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Krishaka Devo Bhava

Let Farmers be Your God



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About

Krishaka Devo Bhava (KDB) is an e-magazine, highlighting rural issues, published by Ramakrishna Mission Vivekananda Educational and Research Institute (RKMVERI), Ranchi Centre. The first issue of the e-magazine was published on the historic occasion of Swami Vivekananda's 150th birth anniversary celebration and during the international year, 2014, of family farming. Let us add the slogan *Krishaka Devo Bhava* to the traditional ancient exhortations and Swami Vivekananda's own exhortation of *Murkha Devo Bhava*, *Daridra Devo Bhava* and struggle to live up to this new exhortation in letter and spirit. This open access and free e-magazine accepts theoretical and conceptual articles as well as empirical and review papers in different areas of agriculture, rural and tribal issues. The magazine occasionally publishes special and contemporary issues that explore a single topic. It also publishes, research notes, creative writing, personal field experience, scholarly comments and reviews of books. Published in three issues per year, January, April and October, coincide with the birth anniversary of Swami Vivekananda, Rabindranath Tagore and Mahatma Gandhi, respectively.

Foreword

It is with great pleasure that I introduce this edition of our e-magazine, released on the significant occasion of Gandhi Jayanti, observed on October 2nd each year. This day marks the birth anniversary of Mahatma Gandhi, a visionary leader whose philosophy continues to guide us, particularly in the domains of social justice, rural development, and sustainable living. In this issue, we aim to pay homage to Gandhiji's timeless ideals and reflect on how his thoughts and principles remain relevant in today's world, especially in the context of rural development.

Gandhiji, often referred to as the "Father of the Nation," believed that the soul of India resides in its villages. His profound connection to rural India shaped much of his ideology, which stressed self-reliance, simplicity, and dignity for every individual. For Gandhi, the prosperity of India could only be achieved through the upliftment of rural areas. He envisioned a decentralized society where villages would become self-sufficient units, producing their own food, clothing, and other necessities.

In a world where urbanization and globalization have become dominant narratives, it is easy to forget the importance of rural development. Yet, Gandhian philosophy reminds us that without the foundation of strong, sustainable villages, the broader national structure would remain weak. His concept of 'Gram Swaraj'—self-rule for villages—was not merely about political independence but also economic, social, and moral autonomy. He advocated for local governance, the use of Indigenous resources, and the development of cottage industries to reduce dependence on external markets. This, he believed, would prevent exploitation and promote equality in society.

Another critical aspect of Gandhian rural development was his focus on non-violence (Ahimsa) and truth (Satya). These principles extended beyond interpersonal relationships to encompass the very way society should function. Gandhi believed that development achieved through exploitation, coercion, or inequality was inherently flawed. True progress, in his view, could only be achieved when the means used to reach it were pure and just. In the context of rural development, this meant empowering local communities in a way that respected their traditions, environments, and social structures while promoting equity and justice.

The concept of Sustainable Development, which is so widely discussed today, was central to Gandhiji's vision. His emphasis on simplicity, minimal consumption, and harmony with nature anticipated many of the concerns about environmental degradation and resource depletion that the modern world grapples with today. Gandhiji's belief in nurturing local, sustainable economies resonates with contemporary efforts to promote eco-friendly development and combat climate change.

As we celebrate Gandhi Jayanti, let us remember his enduring message: that true progress begins at the grassroots, with the upliftment of the rural poor. By embracing Gandhian ideals of truth, non-violence, and inclusive development, we can strive for a future where every village becomes an inspiration of self-sufficiency and dignity.

In the service of God

Swami Bhaveshananda
Administrative Head
RKMEVRI, Ranchi

Information for Contributions

Articles for scientific section should preferably between 1000-3000 words. Scientific papers written in clear, concise and correct English will be considered for publication. Acceptance of articles is based on the content of the original data or interpretation of the material. The editors reserve the right to edit manuscripts to ensure conciseness, clarity and stylistic consistency.

