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From the President's Desk

Drylands are Getting Drier and Hungrier: Sustainable Solutions for an Increasingly Thirsty Planet

The world's drylands, encompassing arid, semi-arid, and dry sub-humid regions that cover over 41% of Earth's land surface, stand at a critical juncture in human and ecological history. These vast landscapes, home to nearly 2.5 billion people, have long served as the foundation of resilient agricultural systems, producing nutrient-rich, drought-tolerant crops like millets, sorghum, and pulses that form the dietary backbone for millions. However, climate change is fundamentally altering these ecosystems in unprecedented ways. A ground-breaking 2025 study published in Science reveals an alarming acceleration of soil moisture decline across global drylands, driven by what researchers describe as an "increasingly thirsty atmosphere" under rising global temperatures. The profound and far-reaching implications are: more frequent and severe droughts, rapidly depleting groundwater reserves, and worsening land degradation that collectively threaten the livelihoods of millions of smallholder farmers who depend on these marginal lands.

Yet within these formidable challenges lies extraordinary opportunity for transformation. Drylands are emerging as fertile testing grounds for some of the most innovative approaches to sustainable agriculture and landscape regeneration worldwide. From decentralized water harvesting systems that revive ancient wisdom to integrated watershed management that combines modern science with traditional knowledge, a quiet revolution is unfolding across the world's dryland regions. These innovations offer valuable lessons for sustainable development that extend far beyond dryland ecosystems themselves, presenting models for how humanity might adapt to an increasingly water-constrained future.

The precarious state of global drylands reveals both their importance and vulnerability. These regions represent one of Earth's most extensive and biologically significant biomes, supporting 44% of global cropland and nourishing 33% of the world's population through unique agricultural

systems finely tuned to water scarcity. Over millennia, dryland communities have developed remarkable adaptive strategies, from the Kakatiya tanks of Telangana to the traditional haveli cultivation systems of Central India and khadins of Rajasthan - sophisticated water harvesting methods that demonstrate indigenous hydrological engineering at its finest. However, climate change is testing the limits of these time-tested systems like never before. The 2025 Science study documents how rising temperatures are increasing atmospheric demand for moisture at unprecedented rates, essentially "sucking" water from soils through enhanced evapotranspiration. Compounding this phenomenon, shifting rainfall patterns are making precipitation less reliable even in areas where total annual amounts haven't significantly decreased, disrupting centuries-old agricultural calendars and practices.

The impacts of these changes are already severe and widespread. Nearly half the world's land area experienced extreme drought conditions in 2023 alone, with aridity expanding by approximately 40% since 1990 according to UNCCD estimates. The economic consequences are staggering, with Africa currently losing an estimated 12% of GDP annually to land degradation, and projections suggesting further GDP losses of 16% in Africa and 7% in Asia by 2035 if current trends continue. These changes are forcing painful adaptations across dryland communities. In India's semi-arid regions, traditional rainfall patterns that once reliably supported rainfed agriculture have become so unpredictable that many farmers are abandoning crops mid-season, while across sub-Saharan Africa's drylands, declining soil fertility and moisture are pushing yields of staple crops like sorghum and millet below subsistence levels in many areas, triggering waves of rural migration.

At the heart of dryland resilience lies the ancient wisdom of water harvesting, exemplified by the haveli system of India's Bundelkhand region. This traditional cultivation method, perfected over generations, involves creating small earthen embankments to capture monsoon runoff within agricultural land, allowing water to gradually percolate and recharge groundwater during rainy season.

Decentralized rainwater harvesting interventions including haveli renovation, excavation of farm ponds, percolation tanks, and check dams and a range of in-situ water conservation practices implemented at benchmark clusters through comprehensive landscape resource conservation programs have shown remarkable results. When properly implemented using a combination of scientific topographic analysis and traditional community knowledge, these interventions can significantly enhance landscape moisture retention ability and freshwater including surface and groundwater availability, while simultaneously mitigating both flash floods and drought situations. The agricultural impacts were transformative, with crop yields rising by 30-70% for various crops while the total area under cultivation expanded as previously marginal lands became productive have made compounding effect in terms of total agricultural production and net household income.

Drylands are not only getting drier but getting hungrier too. Conservation agriculture is powerful strategy for dryland resilience, particularly when combined with these water management approaches. The three pillars of conservation agriculture: i) minimal soil disturbance, ii) permanent soil cover, and iii) crop diversification, work synergistically to improve water use efficiency in moisture-stressed environments.

Development of climate-resilient crop cultivars specifically bred for dryland conditions, helping farmers adapt to increasing climate variability. Notable examples include 'Dhanshakti', a high-iron pearl millet variety that withstands drought while addressing malnutrition, and early-maturing pigeonpea hybrids that escape terminal drought by maturing 25-30 days faster than traditional varieties. In sorghum, 'Parbhani Moti' demonstrates enhanced heat tolerance, maintaining stable yields even at temperatures above 40°C. For chickpea, the 'Super Early' varieties (maturing in 85-90 days) have revolutionized production in drought-prone areas of Andhra Pradesh and Maharashtra. These improved cultivars are coupled with farmer-preferred traits - disease resistance, higher nutrient density, and stable yields under water stress - making them crucial for climate adaptation. Field studies show adoption of these resilient varieties can increase dryland farm productivity by 20-40% while reducing crop failure risk during erratic rainfall years, providing both food and income security to vulnerable farming communities.

To ensure these climate-smart varieties reach farmers and endure future challenges, community seed banks play a pivotal role. They preserve locally adapted and improved seeds, safeguarding genetic diversity against climate shocks. By decentralizing access to resilient cultivars, seed banks empower smallholders, especially women and marginalized farmers, to replant after crop losses and experiment with drought-tolerant varieties. Initiatives like India's National Gene Bank and community-led seed networks also document indigenous landraces, blending traditional knowledge with modern breeding advances. This "living library" of seeds acts as an insurance policy for dryland

agriculture, ensuring farmers can adapt to an uncertain climate while maintaining agro-biodiversity.

