for extensive soil preparation and manual planting, farmers can achieve significant cost savings on labor and equipment.
- **Improved Soil Health:** The organic mulch and added nutrients contribute to soil enrichment, promoting

sustainable farming practices. Over time, hydroseeding enhances soil microbial activity, increases organic matter, and improves soil structure, making it more resilient to environmental stressors.

- **Drought Resistance:** The moisture retention properties of mulch reduce the dependency on irrigation, making hydroseeding suitable for arid and semi-arid regions. The hydroseeding slurry creates a microenvironment that retains moisture around seeds, reducing water evaporation and ensuring prolonged hydration during germination and early growth.

APPLICATIONS OF HYDROSEEDING IN AGRICULTURE

- **Pasture Establishment:** Farmers can use hydroseeding to establish pastures more efficiently, ensuring even grass coverage for grazing livestock. This method allows for rapid and uniform growth, reducing the time needed for pasture development while providing high-quality forage.
- **Cover Crops:** Hydroseeding facilitates the planting of cover crops, which enhance soil fertility, suppress weeds, and prevent erosion. This technique ensures even distribution of seeds and optimal germination, leading to effective ground cover that protects soil during fallow periods.

- **Revegetation of Degraded Land:** Hydroseeding is widely used for land rehabilitation, including restoring vegetation on abandoned farmlands, mine reclamation sites, and areas affected by desertification. The combination of mulch, nutrients, and moisture retention enhances the regrowth of native plant species.
- **Row Crops and Cash Crops:** Although traditionally used for grasses, research is exploring hydroseeding's viability for row crops such as wheat, barley, and vegetables. This method may reduce seed loss, improve plant spacing, and increase overall crop yields.
- **Organic Farming:** Hydroseeding aligns with sustainable agricultural practices by using organic mulch and natural fertilizers. This approach enhances soil health, reduces chemical inputs, and supports eco-friendly farming techniques.

CHALLENGES AND LIMITATIONS

Despite its advantages, hydroseeding has certain limitations:

1. **Initial Equipment Costs:** The specialized machinery required for hydroseeding can be expensive, though the long-term benefits often outweigh the investment.
2. **Seed Selection Limitations:** Not all seeds are suitable for hydroseeding, particularly large-seeded crops or those requiring deep soil placement.
3. **Climate Constraints:** Extreme weather conditions, such as heavy rainfall or prolonged droughts, can affect the success rate of hydroseeding.
4. **Soil Preparation Requirements:** While hydroseeding simplifies sowing, proper soil preparation is still necessary for optimal results.
5. **Limited Research for Certain Crops:** Hydroseeding has been widely studied for grasses and cover crops, but its effectiveness for row crops requires further exploration.

FUTURE PROSPECTS OF HYDROSEEDING IN AGRICULTURE

As technology advances, hydroseeding is expected to become a more integral part of sustainable agriculture. Innovations in bioengineered mulch, seed coatings, and precision hydroseeding equipment will enhance its efficiency and expand its applications. The integration of drone technology for remote hydroseeding is another promising development, particularly for large-scale farming and reforestation projects.

Furthermore, with the increasing focus on climate-resilient agriculture, hydroseeding can play a vital role in soil conservation, water-efficient farming, and sustainable land management. The integration of smart farming technologies such as IoT sensors, AI-driven analytics, and automated irrigation systems can further optimize hydroseeding applications, ensuring efficient resource utilization, improved crop performance, and real-time monitoring of soil conditions.

CONCLUSION

Hydroseeding is an innovative and efficient method of planting that holds great potential for agriculture. With its benefits in erosion control, uniform seed distribution, and enhanced germination rates, it offers a sustainable alternative to traditional planting methods. While challenges remain, ongoing research and technological advancements will further refine hydroseeding, making it a valuable tool for modern agriculture. Farmers and agricultural stakeholders should consider incorporating hydroseeding into their practices to improve productivity, sustainability, and soil health.

INDUSTRIAL HEMP CULTIVATION IN UTTARAKHAND: INDIA'S GREEN GOLD RUSH

Vivek Kumar[1], Raj Kumar[2], Raees Ansari[1] and Mohit Kumar Pandey[1]

[1]Centre for Aromatic Plants, Selaqui Dehradun, Uttarakhand

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Industrial hemp cultivation is rapidly gaining traction in India, and Uttarakhand stands at the forefront of this green revolution. As the first Indian state to legalize commercial hemp farming, Uttarakhand has laid the foundation for what could become a multi-billion-rupee industry. With the global industrial hemp market projected to reach USD 25.17 billion by 2030, and India's growing demand for sustainable raw materials, Uttarakhand has a strategic opportunity to become a key player in this space. The state's supportive policies, rich agro-climatic diversity, and increasing awareness among farmers have turned hemp into a game-changing crop.

FAVOURABLE AGRO-CLIMATIC CONDITIONS

Uttarakhand's geography offers ideal conditions for cultivating industrial hemp. The crop flourishes in both temperate and subtropical climates, typically found in the state's mid to high-altitude zones.

- Altitude suitability: 800 to 2,500 meters above sea level
- Optimal rainfall: 500 mm to 700 mm annually
- Soil requirements: Well-drained loamy soil with pH between 6.0 and 7.5
- Temperature tolerance: Grows best in 15°C to 27°C

The Himalayan foothills act as a natural cradle for hemp growth, having supported wild hemp for centuries. These conditions not only ensure high yield but also improve the fiber quality and cannabinoid profile of the crop. On average, one acre of hemp can yield up to 2 to 3 tons of dry stalk and 300 to 500 kilograms of seeds, depending on the variety and cultivation practices.

GOVERNMENT SUPPORT AND LEGAL FRAMEWORK

Uttarakhand made history in 2018 by becoming the first state in India to legalize the cultivation of industrial hemp for commercial use. The Uttarakhand Hemp Policy allows licensed farmers and companies to grow hemp varieties with THC content below 0.3%, aligning with international standards.

Key initiatives include:

- Formation of a Hemp Cultivation Licensing Authority under the Excise Department
- Partnerships with research institutions like CSIR-IHBT and local universities
- Encouragement for startups to enter the hemp sector through subsidies and incubation programs
- Provision of financial grants and soft loans for hemp processing units and cooperatives

In addition, the government is promoting cluster-based cultivation to optimize land use and streamline post-harvest processes.

ECONOMIC AND ENVIRONMENTAL ENEFITS

Hemp is not just a crop—it's a multifunctional economic engine. It can be used in over 25,000 products, ranging from bio-composites and construction materials to textiles and nutritional supplements.