Manuscript: An electronic version as a Microsoft Word Document is preferred. The manuscript should be typed in double-spacing. References should be arranged alphabetically. The reference list should include all articles cited in the text and tables. Manuscripts should be submitted to the Managing Editor(s), KDB, e-magazine through email: mukherjeeashan@gmail.com

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Impact of MGNREGA facilitated irrigation sources on livelihood opportunities in Ranchi

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Introduction

Agriculture is still the main source of income for most people in rural India. However, in areas that depend on rain and in tribal regions, farming is often difficult because of uneven rainfall, lack of water, low crop yields, and deep poverty. Because water is so uncertain, village families can usually grow only one crop a year, which badly hurts their food security and steady income. To fix these farming problems, the Government of India started the Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) in 2005. At first, it was made just to give paid work, but lately, its focus has shifted to building lasting personal assets, especially for saving water and setting up local irrigation.

In states like Jharkhand, where most farming depends completely on rain, building personal water sources like ring wells acts as a major help to turn basic, small farms into busy areas that grow multiple crops. Giving farmers steady water for their fields helps them reduce farming risks, creates local jobs, and stops people from being forced to move to cities for work. To understand how these government projects help people on the ground socially and financially, this study was done with specific goals.

Objectives

1. To assess the impact of MGNREGA-facilitated irrigation sources on agricultural productivity and cropping patterns.
2. To examine how decentralized irrigation infrastructure contributes to enhancing livelihood opportunities for rural households, especially women.
3. To identify the specific role of water structures in promoting income-generating activities such as commercial vegetable cultivation and allied sectors.
4. To evaluate community participation, ownership levels, and long-term technical challenges influencing asset sustainability.

Methodology

This real-world study was carried out in the Ranchi district of Jharkhand. To look closely at local changes, the Ormanjhi block was specially chosen as the main study area. Within this block, a field survey was done across the village area of Aara village under the Tundaholi Panchayat. The study used a design that describes and analyzes facts at a single point in time. Data collection was done between December 2025 and January 2026. A complete list of farmers who have valid MGNREGA Job Cards and working water setups was taken from the local Gram Panchayat records. A group of 50 farmer households was chosen randomly from this list for a detailed field study. The group details showed that the study area supported poor communities, with 60% of the people belonging to the Scheduled Caste (SC) group and 76% holding verified Below Poverty Line (BPL) cards. Very small farms made up most of the area, with 54% of the farmers working on plots smaller than 1 acre. Data was collected using a pre-tested, organized set of questions. Simple percentages and matching measures were used to understand the changes in farming output and income before and after getting the water setups.

Findings

Motivational Factors and Functional Attributes of Water Structures

The operational performance of rural water schemes depends heavily on structural reliability and direct economic incentives. Field measurements showed that 92% of the constructed assets were individual ring wells, while 94% of the total infrastructure remained actively functional at the time of evaluation. 76% of the irrigation assets provided continuous water reliability for more than 10 months a year, establishing a steady foundation for multi-cropping extensions. Primary factors motivating farmers to maintain these structures included the reduction of lean-period financial distress, household water security (36%), and livestock support (22%). These stable conditions encourage marginal households to transition toward intensive farming systems.

Extent of Impact on Agricultural Productivity and Cropping Intensity

The introduction of localized irrigation assets has successfully eliminated complete monsoon dependency. A vast majority of the respondents (92%) reported an immediate expansion in their net cultivated land area. Before receiving MGNREGA irrigation facilities, only 2% of the farmers practised year-round intensive farming, while 14% were constrained to single cropping due to winter water limitations. Post-intervention, round-the-year multi-cropping increased to 88%, while exclusive double-cropping declined from 78% to 6%. This structural shift helped

94% of the farmers increase their total volume of agricultural production. Practice-wise adoption indices highlight that market-oriented diversification was highly successful, with 94% of the smallholders adopting commercial vegetable cultivation (e.g., tomatoes, cauliflower, cabbage) during non-monsoon periods. Traditional paddy crops remained stable at 58%. The assets function as multi-purpose infrastructure, supporting domestic water access (36%), small-scale kitchen gardening (14%), and fish farming (8%).