Agroforestry systems offer another dimension of resilience by creating microclimates that moderate temperature extremes, enhance climate resilience while boosting farmer incomes. In Bundelkhand, deciduous teak (*Tectona grandis*), which sheds leaves during the cropping season- enriches soil fertility, minimizing competition for sunlight and water. Bund based Agroforestry system provides dual income as crops in field ensure food security; while teak on bunds offers lucrative long-term returns. In coastal Odisha, mango and coconut-based systems create productive microclimates. The multi-layered canopy buffers temperature extremes, conserves soil moisture, protect soil loss; while diverse crops ensure year-round nutrition security. These integrated systems demonstrate how strategic tree-crop combinations can transform drylands into productive, climate-resilient landscapes that deliver both economic and nutritional benefits to farming communities.

At the individual farm/household level, innovative crop management practices are enabling sustainable intensification of dryland agriculture by maximizing the productivity of every precious drop of water. One promising approach is the transplanting of dryland crops. Field trials in Karnataka demonstrated that transplanted methods for finger millet increased yields by 35-45% while reducing water use by 30%, primarily through creating soil conditions that maximize moisture retention and root development. Similarly, transplanted pigeon pea, offers a climate-smart solution for dryland farmers. Unlike traditional direct seeding, this innovative technique involves raising seedlings in nurseries and transplanting them after monsoon onset, effectively extending the growing season by 4-6 weeks. The method has shown remarkable success in drought-prone regions of Maharashtra and Telangana, delivering 25-30% higher yields while reducing vulnerability to early-season drought.

Scaling these technical solutions requires supportive policy frameworks and institutional innovations tailored to dryland realities. India's Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) program provides an excellent example of how to mainstream watershed development through coordinated action, bringing comprehensive water conservation interventions to over 3 million hectares since 2015.

The integration of these approaches including scientific water budgeting, traditional water harvesting, conservation agriculture, strategic agroforestry, adoption of climate-resilient crop cultivars, seed system and various best management practices represents most promising pathway for dryland transformation. When we combine the best of traditional knowledge with modern science, drylands can become productive and resilient landscapes which sustain both ecosystems and livelihoods. To ensure lasting impact, it is important to prioritize capacity building at all levels; equipping farmers, extension workers, and local institutions with the skills and tools needed to implement these solutions effectively. Engaging youth is critical, as their innovation, energy, and tech-savviness can drive the adoption of new practices while bridging indigenous wisdom with modern techniques. A gender-responsive approach is equally vital, ensuring that women, who often play a central role in agriculture, have equal access to resources, training, and decision-making power. The urgent task ahead is to scale these proven approaches through supportive policies; by developing number of sites of learning; inclusive knowledge-sharing platforms, and targeted investments that recognize drylands not as marginal lands, but as frontiers of agricultural innovation in changing climate scenario. By fostering collaboration and collective actions among public-private organizations, and by strengthening local capacities, it is possible to unlock the full potential of dryland communities.

Himanshu Pathak
President

Executive Council Meeting

141st Meeting

The 141st meeting of the Executive Council (EC) was held in hybrid mode on June 04, 2025 under the Chairmanship of Dr. Himanshu Pathak (President). Key agenda items discussed during the meeting were as follows:

- The Academy's publication *"Indian Agriculture by 2047: A Roadmap for Agricultural Research, Education and Extension"* will be released during the 32nd Annual General Meeting on June 05, 2025. E-version of the publication will be circulated to members and made available on the NAAS website.

- The revised document on Academy's Bye-Laws and Rules will be finalized after further deliberations in the next EC meeting.
- The Academy's publications participation in the World Food Prize (WFP) Foundation event to be held in Iowa (USA) in October 2025 was favourably considered. A booth showcasing Academy's initiatives, along with five high school students selected under the NAAS-YUVA initiative shall represent India, with sponsorship from Dr. Larry Walker (Michigan State University, USA).
- The inaugural *"NAAS–Dhanuka Awards for Excellence in Agricultural Extension"* (14) shall be conferred during the Annual General Meeting on June 05, 2025.
- The reorganization of NAAS Regional Chapters was approved, and new conveners, including Dr. Kajal Chakraborty (Lucknow Chapter); Dr. K.M. Bujarbaruah (Barapani Chapter); and Dr. M. Mohanty (Bhopal Chapter) were identified.
- Suggestions were invited for the theme of XVIII Agricultural Science Congress to be held during 2027 and the same along with venue will be finalized in the next EC meeting.
- As the tenure of several Office Bearers and EC Members, including the President, Secretary, and Editor will conclude on December 31, 2025, it was suggested that the Secretariat need to initiate the process for elections as per the Academy's regulations.
- Sectional Committees for the election of the Fellows, Associates, and Young Scientist Awards for 2026 were constituted.
- The Academy received 402 nominations for the Fellowship, Associateship, and Academy Awards, including 15 for Pravasi and three for Foreign Fellowships, in addition to nominations carried forward from 2023 and 2024.
- It was informed that under the *"Smt. Kanak Aggarwal NAAS Girls Scholarship"*, 84 girl students pursuing undergraduate agricultural education received financial support during 2024-25. The selection process for the next batch of students has also been initiated.
- The Academy has taken significant steps toward developing India-specific indicators for the Global Hunger Index (GHI) and Human Development Index (HDI). A committee is working on finalizing the draft report.
- The Academy has further strengthened linkages by signing MoUs with the Trust for Advancement of Agricultural Sciences (TAAS) and the African Academy of Sciences (AAS).

Before concluding the meeting, Dr. Ashok K. Singh (Secretary) extended a formal vote of thanks to all members.

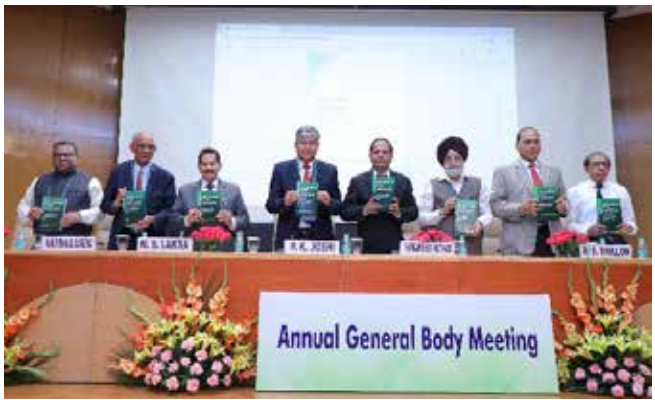
32nd Annual General Body Meeting

The 32nd Annual General Body Meeting (AGM) of the Academy was held in hybrid mode under the Chairmanship of Dr. Himanshu Pathak (President) on June 05, 2025. At the outset, a moment of silence was observed in remembrance of seventeen esteemed Fellows who passed away since the last AGM: Dr. K.C. Alagarswami, Prof. S. Ayyappan, Dr. K.L. Chadha, Dr. H.S. Chauhan, Dr. K.P. Gopakumar, Dr. Akhtar Husain, Dr. C. Ramasamy, Dr. S.K. Raina, Dr. Annadana Seetharam, Dr. (Ms.) Manju Sharma, Dr. Harpal Singh, Dr. Brijendra Pratap Singh, Dr. Manmohan Singh, Dr. Ram Pratap Singh,

Dr. Mannava V.K. Sivakumar, Dr. Supda BhikuVarade, and Dr. R.L. Yadav.