Economic Advantages:

- **Net returns per acre:** ₹1.5 lakh to ₹3 lakh, depending on market and product use
- **Employment generation:** Each 100 acres of hemp cultivation can create at least 80–100 rural jobs
- **Export potential:** India's hemp industry has the potential to generate over ₹500 crore annually from exports in the coming years

Environmental Advantages:

- **Low water footprint:** Requires nearly half the water compared to cotton
- **Carbon sequestration:** One hectare of hemp can absorb up to 15 tons of CO_2 annually
- **Soil remediation:** Through phytoremediation, hemp helps cleanse soil of heavy metals and toxins
- **Minimal pesticide use:** Hemp's natural resistance to pests reduces chemical dependence

CHALLENGES AND ROAD AHEAD

While the potential is immense, several obstacles hinder large-scale adoption:

Key Challenges:

- Limited processing infrastructure for decortication, fiber extraction, and cannabinoid separation
- Regulatory bottlenecks and unclear central policies regarding CBD and THC extraction
- Lack of awareness among farmers and hesitancy due to stigma around cannabis
- Inadequate market linkages and pricing uncertainties

Recommendations for Growth:

- Establish dedicated industrial hemp parks with shared processing units
- Simplify licensing procedures and clarify CBD use guidelines
- Provide training programs for farmers and agripreneurs on hemp agronomy
- Encourage public-private partnerships (PPP) for R&D and export-focused production
- Create farmer cooperatives and link them with value chains, both domestic and international

CONCLUSION

Uttarakhand has already taken bold steps in unlocking the immense value of industrial hemp. Its fertile land, proactive policies, and entrepreneurial spirit provide a strong foundation for a sustainable, high-growth industry. If supported by the right ecosystem—ranging from seed-to-shelf supply chains to global exports—the state can become a national leader and global exporter of hemp-based products. Embracing this opportunity can lead to rural revitalization, sustainable agriculture, and economic diversification, making Uttarakhand not just a pioneer, but a powerhouse in India's green economy.

BLACK WHEAT:
A Nutrient Powerhouse for Better Health and Wellness

Sourajit Ghosh[1], Ashok S. Dambale[1], Nilabja Banerjee[1] & Makey Sri Chakra Naga Vardhan[1]

[1]Department of Agronomy, School of Agriculture,
Lovely Professional University, Phagwara, Punjab

INTRODUCTION:

One of the most significant cereal crops, wheat (*Triticum aestivum*), is grown widely across the world. . Wheat makes up 50% and 30%, respectively, of the world's grain commerce and production. More than 40 nations throughout the world also consider wheat as a fundamental food grain. More than one-third of the world's population relies on wheat as their main sustenance because of its versatility and high nutritional content. 20% of the food's calories and roughly 55% of its carbohydrate content come from wheat. It contains carbohydrates (78.10%), protein (14.70%), fat (2.10%), minerals (2.10%), considerable proportions of vitamins (thiamine and vitamin B), and minerals (zinc, and iron). Black wheat is supposed to have highest anthocyanin content among all colored lines, has around 60% more iron concentration and more nutritious than common wheat varieties. Anthocyanins are naturally occurring water soluble pigment which imparts red, orange, black, blue and purple color to the majority of dark fruits and vegetables depending upon the different concentration of anthocyanin. Anthocyanins are antioxidants which “neutralize” ROS, means it removes free radicals from the body before they are able to react with the cellular components and alter their function or structure. Higher anthocyanin content and thus antioxidant

content in aleurone layer might be associated with their better development and micronutrient accumulation. Black color in wheat has developed from the combination of purple color (associated with mutation in the pericarp) and blue color (a result of wide introgression) but yields lesser due to linkage drag. Whole meal prepared from black wheat has (17.71%) protein content and richer in anthocyanin content followed by blue and purple colored wheat is quite uncommon. It has been estimated that on an average, 100 g of black wheat provides 71 g carbohydrates, 13 g protein, 10 g fiber and 3.40 g fat. There are several crops with high nutraceutical value which are being commercially utilized across the world which includes maize with high anthocyanin content (Petroni et al., 2014), black rice, quality protein maize (QPM) rich in tryptophan and lysine content, potato, sweet potato and purple carrots.

NUTRITIONAL PROFILE:

Rich in nutrient

Black wheat (BW) possess higher protein content, dietary fiber, calcium, Vitamin K, total flavonoid (TFC) and phenolic content (TPC), and antioxidant activity than the conventional yellow wheat. The TPC of BW is six times higher than yellow wheat with most abundant phenolic acid being ferulic acid. Around 225 metabolites mainly belonging to flavonoids group differs between black and yellow wheat and are responsible for their colour difference. On an average, black wheat bread contains 313 cal energy, 53 g carbohydrate, 6 g of fat and 9 g of protein per 100 gm of serving. Black wheat chapatti is a better option for people who are allergic to wheat, suffering from digestive disorders because wheat protein 'gluten' triggers inflammation affecting soft tissue and organs of a body.

Fiber content

Black wheat contains higher fiber content compared to regular wheat. On average, black wheat has about 12-15% dietary fiber, while normal wheat contains around 8-10% fiber.

- This high fiber content helps with:
- Better digestion and gut health
- Regulating blood sugar levels
- Lowering cholesterol
- Weight management

Gluten levels

Black wheat contains less gluten compared to regular wheat. However, it's important to note that while black wheat has reduced gluten levels, it is not entirely gluten-free. Therefore, individuals with celiac disease or severe gluten intolerance should exercise caution and consult with a healthcare professional before incorporating black wheat into their diet.

HEALTH BENEFITS:

Antioxidants (anthocyanins)

Black wheat is a variety of wheat rich in anthocyanins, natural pigments responsible for its distinctive black or purple color. Anthocyanins are potent antioxidants associated with various health benefits, including reduced risks of heart disease, diabetes, and certain cancers. In black wheat, anthocyanin concentrations range from 100 to 200 ppm, significantly higher than the 5-ppm found in common wheat varieties. The anthocyanin content in black wheat can vary based on genetic and environmental factors. Studies have reported concentrations ranging from 95 to 277 μg/g in black wheat, compared to 22 to 278 μg/g in purple wheat and 72 to 211 μg/g in blue wheat. These elevated anthocyanin levels in black wheat contribute to its antioxidant properties, supporting immune function and potentially offering protective effects against various health conditions.

Cancer fighting properties

- Black wheat is rich in anthocyanins, natural pigments with potent antioxidant properties, which have been linked to cancer prevention. These compounds help neutralize free radicals, potentially reducing the risk of cancer development.
- Incorporating whole grains like black wheat into your diet may offer protective benefits against certain cancers, such as colorectal cancer.
- Additionally, black wheat's high fiber content supports digestive health, which is crucial in reducing the risk of colon cancer.

Blood sugar regulation

In a randomized controlled trial involving patients with T2DM, the intake of black-grained wheat (BGW) was assessed for its impact on glycemic control and inflammatory profiles. The study concluded that BGW consumption improved glycemic control and positively influenced inflammatory profiles in these patients.

Due to its high anthocyanin content, may offer benefits in managing blood sugar levels and improving insulin sensitivity. However, further research, especially large-scale human trials, is necessary to fully understand its efficacy and potential applications in diabetes management.

CULINARY USES:

Versatility in cooking

Black wheat can be used in various recipes, just like regular wheat but with added health benefits. Some common ways to use it include:

- Black Wheat Dalia (Cracked Wheat Porridge)-A nutritious breakfast option.
- Black Wheat Pasta & Noodles-A healthy alternative to refined pasta.
- Black Wheat Chapati/Roti-More fiber-rich than regular wheat rotis.
- Black Wheat Halwa & Desserts -Used in sweets like halwa and laddoos.