Economic Empowerment, Gender Dynamics, and Asset Sustainability

The financial gains from multi-cropping directly improved household incomes. Around 90% of the total sample reported a substantial increase in monthly household income. Net agricultural returns grew by 150%, rising from a traditional baseline mean of ₹14,244 to ₹35,618 per annum, reducing seasonal financial vulnerability. The gender analysis shows that women are major stakeholders, making up 70% of the active respondents. Furthermore, 96% of these women reported that localized water proximity enhanced their livelihood options and reduced daily drudgery. 96% of the respondents observed a positive change in women's involvement in household decision-making (62% stating "yes" and 34% "somewhat"). This shift indicates that economic contributions from vegetable sales translate into improved social status within the household. While 86% of the beneficiaries expressed a strong sense of personal ownership, structural sustainability remains a concern. Siltation emerged as the primary technical challenge (30%), followed by low water storage capacity during peak summer months (22%) and a lack of maintenance support (20%). These technical limitations require formal institutional assistance to ensure long-term functionality.

Contribution of the study

This study is important and contributes to the existing knowledge and policy in the following ways:

1. **Practical Evidence:** The study provides real field data showing how MGNREGA irrigation assets (like ring wells) help poor and tribal farmers in the hilly areas of Jharkhand.
2. **Focus on Individual Assets:** It proves that individual assets (92% ring wells in this study) are highly successful and have a 94% functionality rate. This tells policymakers that giving personal assets to farmers works better than community assets.

3. **Big Change in Farming:** It highlights how proper irrigation can completely change farming. In this study, year-round cultivation increased from just 2% to 88%, which directly stopped seasonal migration.
4. **Shows Real Field Problems:** The study does not just show the success, but also highlights real problems like siltation and lack of maintenance. This will help the government improve MGNREGA guidelines for the repair of these wells.

Conclusion

The study demonstrates that individual irrigation assets under MGNREGA can act as a major driver for agricultural growth in rain-fed tribal economies. Securing localized water infrastructure enabled smallholders to expand their cultivated areas and increase cropping intensity through year-round cultivation. The shift toward commercial vegetable production led to a 150% increase in net agricultural income, which helped lower the risks of seasonal distress migration. Additionally, the intervention promoted social equity and gender empowerment, significantly increasing women's involvement in household financial choices. However, long-term asset value is constrained by structural vulnerabilities like heavy siltation and limited summer storage capacity. To secure these livelihoods permanently, rural development programs should look to pair initial asset building with ongoing agronomic training, modern micro-irrigation tools, and institutional support for desiltation and maintenance

Crop Improvement and Tree Breeding Aspects: An Important Ornamental Flowering Tree — Palash

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Palash (*Butea monosperma*) crop improvement and tree breeding are transitioning from traditional selection toward biotechnology-assisted approaches. The core challenge lies in extremely low seed propagation efficiency (low viability, deep dormancy, and rapid loss of germinability after harvest), while conventional vegetative propagation (cuttings, grafting) performs poorly on mature trees and is highly genotype-dependent. Therefore, breeding strategies mainly revolve around establishing clonal propagation systems, assessing genetic diversity, and screening superior germplasm.

Crop Improvement: Micropropagation as the Core of Clonal Systems

Due to traditional propagation bottlenecks, in vitro micropropagation has become the primary breakthrough for Palash improvement. This technology aims to achieve large-scale clonal propagation, producing uniform and disease-free planting material while serving genetic improvement programs.

1. Direct organogenesis pathway: Using cotyledonary nodes or nodal segments as explants, direct shoot induction is achieved through cytokinins. Studies show that BAP (6-benzylaminopurine) at 2 mg/L is optimal, with a shoot proliferation rate of 91.9% and approximately 8.35 shoots per explant. TDZ and KN are less effective.
2. Indirect organogenesis pathway: Through callus-mediated regeneration, higher proliferation rates can be achieved and somatic embryogenesis or transformation research supported. However, this pathway carries a higher risk of somaclonal variation, necessitating genetic stability assessment using molecular markers such as ISSR.
3. Rooting and acclimatization: IBA (indole-3-butyric acid) at 1 mg/L is optimal for rooting (84.5% rooting rate, 3.75 roots per explant), with 75% survival after acclimatization.

Tree Breeding: Genetic Diversity Basis and Selection Strategies

Genetic diversity assessment provides population-level baseline data for breeding. Analysis of Palash flower color variants using ISSR and RAPD markers revealed high levels of genetic variation among

populations (average ISSR polymorphism of 85%), with clustering clearly distinguishing yellow and scarlet lineages. Notably, RAPD primer OPS-02 amplified a specific 687 bp band in wild scarlet variants, enabling development of a SCAR marker that can distinguish yellow from golden-yellow flower variants at the seedling stage, providing a practical tool for molecular-assisted selection.