Dr. Ashok K. Singh (Secretary) then welcomed the President, Immediate Past-President, Vice-Presidents, Secretary, Foreign Secretary, Editors, Treasurer, Executive Council members, and Fellows of the Academy attending in-person and online. Thereafter, Dr. W.S. Lakra (Secretary) presented a detailed report on the Academy's activities during 2024–25, including the successful organization of Brainstorming Sessions (8) and Strategy Workshops (4) along with major events such as the XVII Agricultural Science Congress held jointly with GBPUA&T, Pantnagar, and the National Conference on "Digital Agriculture: Empowering Indian Farming" in collaboration with ICAR and ICRISAT. The Academy continued its efforts to enhance scientific engagement and outreach through its Regional Chapters, which held regular meetings and programs aligned with the annual theme, "Agri-food Innovations for Rural Transformation." A total of 34 Fellows, including two Foreign Fellows and three Pravasi Fellows, along with 12 Associates were inducted during the year, bringing the Fellowship strength to 802 and Associates to 123 as on January 01, 2025.

The Academy released several key publications during the year, including NAAS Year Book 2025; Planner 2025; Advances in Agri-Food Systems Volumes I & II; Indian Agriculture by 2047: A Roadmap for Research, Education and Extension; and the Annual Report 2024–25. The Pedagogy Development Programme (PDP) was also expanded, benefitting nearly 350 ICAR Scientists through eight training sessions. Under the newly launched NAAS–YUVA initiative, various youth-focused programs and webinars were organized, including selection of Indian school students for participation in the World Food Prize Foundation event to be held in October 2025 in USA.



During the year, the Academy also launched the "Smt. Kanak Aggarwal-NAAS Girls Scholarship", supported by M/s Crystal Crop Protection Ltd., disbursing scholarships to 84 undergraduate girl students from agricultural universities. Besides, a new collaboration with M/s Dhanuka Agritech Ltd. led to the institution of the "NAAS–Dhanuka Awards for Excellence in Agricultural Extension," recognizing top-performing KVKs, ATARIs, and Extension Scientists and 14 awards will be conferred.

The Academy also approved the reorganization of NAAS Regional Chapters based on agro-ecological zones and identified new Conveners. To enhance further collaboration, MoUs were signed with the African Academy of Sciences (AAS) and Trust for Advances of Agricultural Sciences (TAAS). Besides, M/s Jain Irrigation Systems Ltd. joined as a Corporate Member by contributing ₹25 lakhs along with five ICAR Institutions and Universities as Institutional Members. The General Body adopted the Annual Report and Audited Accounts for 2024–25 and approved the appointment of M/s Garg Singla & Co. as auditors for 2025–26. The AGM concluded with the formal admission of the newly elected Fellows (34) and Associates (12).

Presidential Address

Dr. Himanshu Pathak (President) delivered his Presidential Lecture on the theme "Repurposing and Restructuring Agri-Extension for Aspiring India." Emphasizing extension as the third critical pillar of Indian agriculture, he traced its historical evolution from the post-1866 Odisha famine to pioneering initiatives like the Etawah Pilot Project (1948), National Extension Service (1953), and the establishment of the first Krishi

Vigyan Kendra (KVK) in 1974. Currently, India has a robust network of 731 KVKs supported by 11 ATARIs. But, he cautioned against the overdependence on KVKs alone for extension functions. He underlined the crucial role that agricultural extension has played in India's growth, contributing to massive increases in production across all agricultural commodities. However, with changing demographics, market demands, technological disruption, and environmental stressors, the current extension model, supply-driven and fragmented, needs urgent transformation.

Challenges and Opportunities

- Inadequate infrastructure and human resources in extension delivery.
- Limited convergence among agencies and poor feedback loops with research.
- Need for market-aligned, tech-savvy, inclusive, and decentralized models.
- Growing demands for nutritious, sustainable, and value-added food products.
- Emerging digital ecosystems: agri-fintech, digital marketplaces, and virtual services.
- Learnings from Global Models

  USA: Decentralized, research-led extension through land-grant universities.

  China: Top-down, integrated system with strong performance monitoring.

  Israel: Farmer-centric, high-tech advisory with real-time decision support.

  Australia: Market-driven, decentralized, and network-led service models.

Vision for Extension Transformation

- **For cultivators and consumers:** Align production with nutrition and affordability.
- **For industry:** Equip FPOs and SHGs to meet input and processing demands.
- **For global markets:** Support exports through certification and market intelligence.
- **For equity:** Empower women, youth, and marginalized communities.

- **For sustainability:** Minimize ecological footprints through innovation.

Strategic Recommendations

- Converge efforts between KVKs, ATMA, state agencies, and private players.
- Launch Virtual KVKs for data-driven agro-advisory.
- Strengthen research-extension feedback loops and standardize KVK operations.
- Develop cluster-based, commodity-specific, and youth-driven extension models.
- Utilize underused demonstration lands at block-level offices.
- Enhance public-private partnerships (PPPs) in agri-extension.

Policy and Institutional Reforms Needed

- Revitalize ATMA and build robust institutional systems for women and youth.
- Promote agri-startups, digital capacity building, and market-led extension.
- Form dedicated extension cadre with proper training and deployment.
- Increase investments, as each ₹1 in extension yields ₹8–12 in returns.

Dr. Pathak concluded by urging the Academy and all stakeholders to act with ambition and collaborative resolve to create a modern, inclusive, and future-ready extension ecosystem, capable of supporting India's journey towards a Viksit Bharat@2047.