Black wheat flour

Black wheat flour is derived from black wheat, a biofortified variety rich in anthocyanins-natural antioxidants responsible for its distinctive color. Compared to regular wheat, black wheat contains higher levels of iron, zinc, protein, and dietary fiber, making it a nutritious alternative. Introduce black wheat flour as an alternative to regular flour and its potential use in gluten-containing recipes for more nutritious and flavourful options.

SUSTAINABILITY AND ENVIRONMENTAL IMPACT:

Sustainable agriculture

The high anthocyanin content in black wheat provides antioxidant properties, enhancing the nutritional profile of products made from it. Black wheat, may exhibit greater resistance to certain pests and diseases. This natural resilience can reduce the need for chemical pesticides, lowering production costs and minimizing environmental impact. Cultivating black wheat allows farmers to diversify their crops and enter niche markets. By offering unique products, they can capture added value, enhancing farm income and promoting economic sustainability.

Less water consumption

- Reduced Water Requirements: Black wheat has been developed to require less water compared to traditional wheat varieties, making it a more sustainable option in regions facing water scarcity.
- Adaptability to Diverse Climates: This variety exhibits adaptability to various environmental conditions, reducing the need for intensive irrigation practices.

CONCLUSION

Black wheat is a unique variety distinguished by its dark hue, attributed to high levels of anthocyanins potent antioxidants also found in blueberries. Black wheat offers several health benefits like rich in Antioxidants, Enhanced ddigestive hhealth, Heart hhealth, Weight mmanagement, Blood ssugar rregulation, Rich in eessential nnutrients. Black wheat is abundant in vitamins B1, B2, B3, B5, B9, protein, carbohydrates, and minerals like iron, zinc, copper, calcium, potassium, magnesium, selenium, and phosphorus, contributing to overall health. Black wheat presents significant health benefits and economic opportunities, addressing market infrastructure, policy support, and awareness is crucial for its widespread adoption and cultivation.

NANOFIBER ADVANCEMENTS FOR NEXT-GENERATION AGROTEXTILES

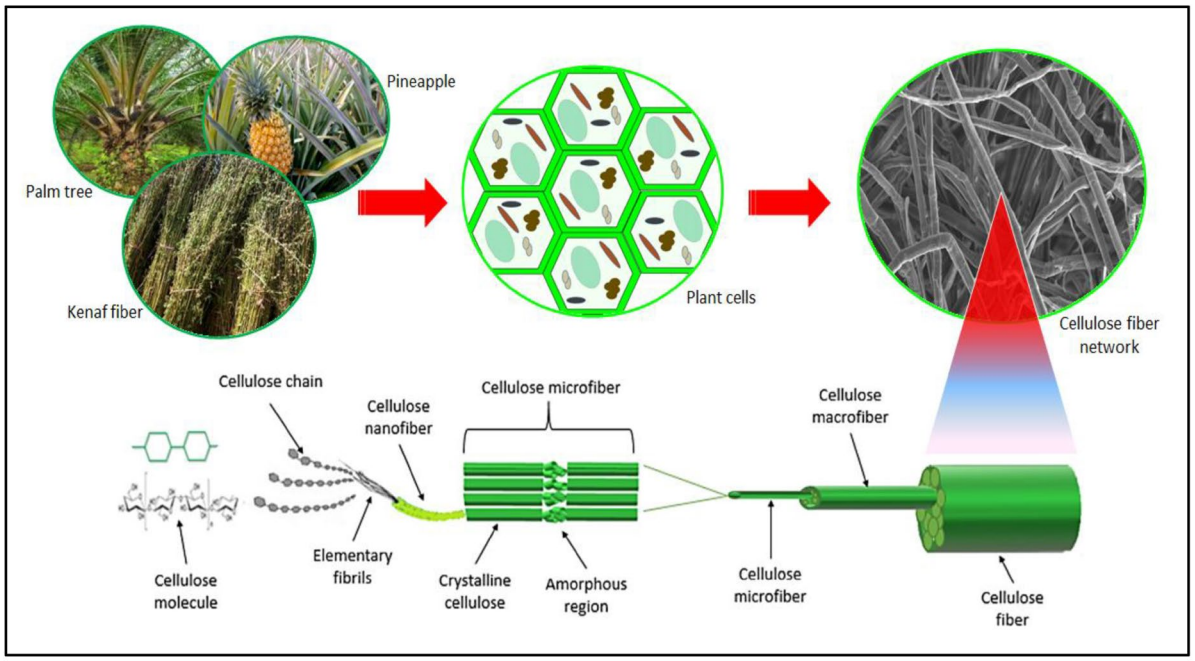
Sushila[1] and Sarita Devi[2]

[1]School of Fashion Design FDDI, Noida Campus, India

[2]School of Fashion Design, FDDI, Rohtak Campus, India

INTRODUCTION

Nanotechnology is revolutionizing the agricultural sector, especially through advancements in agrotextiles. As global demand grows for sustainable and eco-friendly solutions, natural fibers are gaining renewed attention due to their biodegradability, renewability and compatibility with the environment. When processed at the nanoscale, these fibers transform into nanofibers with enhanced properties such as high surface area, porosity and adaptability making them ideal for modern agricultural applications.

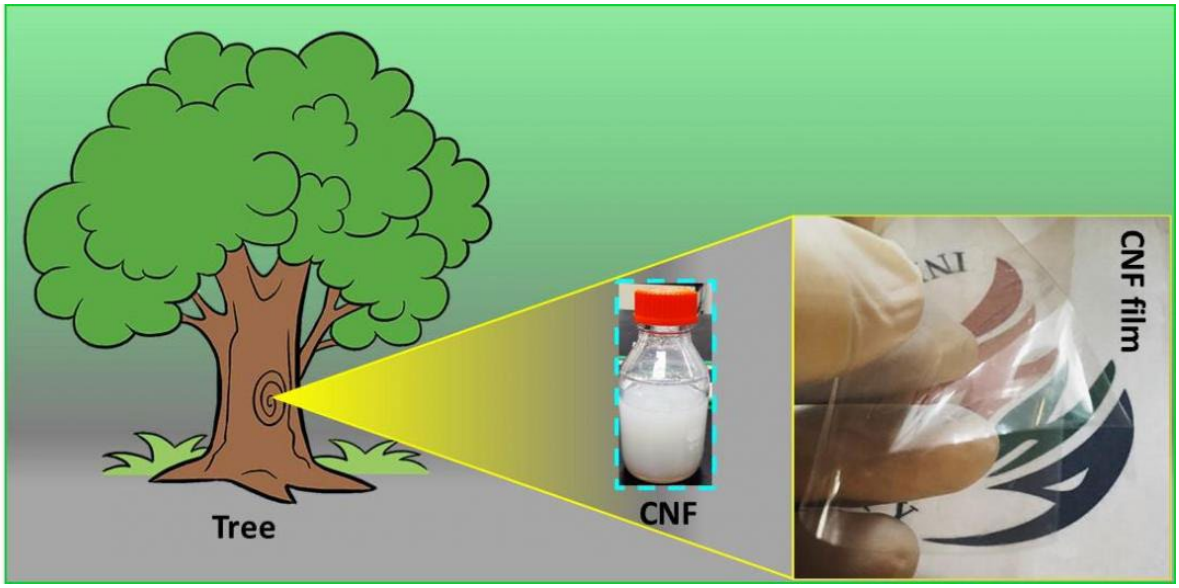


Electrospinning and other fabrication techniques allow for the production of uniform, functionalized nanofiber mats tailored for specific agricultural tasks. Integrating nanotechnology with natural fiber resources offers an innovative pathway to develop smart and sustainable agrotextiles.