Current Breeding Bottlenecks and Directions

Major obstacles facing Palash breeding include: seed recalcitrance and dormancy severely limiting seedling selection efficiency; and insufficient genomic resources restricting the depth of molecular breeding. Future directions should include: utilizing genomics, transcriptomics, and metabolomics to identify key genes controlling target traits (such as bioactive secondary metabolite content and stress tolerance), and establishing transgenic systems for targeted quality improvement. For the rare variant var. *lutea* (with fewer than 100 individuals remaining in natural populations), in vitro conservation and micropropagation are priority measures to prevent genetic erosion.

Conclusion

In summary, the improvement pathway for Palash presents a three-tier structure: "micropropagation breaking through propagation bottlenecks, molecular markers supporting diversity management, and phenotypic selection screening superior parents," with the introduction of genomic tools representing the key leap in the next phase.

From the Farmer to the Entrepreneur: The New Face of Indian Agriculture

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For generations, the image of Indian agriculture was fixed in the popular imagination: a farmer bent over a small plot of land, dependent on the monsoon, selling produce at a local mandi at prices dictated by middlemen, and passing on the same methods and the same struggles to the next generation. That image, while still true for millions, is no longer the whole story. Across villages, small towns, and even peri-urban clusters, a new figure has begun to emerge alongside the traditional farmer: the agri-entrepreneur. This is a person who still understands the soil, the seed, and the season, but who also understands markets, branding, technology, finance, and customer relationships. India's agricultural story is gradually shifting from being only about production to being about enterprise as well.

This transformation is not a replacement of the farmer by the entrepreneur, but an expansion of what the identity of "farmer" can mean. It is a story of the same hands that once only sowed and harvested now also packaging, pricing, marketing, and exporting. Understanding this shift: its causes, its examples, its beneficiaries, and its unfinished business: is essential to understanding where Indian agriculture is headed in the coming decades.

The Traditional Farmer

Agriculture has long been the backbone of the Indian economy. It employs a very large share of the workforce, yet contributes a much smaller proportion of the country's GDP. This mismatch is not accidental; it reflects deep structural problems that have persisted even as production volumes have grown impressively over the decades. The average Indian landholding is small and often fragmented across multiple non-contiguous plots, which limits the ability of any single farmer to benefit from economies of scale. Access to formal credit has historically been difficult for smallholders, pushing many toward informal moneylenders who charge exploitative interest rates. Supply chains have traditionally run through multiple layers of intermediaries: village traders, commission agents, wholesalers: each taking a margin before produce reaches the final consumer, leaving the farmer with a shrinking share of the final price. Storage infrastructure has been inadequate, leading to significant post-harvest losses, especially

for perishable fruits and vegetables. And weather dependency, particularly on the monsoon, has made farm incomes volatile and unpredictable from one season to the next. The Green Revolution of the 1960s and 1970s solved a critical problem: it transformed India from a food-deficit nation dependent on imports into a food-surplus nation capable of feeding its own population. But it was primarily a production-focused revolution. It increased yields through high-yielding seed varieties, irrigation, and chemical fertilizers, but it did not fundamentally change who captured the economic value created by that increased production. Many farming households remained locked into a subsistence or near-subsistence model: growing, harvesting, and selling raw, unprocessed produce with very little control over pricing, timing, or the final market their goods reached.

What Is Driving the Changing?

Over the last decade or so, several forces have converged to reshape this picture in meaningful ways.

- 1. Access to Information and Direct Markets:** The spread of smartphones and affordable mobile data has fundamentally altered the information landscape in rural India. A farmer today can check weather forecasts specific to their district, access expert agronomic advice through mobile applications, compare mandi prices across multiple markets before deciding where to sell, and in some cases sell directly to institutional buyers or consumers through digital platforms. This access to information has begun to erode the traditional information asymmetry that middlemen relied upon, giving farmers more negotiating power than they have historically had.
- 2. Policy Reforms and Institutional Support:** Government policy has, in various ways, tried to nudge the sector toward greater farmer empowerment. The promotion of Farmer Producer Organisations (FPOs) has allowed farmers to pool their produce, negotiate collectively with buyers, access bulk inputs at lower cost, and in some cases invest jointly in processing or storage infrastructure that no individual smallholder could afford alone. Schemes supporting food processing, rural entrepreneurship, and agricultural infrastructure development have created new channels of institutional credit and subsidy support for farmers willing to diversify beyond raw cultivation. Reforms aimed at agricultural marketing, though contested and unevenly implemented, have opened conversations about giving farmers more choice in where and how they sell their produce.