Prof. M.S. Swaminathan Foundation Day Lecture

The Foundation Day lecture to honor Professor M.S. Swaminathan was delivered by Dr. Soumya Swaminathan (Chairperson, MSSRF) on "One Health: Guiding our Future." The lecture highlighted the importance of partnerships and collective action in addressing global health challenges, drawing

from her father's legacy in agriculture and her own experience as the first Chief Scientist at the World Health Organization.

In her Lecture, Dr. Soumya Swaminathan underscored the significance of the One Health Paradigm in addressing the growing interconnected challenges to public, animal, and environmental health. She explained how rapid urbanization, global travel, and deforestation are bringing humans and animals into closer contact, increasing the risk of zoonotic disease outbreaks. Citing World Health Organization (WHO) and Centers for Disease Control and Prevention (CDC) data, she pointed out that more than 60% of emerging infectious diseases are zoonotic in origin, with three out of four new infectious diseases in humans linked to animals. Climate change, she noted, is further expanding the geographical range of disease vectors, thereby intensifying the health burden across species. Dr. Swaminathan highlighted antimicrobial resistance (AMR) as a major global health threat, responsible for nearly 5 million deaths annually, fueled by overuse of antibiotics in both humans and livestock. She emphasized that AMR transcends human health and affects entire ecosystems through the contamination of soil and water. Environmental degradation alone accounts for nearly a quarter of global deaths, reflecting the deep interdependence between ecological health and human well-being. She called for urgent, integrated responses through stewardship, surveillance, regulatory frameworks, and public engagement.

Dr. Swaminathan stressed the critical role of community participation, particularly through local influencers, schools, and One Health clubs, in spreading accurate information and encouraging healthy behaviors. Culturally rooted communication methods like folk performances, radio, and theatre can enhance outreach, especially in rural and marginalized areas. She advocated for early detection of unusual health events by empowering villagers to act as "first informants," which can trigger timely responses and prevent larger outbreaks. The revival of climate-resilient traditional practices, like the Pokkali rice-shrimp system in Kerala, was also highlighted as a model for integrating ecological sustainability with livelihood security. Her lecture called for an inclusive, integrated, and informed movement to build a healthier future aligned with the One Health approach.

Reinforcing Prof. M.S. Swaminathan's vision, she concluded that it is collective excellence and community participation—not isolated efforts—that will drive systemic and sustainable change in health and environmental outcomes.

NAAS Felicitation Function

The Academy arranged a special Felicitation Function on June 05, 2025 to recognize and celebrate the remarkable contributions of Individuals and Institutions to Indian agriculture and allied sciences. The Academy honoured 37 senior NAAS Fellows (aged 80 and above) for their lifelong service and outstanding achievements across various domains of agricultural research and development.

The Academy also felicitated Padma awardees including, Dr. S.K. Vasal (NAAS Fellow) and two exemplary farmers, Shri Hangthing and Shri Hariman Sharma, whose innovations and field-level efforts have made a significant impact on farming communities. In addition, Mr. Ajit Jain from Jain Irrigation Systems Ltd. was felicitated for his contributions to agribusiness, while senior journalists Shri Prabhudatta Mishra and

Shri Harvir Singh were recognized for their outstanding contributions to agricultural media.

The NAAS–Dhanuka Awards (14) were presented to outstanding Krishi Vigyan Kendras (KVKs) for their exemplary extension services across various zones. Awardees included KVK-Baramati, KVK-Buxar, KVK-Dhakrani, KVK-Dhalai, KVK-Dhaura, KVK-Govindnagar, KVK-Kamrup, KVK-Khordha, KVK-Kota, KVK-Lakshadweep, and KVK-Theni. In addition, KVK-Lakshadweep also awarded the Best KVK Nationwide award, ATARI Zone I, Ludhiana was conferred the Best ATARI award and Dr.Jigmet Yangchan was honoured as the Best Extension Scientist. Additionally, eight promising researchers were conferred NAAS Young Scientist Awards for their path breaking work across diverse agricultural disciplines, underscoring the Academy's commitment to fostering young scientific talent in the country.

Presentations by the Newly Elected Fellows

A dedicated Scientific Session was organized on June 4, 2025, as part of the Annual General Meeting of the Academy, wherein the newly elected Fellows presented their significant research contributions across diverse domains of agricultural science. The forenoon session was chaired by Dr. Himanshu Pathak (President) and Co-chaired by Dr. B.S. Dhillon (Vice-President). The Session included presentations by Foreign Fellows Dr. Om Parkash Dhankher and Dr. Zora Singh, followed by presentations from Fellows in the field of crop sciences focusing on rice bio-fortification, stress-resilient pulses and cereals, and advanced genomic tools for varietal development. Horticultural sciences were represented through talks on medicinal plant biodiversity, genetic enhancement of vegetable crops, and innovations in tissue culture and breeding. The session on animal sciences covered molecular epidemiology, diagnostics for zoonotic diseases, and novel technologies for enhancing livestock productivity.

The scientific discussions continued in the afternoon session under the Chairmanship of Dr. Himanshu Pathak and Co-Chairmanship of Dr. P.K. Joshi, (Vice-President) with Dr. Ashok K. Singh, (Secretary) delivering the welcome address. Fellows from fisheries sciences shared innovative approaches for enhancing omega-3 fatty acid delivery and stress mitigation in aquaculture. Presentations from the natural resource management group addressed sustainable farming practices, nutrient-use strategies, and the role of microbes in developing a circular bio-based economy. Plant protection experts discussed molecular diagnostics and management of emerging plant pathogens. The agricultural engineering and technology segment introduced micro and nano-scale delivery systems, while social sciences contributions explored the intersection of climate, water, agriculture, and nutrition. The session concluded with insightful presentations by Pravasi and Foreign Fellows on global plant genetic resources and advanced processing technologies. The Scientific Session provided a vibrant platform for knowledge exchange, showcasing cutting-edge research with high relevance to sustainability, innovation, and the future transformation of Indian agriculture.

BRAINSTORMING SESSION (BSS)

"Preparing Future Ready Youths for Entrepreneurship Development in Agriculture" (Convener: Dr R.C. Agrawal, DDG Education, ICAR; Co-convener: Dr. Seema Jaggi, ADG, ICAR)

A Brainstorming Session on "Preparing Future-Ready Youths for Entrepreneurship Development in Agriculture" was organized on April 22, 2025. The session was chaired and co-chaired by Dr. Himanshu Pathak (President) and Dr. P.K. Joshi (Vice-President) respectively.