NANOFIBERS FROM NATURAL AND AGRO-WASTE SOURCES

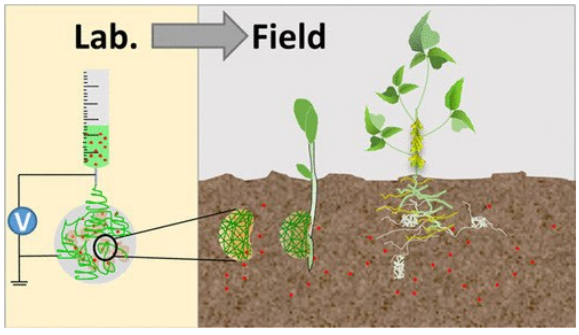
1. Natural fibers sourced from plant parts like leaves (e.g., banana, abaca), basts (e.g., jute, flax), seeds (e.g., cotton) and fruit husks (e.g., coconut) can be transformed into nanofibers with enhanced chemical and physical characteristics. These nanofibers, typically 1–100 nanometers in diameter, show excellent mechanical strength, surface functionality and environmental performance.
2. Agro-waste, often discarded, is a valuable source of cellulose for nanofiber production. Materials like rice straw, banana pseudostems and sugarcane bagasse are rich in

cellulose and can be processed through mechanical, chemical or enzymatic means to produce cellulose nanofibrils (CNFs) or nanocrystals (CNCs). These sustainable nanomaterials promote waste valorization and support circular economy principles.



PRODUCTION MECHANISM OF NANOFIBERS:

1. The first step in the production of nanofibers is selecting suitable raw materials, typically natural fibers or agricultural waste, which are rich in cellulose. These raw materials undergo pre-treatment to eliminate non-cellulosic components like lignin, hemicellulose and other impurities. Pre-treatment is carried out through mechanical, chemical or enzymatic processes. Once purified, cellulose is extracted from the plant matrix using methods such as alkaline extraction or acid hydrolysis. The cellulose is then converted into nanofibers through techniques like mechanical nanofibrillation or electrospinning. After nanofiber production, purification is performed to remove any residual solvents or impurities. Finally, the functionalized nanofibers are characterized using techniques such as Scanning Electron Microscopy (SEM), X-ray Diffraction (XRD) and tensile testing to assess their properties.



AGRICULTURAL APPLICATIONS:

Nanofibers offer multifaceted benefits for agriculture:

Seed Coating and Germination Enhancement: Nanofibers deliver nutrients, phytohormones and growth regulators directly to seeds, improving germination and early growth.

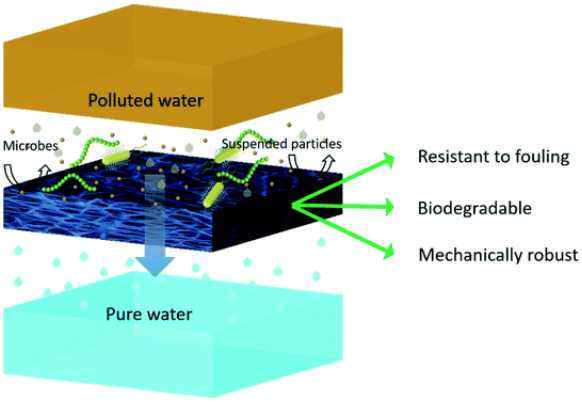
Controlled Release of Agrochemicals: Encapsulation of pesticides and herbicides in nanofibers ensures slow, targeted release and minimizing environmental impact and chemical runoff.

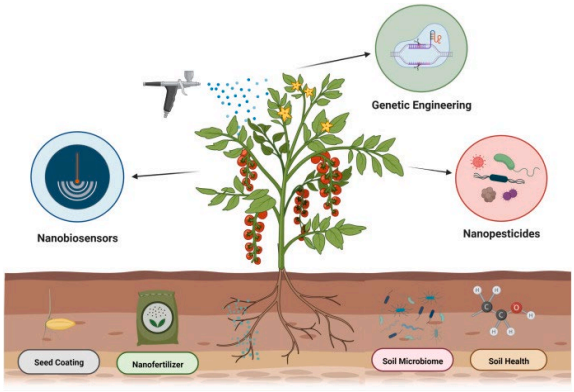
Smart Agrotextiles: Sensors embedded in nanofiber-based fabrics can detect soil moisture, temperature and pest activity, enabling precision farming.

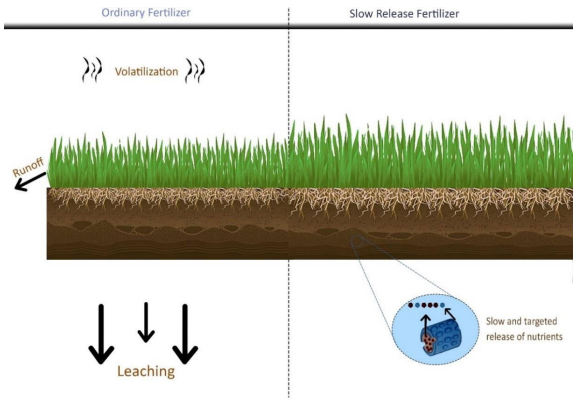
Water Filtration: Nanofiber membranes purify irrigation water by removing heavy metals, microbes and organic pollutants with added functionality through surface modifications.

Fertilizer and Hormone Delivery: Nanofibers enable controlled, efficient delivery of nutrients and phytohormones to crops enhancing growth and reducing input losses.

Crop Protection: Nanofibers can act as physical barriers or carriers for antimicrobial agents, protecting plants from pathogens and pests. Nanocomposites incorporating materials like graphene oxide or nano-silica further improve the antimicrobial, catalytic and adsorption properties of agrotextile products.