3. **Value Addition Over Raw Sale:** Perhaps the most economically significant shift is the move up the value chain. Rather than selling raw commodities at prices set by external market forces, an increasing number of farmers are processing their own produce into higher-value goods. Turmeric is being ground into branded powder rather than sold as raw rhizome. Milk is being processed into packaged dairy products: paneer, ghee, flavoured yogurt: rather than sold in bulk to a dairy cooperative alone. Fruits are being converted into pulp, jams, and dried snacks. Grain is being milled and packaged as branded flour. Each of these steps converts a commodity, whose price the farmer cannot control, into a product with its own market identity, shelf life, and margin: a fundamentally more resilient economic position.
4. **Technology-Enabled Farming:** Precision agriculture tools are slowly making their way into Indian fields. Soil testing kits help farmers apply fertilizer more efficiently rather than by habit or guesswork. Drip and sprinkler irrigation systems reduce water use while improving yield consistency. Drones are beginning to be used for spraying and crop monitoring on larger holdings. Meanwhile, a growing ecosystem of agri-tech startups is building platforms that connect farmers directly to buyers, financiers, warehousing services, and logistics providers, cutting out layers of intermediation that previously ate into farm incomes.
5. **A Generational and Attitudinal Shift:** Perhaps the most significant change is not technological or institutional but attitudinal. Young people from farming families: some with formal education, some with prior urban work experience: are choosing to return to their villages not simply to continue farming as their parents did, but to build agribusinesses. This might take the form of a cold storage facility serving an entire cluster of villages, an organic produce brand sold through e-commerce, an agri-tourism venture that brings urban visitors to experience rural life and buy farm produce directly, or an export-oriented enterprise built around a specific crop with global demand. For this generation, agriculture is not a fallback occupation but a deliberate business choice.

The Farmer as Entrepreneur: What It Looks Like in Practice

This transformation shows up in tangible, observable ways across the country. A cluster of farmers organized through an FPO can negotiate bulk input purchases and better sale prices than any of them could individually, effectively converting collective action into business leverage. A dairy farmer who once sold milk in bulk to a local trader may now run a small

packaged-milk or paneer brand, sold through local retail outlets and, increasingly, through online delivery platforms that did not exist a decade ago. A cotton or spice grower might pursue organic certification, opening doors to premium domestic and export markets that specifically reward sustainable and chemical-free cultivation practices.

What unites these examples is a shift in orientation. Instead of producing whatever the land and tradition dictate and then hoping for a fair price, the entrepreneurial farmer begins with the market and works backward: asking what buyers want, what quality standards are required, what packaging appeals to consumers, and what price point the product can command. This is a fundamentally different way of thinking about farming: less about producing what can be grown, and more about growing what can be sold at a good margin. This shift from being a pure price-taker to becoming, at least partially, a price-maker is one of the most important economic transitions happening in rural India today. It does not eliminate market risk, but it distributes that risk differently, giving the producer more agency than before.

The Expanding Role of Women and Youth

This new face of Indian agriculture is notably more inclusive than the old one. Women's self-help groups, long used as vehicles for micro-savings and micro-credit, have increasingly become platforms for micro-enterprises in food processing, seed production, and various agri-services. These groups allow women, who have always done substantial agricultural labor but were rarely recognized as economic decision-makers, to formally participate in and benefit from value-added agricultural enterprise. Rural youth, supported by improving digital literacy and connectivity, are also launching ventures that serve farming communities directly. This includes building simple mobile applications for crop advisory and disease diagnosis, creating platforms for renting expensive farm equipment like tractors and harvesters on a pay-per-use basis, and establishing direct-to-consumer channels that connect fresh, local produce to urban buyers without multiple intermediaries. In this way, agriculture is gradually becoming a sector that educated young people are choosing to enter and build careers within, rather than one they seek to escape as quickly as possible.