Following the welcome address by Dr. W.S. Lakra (Secretary), Dr. R.C. Agrawal presented the initiatives taken by ICAR to align agricultural education with the National Education Policy (NEP) 2020, along with key challenges and a roadmap for strengthening entrepreneurship development among youth in

agriculture. Dr. Himanshu Pathak emphasized the need for a, systems-based approach to agricultural education that integrates skill development, vocational training, and covers the entire agri-food value chain—from pre-production to post-production. He called for actionable, transformative reforms to foster innovation and entrepreneurship in the agricultural sector. Dr. P.K. Joshi reinforced the critical need to reform agricultural education and provided strategic inputs on enhancing institutional capacity, outreach, and relevance.

The deliberations focused on transforming agricultural education in India under ICAR's leadership and in alignment with NEP 2020. Key themes included fostering entrepreneurship, integrating technology, promoting interdisciplinary learning, and addressing the challenges of preparing future-ready youth for the agricultural sector.

The panel representing a diverse range of institutions from academia, government, and private sectors highlighted the significance of hands-on training, industry-academia partnerships, and the early cultivation of entrepreneurial mindsets. Recommendations included the introduction of foundation courses to shift perspectives and specialized elective courses for skill enhancement and capacity building. The session concluded with a formal vote of thanks by Dr. Seema Jaggi acknowledging the contributions of all participants (76).

OTHER ACTIVITIES

Regional Chapters' Conveners Meeting

A Meeting of the Conveners of Regional Chapters was held on June 04, 2025 in hybrid mode to review the progress of activities. The meeting was chaired by Dr. Himanshu Pathak (President).

Following the welcome address by Dr. W.S. Lakra (Secretary), Dr. Himanshu Pathak (President) in his opening remarks highlighted the importance of regional chapters in promoting agricultural science and addressing regional issues. He also shared the new structure of the Regional Chapters and the following points emerged during the meeting:

- Conveners to update contact information of the Fellows and Associates in their region and inform headquarters of changes if any.
- Regional Chapters to create WhatsApp groups for the Fellows and Associates in their region to facilitate communication.
- Regional Chapters to identify two local important agricultural issues for deliberation.
- Headquarter to compile and share list of important National and International days for Regional Chapters to observe.
- Regional Chapters to send updated utilization certificates (UCs) to headquarter while requesting additional funds.
- Regional Chapters Conveners to furnish their reports along with high resolution photographs for inclusion in the NAAS-NEWS.

Activities of the Regional Chapters

Barapani Chapter

NAAS-Barapani Chapter organized a Brainstorming Session on April 24, 2025, on "Livestock for Livelihoods: Confronting Challenges and Crafting Strategies for Northeast India" in collaboration with ICAR Research Complex for NEH Region, Umiam. The session was chaired by Dr. A.K. Misra (Former Chairman, ASRB) and convened by Dr. V.K. Mishra and Dr. S. Ghatak.

The event focused on identifying region-specific challenges and strategic opportunities to strengthen livestock-based livelihoods in Northeast India. Dr. A.K. Misra outlined a vision for dairy development in the region, while Dr. S. Ghatak presented an overview of ongoing animal science activities aligned with local needs. Dr. S. Deori highlighted the potential of livestock and poultry farming, emphasizing the importance of genetic resource conservation and tailored interventions. Key priorities identified included strategic planning for dairy enhancement, improving livestock productivity through localized approaches, and preserving indigenous genetic resources.

Coimbatore Chapter

- NAAS-Coimbatore Chapter organized an invited lecture on April 15, 2025 on "Reviving Sugar Industry in Tamil Nadu – Challenges and Opportunities", which was delivered by Dr. R. Viswanathan (Director, ICAR-Indian Sugarcane Research Institute, Lucknow). The session was attended by Scientists and officials from the sugarcane and sugar industry sectors, to address challenges and explore growth opportunities for the sugar industry in Tamil Nadu.
- A field demonstration was conducted on May 14, 2025 in collaboration with ICAR-Sugarcane Breeding Institute, Coimbatore. The demonstration focused on the mechanized sett treatment device for efficient delivery of *Trichoderma*, fungicides, and micronutrients in sugarcane, banana, and turmeric rhizomes, aimed at enhancing farmers' awareness and adoption of improved practices.
- An interaction meeting involving farmers and sugar industry officials was organized on June 18, 2025 in collaboration with ICAR-Sugarcane Breeding Institute and the South Indian Sugar Millers Association. The meeting focused on ongoing varietal evaluation trials and strategies for pest and disease management in sugarcane.

Hyderabad Chapter

NAAS-Hyderabad Chapter, celebrated the International Day of Yoga on June 21, 2025 in collaboration with ICAR-Indian Institute of Rice Research (IIRR). The event was held under the global theme "Yoga for One Earth, One Health," emphasizing the interconnectedness of individual well-being and planetary health. The program commenced with opening remarks by Dr. R.M. Sundaram (Director, IIRR).

The event featured a guided one-hour yoga and meditation session led by Ms. Deepthi Mantri, founder of YOGASHALA – The Path of Transformation. She explained the techniques, benefits, and significance

of various yoga postures and breathing exercises, making the session both enriching and informative. Participants (60) found the experience rejuvenating and expressed appreciation for the renewed sense of balance, focus, and energy it brought.

Karnal Chapter

- NAAS-Karnal Chapter hosted an interactive session on April 08, 2025, with students (35) and faculty members from Medicaps University, Indore. Dr. Gurbachan Singh (Convener) interacted with the students on various topics including soil and water conservation, natural farming practices, integrated farming systems for doubling farmers' income, crop diversification, crop residue management, and climate-smart agriculture. The students also visited the seed processing plant and learnt about the steps involved in quality seed production.
- In collaboration with ICAR-National Bureau of Animal Genetics Resources (NABGR), Karnal, celebrated International Biodiversity Day on May 22, 2025. The event saw enthusiastic participation from school students, farmers, scientists, and