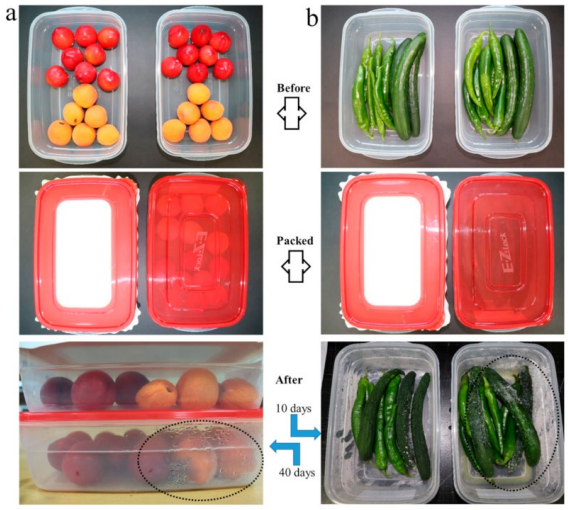




ENVIRONMENTAL AND PACKAGING APPLICATIONS

Nanofibers in Food Packaging

In addition to agricultural field applications, nanofibers contribute to food safety and sustainability through smart and active packaging solutions. Traditional plastic packaging, while effective, poses serious ecological threats due to its non-biodegradable nature. Nanofiber-based packaging offers a sustainable alternative with added functionality.

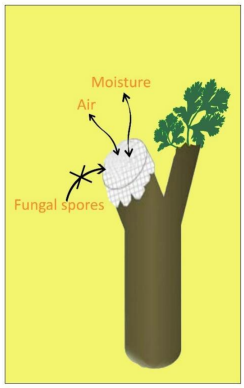


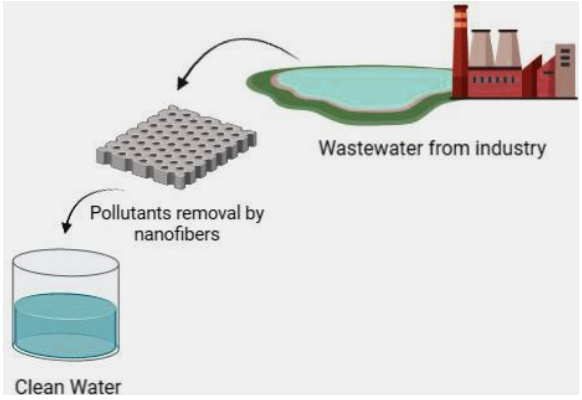
In food packaging, nanofibers enable biodegradable, active and intelligent packaging systems. These advanced materials help preserve food by releasing antimicrobial compounds or detecting spoilage through embedded sensors, while minimizing plastic waste.

- **Active Packaging:** Incorporation of antimicrobial or antioxidant agents to prolong shelf life.
- **Intelligent Packaging:** Sensors embedded in packaging materials that detect spoilage indicators (e.g., pH, gas levels, or temperature).
- **Biodegradability:** Use of cellulose nanofibers or bio-based composites from fruit and vegetable waste ensures environmental safety after disposal.

Nanofibers for Environmental Remediation

Water scarcity and pollution pose significant threats to agriculture. Cellulose based nanofibers are emerging as powerful tools in water and wastewater treatment due to their filtration efficiency and customizable surface chemistry. They filter contaminants, degrade organic pollutants and act as sensors for water quality monitoring. Their compatibility



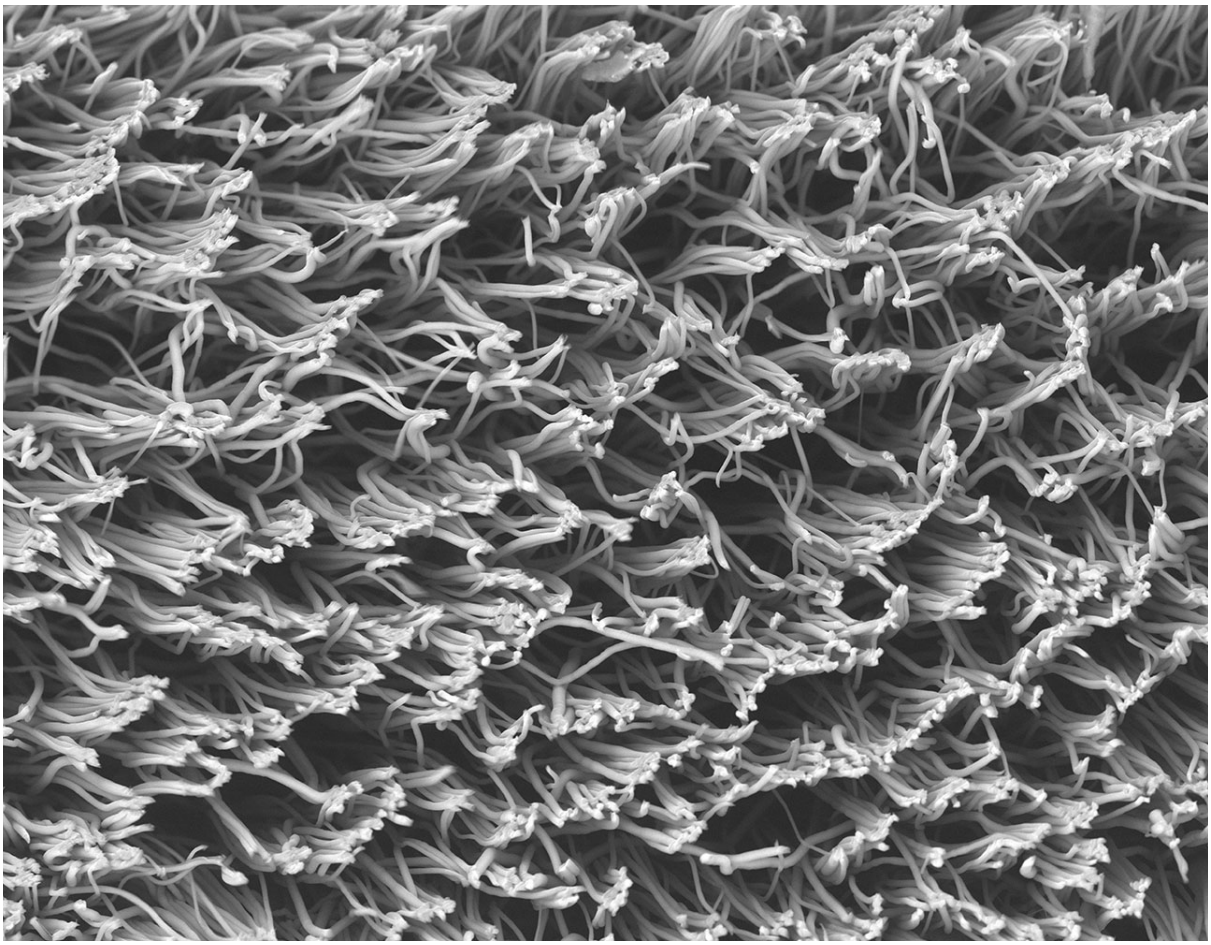


with bioactive agents enhances antimicrobial performance. Key functionalities include:

- **Filtration and Adsorption:** Removal of heavy metals, dyes and microbial contaminants from water sources.
- **Antimicrobial Action:** Embedding silver nanoparticles or other bioactive agents for pathogen control in water.
- **Catalytic Degradation and Sensing:** Using functionalized nanofibers to degrade organic pollutants and monitor water quality parameters such as pH and chemical concentrations.