Challenges Ahead

It would be misleading to suggest that this transition is complete, or that it is evenly spread across India's vast and diverse agricultural landscape. The reality is more uneven, and several

structural challenges remain unresolved. Most Indian farmers still operate small and fragmented landholdings, which continues to limit their ability to achieve meaningful economies of scale even when they diversify into processing or branding. Access to formal, affordable credit remains uneven across regions and social groups, with women and marginal farmers often facing greater barriers than others. Infrastructure gaps: particularly in cold storage, rural roads, and processing facilities: continue to cause significant post-harvest losses, especially for perishable produce that requires timely handling. Climate variability, including erratic rainfall and increasingly frequent extreme weather events, adds a layer of risk that no amount of market savvy or branding can fully offset. And for every visible success story of a farmer who has become a successful agri-entrepreneur, there remain many others who lack the starting capital, technical training, or market linkages needed to make a similar leap. Digital access itself, while improving rapidly, is still not universal. Language barriers, low digital literacy among older farmers, and inconsistent internet connectivity in remote areas mean that many of the platforms and tools designed to empower farmers do not yet reach the people who might benefit most from them. Bridging these gaps will require sustained and coordinated effort: continued investment in rural infrastructure such as cold chains and processing units; financing products genuinely designed around agricultural cash flow cycles rather than conventional urban lending models; extension services that teach not only improved farming techniques but also basic business and marketing skills; and digital platforms that are deliberately designed for low-literacy, low-connectivity users rather than adapted as an afterthought from urban-first products.

Conclusion

The story of Indian agriculture today is not a simple, linear transition from farmer to entrepreneur, but rather an expansion of what farming itself can mean in the twenty-first century. The most successful and resilient players in this new landscape are those who hold both identities at once: remaining rooted in agronomic knowledge and a deep, practical understanding of the land, while becoming equally comfortable with markets, technology, branding, and enterprise. This shift is being driven by better access to information, supportive policy reforms, a move toward value addition, the spread of appropriate technology, and, above all, a generational change in mindset among rural youth and women who see agriculture not as a livelihood of last resort but as a genuine field of opportunity. If this transformation can be extended more broadly and equitably across India's enormous and diverse farming population:

reaching smallholders, women, and remote regions as effectively as it has reached early adopters: Indian agriculture could be reshaped fundamentally over the coming decade. In that future, the farmer and the entrepreneur will not be two separate figures standing side by side, but increasingly, the same person: someone who grows, processes, brands, and sells, and who claims a fuller share of the value that Indian agriculture has always had the potential to create.

Beyond classrooms: An Unforgettable Educational Trip to Coimbatore – Part One

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Introduction: A Journey of Knowledge, Nature and Friendship

Some journeys are remembered for the places we visit, while others remain unforgettable because of the experiences, emotions, and friendships we collect along the way. Our educational tour to Coimbatore, was one such extraordinary journey that transformed our classroom learning into a beautiful real-life experience.

As B.Sc. Agriculture students, we had spent years studying agricultural sciences, crop production, plant breeding, entomology, and other important subjects. However, we always knew that the real beauty of agriculture could be understood more deeply by stepping outside the classroom and observing the world around us. Our sixth-semester educational tour provided us with that wonderful opportunity. We were excited to visit Tamil Nadu, particularly Coimbatore, a city often known as the Manchester of South India. Along with Coimbatore, we were also going to explore the breathtaking landscapes of the Nilgiri Hills, including Wellington, Coonoor, and Ooty. The primary objective of our tour was to visit prestigious agricultural institutions, observe research activities, interact with experts, and gain practical exposure to different fields of agriculture. A total of 39 students participated in this memorable expedition under the guidance of our respected faculty members, Dr. Eashan Mukherjee Sir and Dr. Swati Shabnam Ma'am. We began our journey with enthusiasm, curiosity, and countless expectations. By the time we returned, we had gained much more than academic knowledge. We had collected stories, strengthened friendships, discovered new cultures, and experienced moments that would remain in our hearts for a lifetime.