जैव विविधता को बचाना हमारी जिम्मेदारी

एनबीएजीआर में आयोजित कार्यक्रम में बोले- कृषि वैज्ञानिक डॉ. गुरबचन

माई सिटी रिपोर्टर

महिला किसान को सम्मानित करते मुख्य अतिथि। स्वयं

प्रतियोगिता के विजेताओं को किया पुरस्कृत

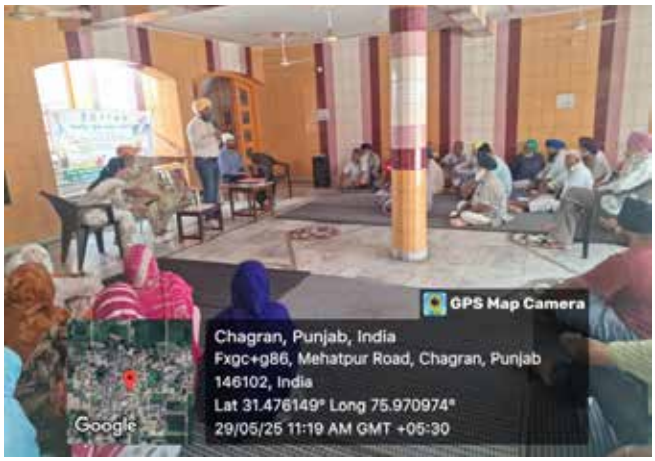
NAAS Fellows. Dr. Gurbachan Singh (Chief Guest) delivered the keynote address, highlighting the status of biodiversity in India, challenges related to natural resource degradation, and the need for strategic conservation for sustainable development. Dr. Krishan Kumar (Former DDG Horticulture, ICAR), Dr. Om Prakash Chaurasia (Director, DIHAR, Leh-Ladakh), and Dr. N.H. Mohan (Director, ICAR-NBAGR) also addressed the gathering. Progressive and innovative farmers were felicitated during the event.

- To mark World Environment Day on June 05, 2025, Dr. Gurbachan Singh (Convener), designed an awareness poster highlighting the importance of environmental conservation. The poster was widely circulated through social media platforms including Facebook, WhatsApp, and Instagram to reach larger audience and promote environmental stewardship.

Ludhiana Chapter

- NAAS-Ludhiana Chapter, under the patronage of Dr. A.S. Dhatt, organized an Awareness Programme on *"The Benefits of Mindful Eating"* on April 7, 2025, at Government Primary School, Nangal Choran (Hoshiarpur) in collaboration with Krishi Vigyan Kendra, Bahowal (Hoshiarpur). Dr. Sukhdeep Kaur delivered a lecture aimed at cultivating healthy eating habits among young children. She explained how mindful practices—such as eating slowly, recognizing hunger and fullness cues, and avoiding distractions during meals—can improve digestion, prevent overeating, and foster a healthier relationship with food. About 34 school children participated in the session.

- An awareness programme on *"Significance of Soil Testing"* was organized on May 29, 2025, at Village Chaggran (Hoshiarpur) in collaboration with Krishi Vigyan Kendra, Bahowal. Dr. Maninder Singh Bons led the session, highlighting the critical role of soil testing enabling precise and balanced fertilizer application, thereby enhancing crop yields



and preserving long-term soil health. Around 161 farmers and farm women participated and appreciated the guidance provided on interpreting soil test reports and implementing site-specific nutrient recommendations.

- An awareness programme on *"Critical Importance of Water Conservation at Agricultural Level"* was held on June 02, 2025 at Village Bisso Chak

(Hoshiarpur) in association with Krishi Vigyan Kendra, Bahowal. Dr. Ajaib Singh addressed the gathering on the urgent need for irrigation water conservation and shared best practices such as drip irrigation, mulching, and rainwater harvesting. He also encouraged the installation of household rainwater harvesting systems. The programme was attended by 32 farmers and farm women.

- Organized a Special Lecture on *"Applications of Modern Tools of Biotechnology for Pest Management and Food Security"* on June 20, 2025, in association with the Indian Society for the Advancement of Insect Science (INSAIS), Ludhiana. Dr. H.C. Sharma (Former Vice-Chancellor, YSPUHF, Solan) in his lecture emphasized the application of genetic engineering technologies such as Bt crops and RNA interference in achieving effective and eco-friendly pest control. The event, chaired by Dr. A.S. Dhatt (Convener), was attended by university officers, scientists, and students.

Varanasi Chapter

NAAS-Varanasi Chapter in collaboration with the Division of Agricultural Extension, ICAR New Delhi; ICAR-National Institute of Secondary Agriculture

(NISA), Ranchi; and ICAR-Agricultural Technology Application Research Institute (ATARI), Zone-IV, Patna organized one-day seminar on *"Social-Ecological Resilience: Strengthening Bio-cultural Resource-Based Livelihoods in the Face of Multiple Stressors"* on May 11, 2025, at NISA, Ranchi. Dr. Himanshu Pathak (President) and Dr. S.C. Dubey, (Vice-Chancellor, Birsa Agricultural University, Ranchi) were Chief Guest and Guest of Honour respectively during the seminar.

The event aimed at understanding the attributes of bio-cultural resource-based resilience among tribal communities, identify key environmental stressors affecting livelihoods, and explore adaptive strategies based on traditional knowledge and nature-based solutions such as crop diversification. More than 125 progressive farmers from 28 KVKs of Jharkhand and Bihar along with over 50 scientists and subject matter specialists from ICAR Institutes and agricultural Universities participated in the seminar.

Activities of NAAS-YUVA

A webinar by NAAS-YUVA in collaboration with Amity Foundation for Food and Agriculture was organised on April 04, 2025 on "**Beyond Short-term Gains: Soil Conservation for Sustainable Agriculture.** Professor Gerardo Rubio (University of Buenos Aires, Argentina) delivered a lecture on comparative soil conservation practices and sustainable agriculture in Argentina and India.