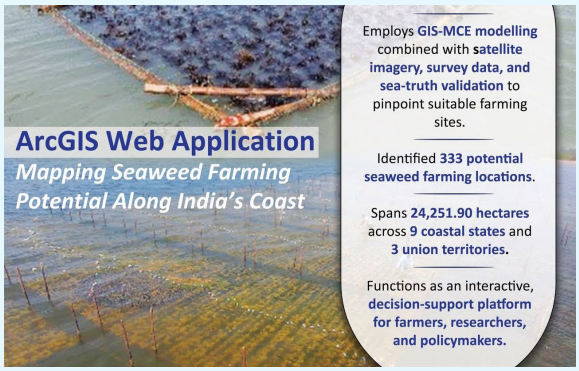
CONCLUSION

Nanofiber-based agrotextiles represent a frontier in material science that offers powerful solutions for modern sustainable agricultural challenges. By transforming natural fibers and agro-waste into high-value functional materials, they support precision farming as well as reduce environmental footprints and promote resource efficiency. It is concluded that future research and industrial efforts should prioritize scaling up the production of nanofibers from agricultural residues, while ensuring that innovations align with sustainable development goals.



LATEST NEWS ABOUT AGRICULTURE

The Indian Council of Agricultural Research (ICAR) continues to pioneer agricultural innovation across biotechnology, crop improvement, fisheries, and mechanization. Here are the most recent scientific breakthroughs and developments from ICAR institutions nationwide:



SEAWEED FARMING POTENTIAL MAPPED USING ArcGIS

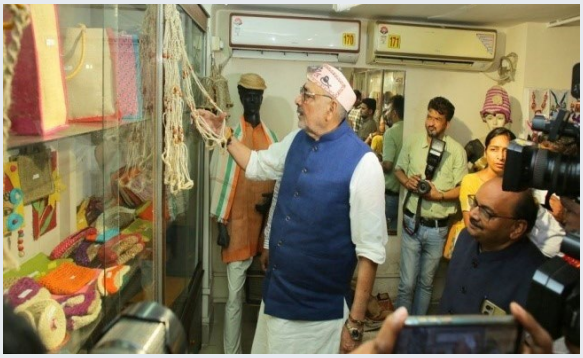
ICAR–Central Marine Fisheries Research Institute (CMFRI), Kochi has developed a Web-based ArcGIS Application to map the potential zones for seaweed cultivation along the Indian coastline. This tool aids policymakers and farmers in identifying ecologically suitable and economically viable locations for seaweed farming—a sustainable livelihood for coastal communities.

POLLINATOR HABITAT RESTORATION KIT LAUNCHED

ICAR–Directorate of Floricultural Research (DFR), Pune introduced the first-of-its-kind Pollinator Habitat Restoration Kit, designed to enhance farmland biodiversity by attracting natural pollinators. The kit includes a curated mix of floral species and management guidelines, supporting pollination services essential for crop productivity and ecosystem health.

MINI-SPINNING JUTE MACHINERY DEVELOPED

ICAR–National Institute of Natural Fibre Engineering and Technology (NINFET), Kolkata has developed a mini-spinning unit capable of producing 100–300 kg of jute yarn per day. This compact and efficient machinery addresses the fiber processing needs of small-scale entrepreneurs and enhances rural employment opportunities in jute-growing areas.

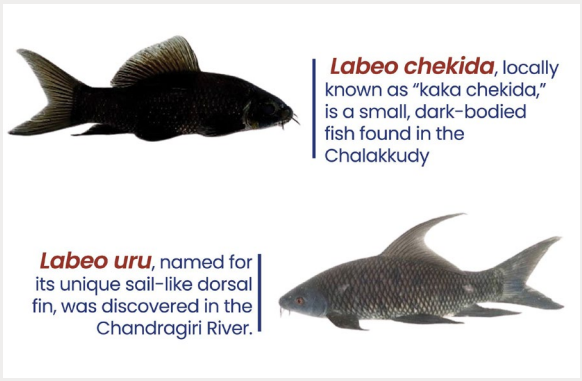


RAW MATERIAL BANK FOR JUNE INNOVATION DRIVE INAUGURATED

A Raw Material Bank was inaugurated at ICAR–NINFET, Kolkata to support the JuNe (Jute and Natural Fibre Ecosystem) Innovation Drive. The facility aims to ensure consistent supply of raw materials for startups and innovators working on sustainable fiber-based products, enhancing agri-value chain resilience.

'ANMOL' APPLE VARIETY RELEASED

A Raw Material Bank was inaugurated at ICAR–NINFET, Kolkata to support the JuNe (Jute and Natural Fibre Ecosystem) Innovation Drive. The facility aims to ensure consistent supply of raw materials for startups and innovators working on sustainable fiber-based products, enhancing agri-value chain resilience.



TWO NEW FISH SPECIES DISCOVERED FROM WESTERN GHATS

ICAR–National Bureau of Fish Genetic Resources (NBFGR), Lucknow has identified two novel freshwater fish species from the ecologically rich Western Ghats region. The discovery contributes to biodiversity documentation and supports conservation planning for India's endangered aquatic fauna.

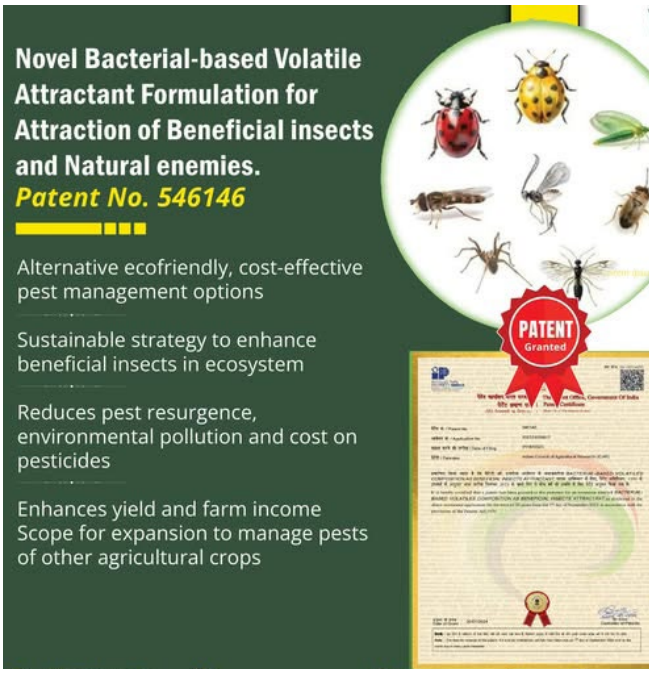
NANO-ANTIBACTERIAL TECHNOLOGY TO COMBAT POULTRY MDR

A novel green nano-antibacterial formulation has been developed to tackle multi-drug resistance (MDR) in poultry pathogens. The eco-safe, residue-free technology shows high efficacy against resistant bacterial strains and holds significant promise in ensuring safer poultry products and better animal health.

LATEST ICAR PATENTS

1. Volatile Attractant Formulation for Beneficial Insects

ICAR scientists patented a bacterial-based volatile attractant designed to draw pollinators and natural enemies of crop pests. This biocompatible innovation reduces pesticide use and strengthens natural pest control in agroecosystems.