Publications

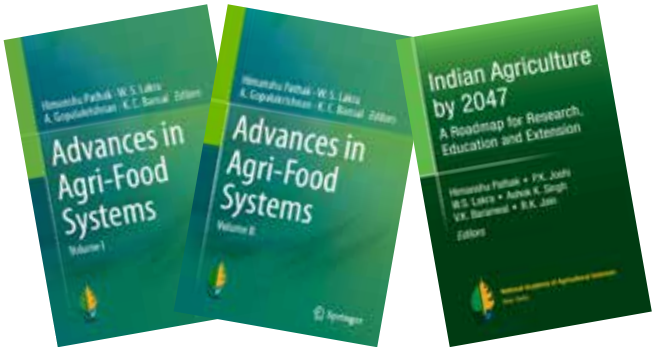
Policy Paper (PP)

PP-134: Cellular Fish Meat Production: Prospects and Challenges

Books

Advances in Agri-Food Systems Vol. I and II

Indian Agriculture by 2047: A Roadmap for Research, Education and Extension



Forthcoming Programs

- Enhancing Efficiency and Sustainability of Farmer Producer Organizations in India
- Precision Irrigation Systems Using AI and IOT
- Harnessing the Functional Plant Microbiome for Next-Generation Plant Health Management
- Marine Nutraceuticals for Boosting Bio-Economy in India
- Semio-Chemicals Driven Pest Management Strategy
- Managing Emerging Environmental Contaminants in Aquaculture and Fisheries
- Horticultural Innovation to Enhance Export Promotion
- Organic Farming for Sustainable Agriculture
- Genome Editing In Agriculture – Prospects and Challenges
- Innovative Approaches for Crop Residue Management
- Fisheries Research and Development Priorities for Partnership in South Asia

Obituaries

Dr. S. Ayyappan

(1955 –2025)

With the passing of Dr. Subbanna Ayyappan on May 10, 2025**,** India has lost one of its highly regarded visionary fisheries scientists and institution builders - who worked tirelessly to strengthen agricultural research, education, and technology outreach across the country and beyond.

As a key architect of blue revolution in the country, he remained as a source of inspiration for millions associated fisheries and aquaculture sector in the country over last four decades. His elevation from a scientist of fisheries discipline to the position of Secretary, DARE and Director General, ICAR, Government of India - from January, 2010 to February, 2016, is enough testimony of his competence, expertise and efficiency. He also occupied the position of the President of the National Academy of Agricultural Sciences (NAAS), New Delhi.

Dr Ayyappan was born in Alakere, Karnataka on 10th December, 1955 in a middle-class family. His professional journey began when he joined the Bachelor of Fisheries Science programme at the College of Fisheries, Mangalore, under the University of Agricultural Sciences, Bangalore, where he continued his academic pursuit with a Master's degree in Fisheries Science. He later earned a Ph.D. in Aquatic Microbiology from the Bangalore University. His professional career commenced in 1978 as Scientist at the ICAR-Central Inland Fisheries Research Institute, Barrackpore. Over a distinguished career spanning more than four decades, he held several key scientific and administrative positions, including Director, ICAR-Central Institute of Freshwater Aquaculture, Bhubaneswar (1996-2000); Director and Vice-Chancellor, ICAR-Central Institute of Fisheries Education, Mumbai (2000-2002); and Deputy Director General (Fishery Science), ICAR (2002-2009). Through revolutionary contributions to fisheries and aquaculture, he contributed significantly to the nation's fishery sector into a vibrant industry, improving the livelihoods of millions. In each role, he brought visionary thinking, institutional reform, and a deep commitment to excellence. He played a pivotal role in formulating a pragmatic roadmap for advancing the agriculture research in the country. He possesses over 200 national/international publications of importance in the areas of fisheries, limnology, and aquatic microbiology.

As the founder Chief Executive of the National Fisheries Development Board (NFDB) during 2006-2008, he oriented India's fisheries development agenda towards sustainability, livelihoods, and inclusive growth. In his subsequent roles as NABARD Chair Professor, Chancellor of Central Agricultural University, Chairman of the Karnataka Science and Technology Academy (KSTA), and Chairman of NABL, Dr. Ayyappan continued to shape national discourse in science, policy, and institutional development. His pioneering work earned him 15 honorary D.Sc. degrees, the prestigious Padma Shri (2022), and the Karnataka Rajyotsava Award (2013). He also received numerous other prestigious awards, including the Zahoor Qasim Gold Medal, Special ICAR Award, Dr. V.G. Jhingran Gold Medal, and was named among the Asian Scientist 100 in 2023.

As the Director General, ICAR, Dr. Ayyappan had launched several new initiatives such as the National Initiative on Climate Resilient Agriculture; Consortia Research Platforms; Farmer FIRST; Student READY; ARYA (Attracting & Retaining Youth in Agriculture); ATFC (Agri-Tech Foresight Centre); National Agri-Innovation Fund; National Agri-Science Fund; Established new Institutions like AgrInnovateIndia, NIBSM, IIAB, CAU, Bundelkhand; and formulated Vision-2030 and 2050 Documents. He served as a powerful representative of India on global platforms, bringing attention to the role of agriculture and allied sectors, particularly in fisheries, addressing poverty, nutrition, and sustainability in developing nations. His achievements in the field of fisheries had received several international acclaims, thereby he was invited to serve as Member/Chairman on the Boards of several international institutions/organizations including Network of Aquaculture Centres in Asia-Pacific (NACA), Bangkok, Thailand; MIRCEN of UNESCO in

India; International Network on Genetics in Aquaculture (INGA) of WorldFish, Penang, Malaysia; FAO/ NACA Mission on Rural aquaculture to India, Bangladesh, Thailand, Vietnam and China; etc.

Beyond his professional accomplishments, Dr. Ayyappan was deeply committed to social welfare. He founded the 'Chintana trust' into which he placed all his life savings, including his pension as well as all the amounts from various awards he had received. The interest generated from this corpus was intended to be used for the upliftment of rural communities, demonstrating his deep sense of social justice. His selfless nature of giving and serving humanity is exemplified by the gesture of writing his wish to bequeath his organs and his body to a medical college. He remained in the heart of one and all for his simplicity, modesty and kind-heartedness.

Dr. Ayyappan will not only be remembered as a scientist of stature, an able administrator and institution builder, but also as a champion of professionals, and a humanitarian at heart. His legacy lives on the institutions he shaped, the professionals he mentored, and the lives he uplifted through his vision and values.

He is survived by his wife, two daughters and their families. We offer our heartfelt condolences to his family and to the vast community of colleagues, students, and friends whose lives he touched and inspired. His contributions will continue to guide us for generations to come.

Dr. J.K. Jena
DDG Fisheries (ICAR)

Dr. A. Seetharam
(1943-2025)

Dr. Annadana Seetharam, an esteemed scientist, educator, and mentor, who was a Fellow of the National Academy of Agricultural Sciences (NAAS) since 1999, passed away on June 02, 2025, at the age of 82. Born in Harohally, Bengaluru (Karnataka), on June 03, 1943, Dr.Seetharam dedicated his life to advancing agricultural science, particularly in the realm of small millets and crop improvement. His academic journey spanned from Municipal High School in Kanakapura to distinguished Institutions, culminating in a Ph.D. from the Indian Agricultural Research Institute, New Delhi in 1968.