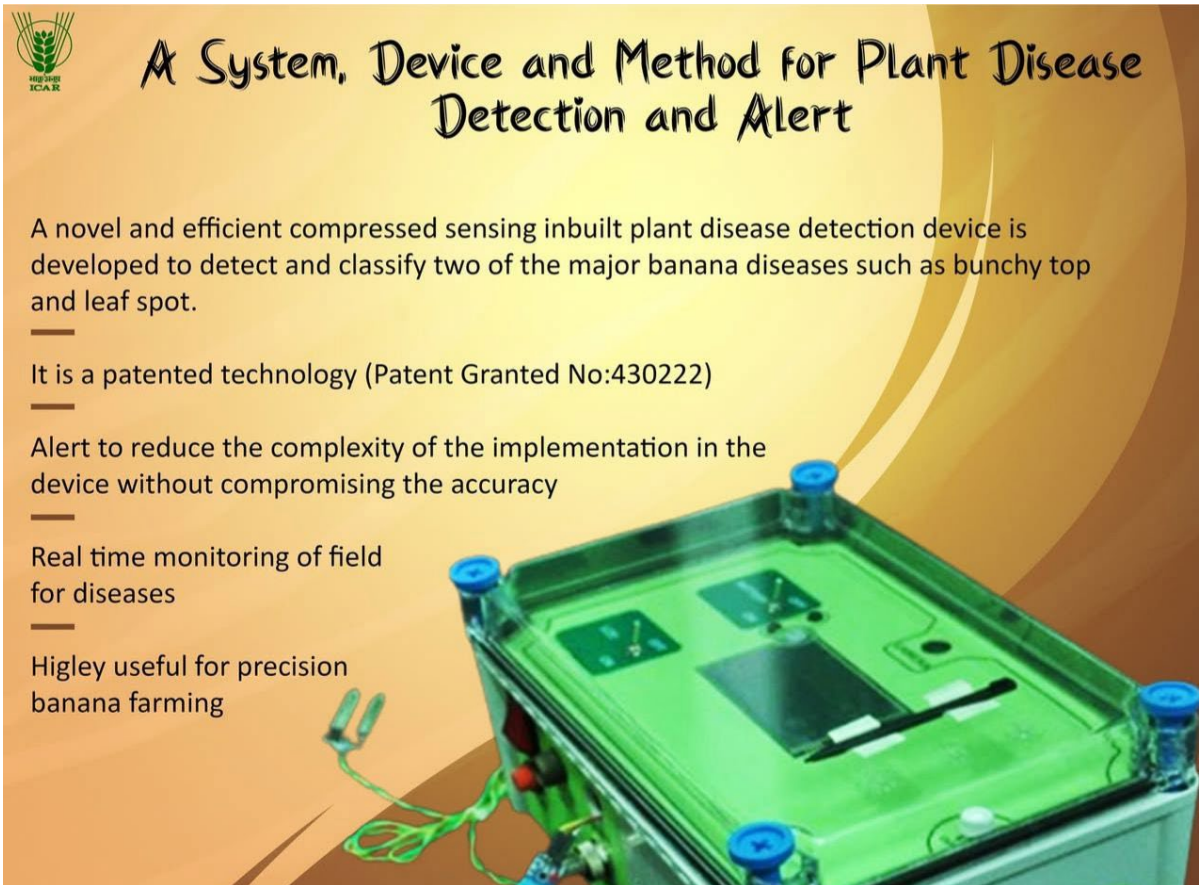


2. Rapid Anthrax Detection Kit (LFA)

ICAR–National Meat Research Institute, Hyderabad developed a Lateral Flow Assay (LFA) Kit for rapid field-level detection of Bacillus anthracis spores in soil and feed. The patent-protected kit ensures timely identification and prevention of anthrax outbreaks in livestock.

3. Device for Early Detection of Banana Diseases

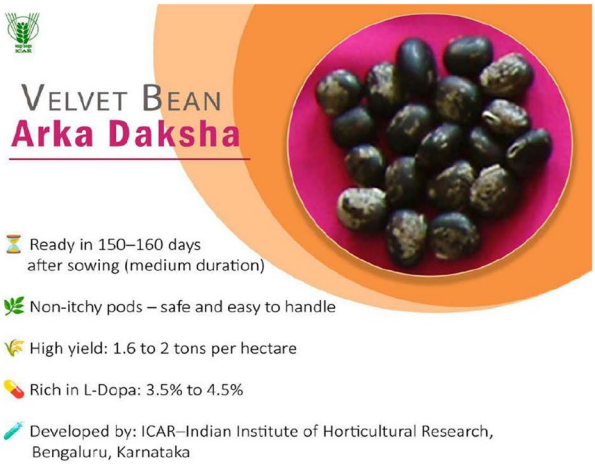
A patent was granted for an innovative sensor-based diagnostic device that detects bunchy top and leaf spot diseases in banana plants at early stages. This device enables precision management and minimizes economic losses in banana cultivation.



LATEST VARIETIES RELEASED

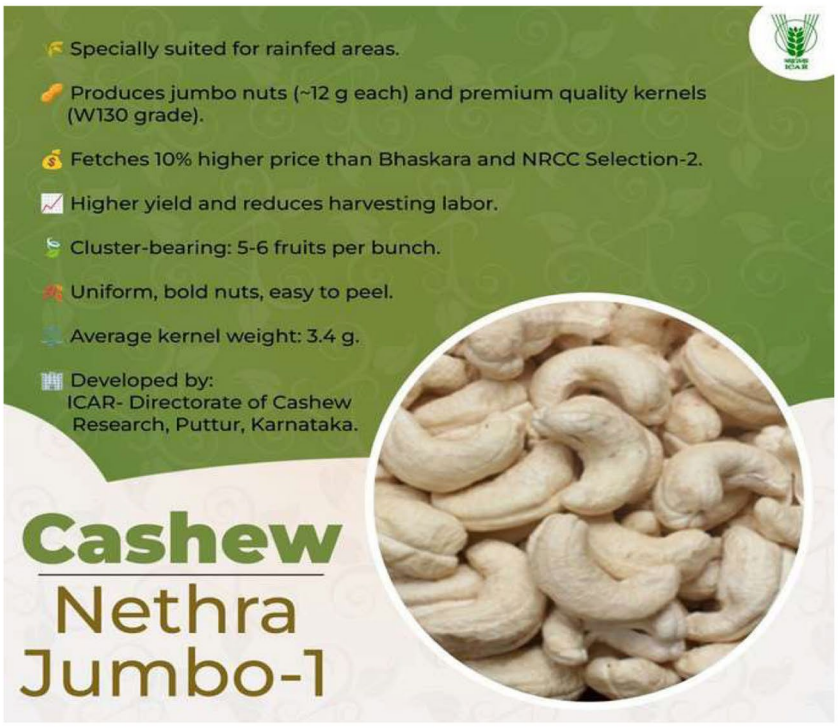
VELVET BEAN 'ARKA DAKSHA'

Developed by ICAR–Indian Institute of Horticultural Research (IIHR), Bengaluru, 'Arka Daksha' is a velvet bean variety rich in L-Dopa (3.5–4.5%), a precursor to dopamine used in Parkinson's treatment. It offers excellent potential in both nutritional and pharmaceutical sectors.



CASHEW 'NETHRA JUMBO–1'

ICAR–Directorate of Cashew Research, Puttur, Karnataka released 'Nethra Jumbo-1', a high-yielding cashew variety suited for rainfed conditions. Known for its large nut size and high kernel recovery, it is ideal for commercialization in marginal lands.



(10.12.1955 -10.05.2025)

With deep sorrow, Just Agriculture mourns the sad demise of

Padma Shri. Dr. S. Ayyappan

Former Secretary (DARE) and Director General,
ICAR (2010-2016).

A true visionary and an unwavering champion of Indian agricultural science, his contributions will continue to inspire us all.

MAY HIS SOUL REST IN ETERNAL PEACE!

Dr. M.L. JAT'S FIRST WELCOME IN RAJASTHAN–INAUGURATION OF KHARIF PULSES ANNUAL GROUP MEETING

Under the aegis of the Indian Council of Agricultural Research (ICAR), the Kharif Pulses Annual Group Meeting 2025 began at Rajasthan Agricultural Research Institute (RARI), Durgapura, Jaipur on May 7. This is the first visit of ICAR Director Dr. M.L. Jat to Rajasthan after assuming charge, and he was given a grand welcome at the state's premier agricultural research institution.

The inaugural session featured ICAR officials and dignitaries including the Vice Chancellor of Sri Karan Narendra Agriculture University, Jobner, Dr. Balraj Singh; Director of ICAR-IIPR, Dr. Pooran Chand; and Director of RARI, Dr. R.P.S. Verma, among others. Dr. Jat appreciated the arrangements and praised the efforts of the organizing team.

He emphasized that high-yielding varieties, climate-resilient technologies, and improved packages of practices for rainfed and natural farming systems are crucial for the progress of farmers in Rajasthan. He stated that the development of a strong seed system, post-harvest management, and processing technologies must be prioritized to ensure better income for farmers.

Dr. Jat further added that agricultural universities should work as centers of excellence in research, education, and extension. He congratulated the team for the "Challenging Opportunities" theme and emphasized the need for a roadmap to ensure pulse self-sufficiency in alignment with the "Atmanirbhar Bharat" vision.

Dr. S.K. MALHOTRA,

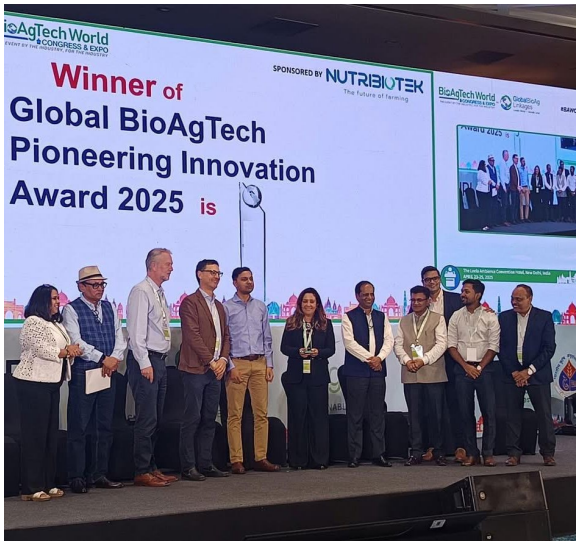
VICE CHANCELLOR OF MAHARANA PRATAP HORTICULTURAL UNIVERSITY, HONORED FOR LEADERSHIP IN ADVANCING SUSTAINABLE AGRICULTURE AT THE 6TH BIOAGTECH WORLD CONGRESS & EXPO 2025

New Delhi, April 25, 2025 – The 6th BioAgTech World Congress & Expo 2025 witnessed an inspiring convergence of global agricultural leaders and innovators, and among the most celebrated dignitaries was Dr. S.K. Malhotra, Vice Chancellor of Maharana Pratap Horticultural University (MHU), Karnal, India. Dr. Malhotra's active participation and thought leadership during the Congress highlighted his enduring commitment to shaping the future of sustainable horticulture and biological agriculture both in India and globally.

Held from April 23–25 at The Leela Ambience Convention Hotel, New Delhi, the Congress brought together over 400 delegates from 30+ countries, marking one of the largest international platforms for stakeholders in the biological agriculture sector. The event was organized by Global BioAg Linkages (GBL) in association with strategic partners including ICAR, Agrinnovate India, ICRISAT, and MHU.

The Congress began with an inspiring inaugural ceremony led by Dr. Suresh Prabhu (Former Union Minister and Member of Parliament, Rajya Sabha, India), joined by a distinguished panel including Dr. Himanshu Pathak, Director

General of ICRISAT and Former DG, ICAR; Dr. S.K. Malhotra, Vice Chancellor, Maharana Pratap Horticultural University (MHU); Dr. Carlos Goulart, Secretary of Agricultural Defense, Ministry of Agriculture (MAPA), Brazil; Mr. Giuseppe Natale, Founder of Vedalia and Former CEO of Valagro; Mr. Antonio Zem, Board Member of BioFirst and Former CEO of Biotrop; and Mr. A.G. Kawamura, Former Secretary of Agriculture, California, USA. This ceremonial start symbolized international unity for food security and climate resilience. A key highlight was the introduction of the Valencia Disaster Relief Fund, underscoring the Congress's humanitarian commitment to



supporting disaster affected agricultural communities. The day concluded with the Global BioAgTech Sustainable Grower Awards, recognizing outstanding leadership in biodiversity and food security.

As former Agriculture Commissioner of India, Dr. Malhotra brought unparalleled depth of expertise and a visionary outlook to the Congress. His presence underscored India's leading role in championing innovations in biologicals, sustainable horticulture, and farmer empowerment. In alignment with MHU's mission, Dr. Malhotra emphasized the importance of integrating scientific research, education, and extension activities to scale biological inputs and improve smallholder productivity.

The Congress featured over a dozen technical sessions and roundtables. Dr. Malhotra's contributions during closed-door strategic dialogues and mentor roundtables helped shape discussions around regulatory harmonization, soil health restoration, and BioAgTech innovations relevant to Indian agro-climatic conditions. He also played a crucial role in affirming MHU's commitment to collaborative research, farmer-centric outreach, and climate-resilient technologies.

Reflecting on his participation, Dr. Malhotra stated, "The 6th BioAgTech World Congress exemplifies what global collaboration can achieve. At MHU, we remain committed to accelerating innovation and delivering scalable, nature-positive solutions for the horticulture sector."

His participation was further lauded by fellow delegates and organizers. Mr. Roger Tripathi, Founder & CEO of Global BioAg Linkages, praised Dr. Malhotra as "a strategic visionary and a tireless champion for sustainable agricultural transformation in India."

As the Congress concluded with a vibrant appreciation ceremony and global awards, Dr. Malhotra's presence stood as a beacon of academic, administrative, and policy leadership. His ongoing efforts continue to influence a new generation of agricultural scientists and policy architects.

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