Throughout his prolific career, Dr. Seetharam served in various pivotal roles and contributed to the betterment of Indian Agriculture and advances in research as Assistant Cytogeneticist (1970-72); Geneticist (Sunflower) (1972-79); Associate Coordinator (Sunflower) (1980-86) at UAS Bangaluru; and Project Coordinator for Small Millets, ICAR-All India Coordinated Small Millets (1986-2003); and ICAR-Emeritus Scientist, (2003-05) at ICAR- All India Co-ordinated Research Project on Small Millets.

His research made landmark contributions, including the development of the world's first sunflower hybrid and high-yielding, blast-resistant finger millet variety GPU 28 - an illustrious achievement, that variety once occupied approximately 80% of area under finger millet cultivation in Karnataka. Dr. Seetharam was a pioneer in germplasm conservation, genetic improvement, and disease resistance breeding of sunflower and small millets such as finger millet, foxtail millet, kodo millet, proso millet, little millet, and barnyard millet.

As prolific author, he penned the influential book *"Small Millets in Global Agriculture"*. He was recognized with numerous awards/honours, including R.D. Asana Endowment Award (1980); O.P. Bhasin Award (1998); Dr. N.G.P. Rao Memorial Endowment Lifetime Achievement Research Award (2021) from Society for Millets Research; *Poshak Anaaj* Award (2022); Chairman, International Small Millets Steering Committee; and President of the Indian Society of Millets Research.

Dr. Seetharam's expertise extended beyond research, teaching and extension to the promotion of millets as nutritionally rich, sustainable crops vital for food security. His leadership and dedication earned him recognition within the scientific community and greatly advanced millets research and development.

Despite his scientific achievements and accolades, Dr. Seetharam was known for his simple and humble nature. His mentorship shaped countless researchers and his contributions have left an indelible mark on agricultural research.

The entire fraternity of scientists, farmers, and students mourns the loss of a visionary leader and dedicated scientist. His legacy will continue to inspire efforts toward dryland agriculture research and nutritious millets.

Dr. C. Tara Satyavathi
Director, Indian Institute of Millet Research, Hyderabad

Dr. Mannava V.K. Sivakumar
(1953–2025)

Dr. M.V.K. Sivakumar, a distinguished agroclimatologist, global thought leader, and former Chief of the Agricultural Meteorology Division at the World Meteorological Organization (WMO), Geneva passed away peacefully on March 30, 2025, leaving behind a towering legacy in agricultural sciences in general and *Agroclimatology in particular* for sustainable development.

Born in 1953 in India, Dr. Sivakumar commenced his journey in Science with a deep-rooted passion for the interface between agriculture and climate. A graduate of Agricultural College Bapatla (1966-70); M.Sc. from Indian Agricultural Research Institute, New Delhi (1970-73); and holder of Ph.D. from Iowa State University, USA (1973-77), he dedicated his life to applying climate science to improve agricultural resilience, especially in developing countries vulnerable to climate variability.

Dr. Sivakumar served with distinction at the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Hyderabad (1977-97) before joining WMO (1997-2012), where he spearheaded numerous international initiatives promoting the integration of weather and climate information into agricultural planning. His visionary leadership laid the foundation for many of today's climate-smart agriculture practices. He was instrumental in building institutional partnerships between WMO, FAO, CGIAR, and national meteorological services across continents.

Throughout his illustrious career, Dr. Sivakumar authored over 150 scientific publications and was a mentor to countless scientists and professionals globally. His dedication to the cause of food security; his commitment to scientific integrity; and his generosity of spirit earned him deep respect among peers. His insights helped in shaping climate policy frameworks and early warning systems that have saved lives and livelihoods around the world.

Besides Foreign Fellow of NAAS, he was Fellow of the American Society of Agronomy; Honorary Fellow, Indian Meteorological Society; Corresponding Academician of the Academy of Georgofili of Italy; and National Environmental Science Academy, India. He was also recipient of awards and honors including, Gamma Sigma Delta of USA (1976); INSA Young Scientist Award (1983); Member, Baker Endowment Council, Iowa State University, USA (2001-04); and Bharat Jyoti Award (2011).

He is survived by his family, who supported his life of service and scholarship with quiet strength and dignity. As we remember him, we celebrate a life lived with purpose, a mind that inspired, and a heart that cared.

Dr. Jyoti Prakash Tamang
(1961–2025)

Dr. Tamang, a Senior Professor and renowned Indian food microbiologist, has been working on fermented foods and alcoholic beverages of the Himalayan regions of India, Nepal and Bhutan and South East Asia for more than three decades. After acquiring Ph.D. from North Bengal University (1992), he commenced his professional inning from Sikkim University (Central University), Gangtok, (Sikkim) as Faculty. He passed away on April 29, 2025. He served the institution throughout his life and held various positions at the university, including Academic coordinator; Dean, School of Life Sciences; Registrar; and Professor, Department of Microbiology. He was also currently the officiating Vice-Chancellor of Sikkim University. In between, he had a short stint as Visiting Professor at the Research Institute of Humanity and Nature, Ministry of Education, Science and Technology, Kyoto, Japan during 2009-10. He was also Visiting Professor at Chonbuk National University Hospital, Jeonju, South Korea.

Known for his exceptional studies on fermented food, Dr. Tamang was an elected Fellow of the Indian National Science Academy (INSA); National Academy of Science, India (NASI); National Academy of Agricultural Sciences (NAAS); Indian Academy of Microbiological Sciences; and Biotech Research Society of India. The Department of Biotechnology (Government of India), also awarded him the National Bioscience Award for Career Development for his contributions to biosciences in 2005 and he was the International Centre for Integrated Mountain Development (ICIMOD)-Mountain Chair (2019-2022). Tamang was nominated as the Global Kimchi Ambassador by the World Institute of Kimchi, Government of South Korea.

During his career, he published more than 200 research papers, and authored 10 books with more than 10,500 citations with h-index 55. He is survived by his wife, son, daughter, son-in-law and grandson.

Dr. R.K. Avasthe
Joint Director, ICAR Research Complex, NEH Region, Sikkim

Editors: Drs. V.K. Baranwal and R.K. Jain

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