The Adventure Begins: From Ranchi to Coimbatore

Our journey began at Ranchi railway station, where excitement was clearly visible on every student's face. Everyone was busy carrying luggage, checking tickets, calling friends, and making last-minute arrangements. We boarded Train No. 13351, the Dhanbad–Alappuzha Express, at approximately 3:30 PM. As the train slowly departed from Ranchi, our long-awaited educational tour officially began. There was a mixture of excitement, nervousness, happiness, and curiosity among us. We were leaving behind our familiar surroundings and

heading towards a distant part of India that many of us had never visited before. Although we were travelling together, we were seated in different coaches. My seat was in the B3 coach, which was a third AC compartment. Soon, the train journey turned into a celebration of friendship. We shared food, exchanged jokes, laughed at silly conversations, visited friends in different coaches, and enjoyed the beautiful experience of travelling together. Even the simplest activities became memorable. Sharing a meal with friends, looking outside the window, discussing our plans, and laughing over small incidents made the journey special. As we moved farther south, the landscapes outside the train windows gradually changed. The journey became an opportunity to observe the geographical and agricultural diversity of India.

One particularly interesting sight was the extensive agricultural landscape of Andhra Pradesh. We could see large fields containing coconut palms, arecanut trees, and banana plantations. The greenery stretching across the countryside was fascinating, especially for us as agriculture students. During the night, our train reached Chennai Central, where it halted for approximately 40 minutes for a locomotive change. Despite the late hour, the experience of arriving at such a major railway station was exciting. Later, at Erode Junction, we noticed several peacocks moving around near the railway tracks. Their presence was a delightful surprise and added a touch of natural beauty to our journey. Finally, after approximately 44 hours of travelling, we arrived at Coimbatore Junction on the morning of 19 June. The moment we stepped onto the platform, we felt a wonderful sense of achievement. We had completed a long railway journey and reached the destination we had been eagerly waiting for.

Our educational adventure had truly begun!

RKMVERI Coimbatore: A Campus Where Nature Meets Education

At Coimbatore Junction, an Assistant Professor from Ramakrishna Mission Vivekananda Educational and Research Institute (RKMVERI), Coimbatore, came to receive us. We were taken to the campus, where arrangements had been made for our accommodation and meals. The moment we entered the campus, we were impressed by its peaceful atmosphere, beautiful greenery, and natural surroundings. It felt as though we had entered a completely different world, far away from the noise and rush of the city. One of the most remarkable features of the campus was its extensive vegetation. We learned that more than 75,000 trees were present across the campus, contributing to its green surroundings and pleasant environment. The campus was also home to several animals and birds. We were delighted to see peacocks, emus,

and deer moving around the premises. For us, it was fascinating to experience an educational institution where human activities existed alongside such rich natural surroundings. The peaceful environment, greenery, and open spaces made our stay refreshing and enjoyable. Another highlight was the food served in the campus mess. We had the opportunity to enjoy several delicious South Indian dishes, including rasam rice, curd rice, uttapam, idli, and sambar. The flavours were different from the food we usually ate at home, making every meal a new experience. The hospitality extended to us by the institute made our stay comfortable and memorable. We were especially grateful to Maharaj and the RKMVERI Coimbatore administration for providing accommodation and meals at a very reasonable cost. For us, the campus was not simply a place to stay. It became our temporary home, where every day began with new excitement and ended with conversations, laughter, and memories.

Exploring the World of Agricultural Research

The most important academic objective of our educational tour was to gain practical exposure to agricultural research and understand how scientific knowledge is applied beyond textbooks. During our stay, we visited various institutions associated with Tamil Nadu Agricultural University (TNAU) and explored facilities that introduced us to different aspects of agriculture, forestry, and allied sciences. These visits helped us understand the importance of research, innovation, and scientific approaches in addressing agricultural challenges.

 **Gas Forest Museum: Discovering the Importance of Forests** Our visit to the Gas Forest Museum was an interesting experience that expanded our understanding of forests and natural resources. The museum provided an opportunity to explore forest-related collections and appreciate the diversity and importance of forest ecosystems. As agriculture students, we understood that forests play a significant role in maintaining ecological balance. They help conserve biodiversity, protect soil, regulate the climate, and support the sustainability of natural resources. The visit reminded us that agriculture cannot be viewed in isolation. It is closely connected with forests, wildlife, water resources, and the environment. It encouraged us to develop a broader perspective on sustainable agriculture and natural resource management.

 **Insect Museum: A Fascinating World of Tiny Creatures:** Another exciting destination was the Insect Museum. For agriculture students, insects are among the most important organisms to study because they include both beneficial species and serious agricultural pests. The museum offered us an opportunity to observe insect specimens and

appreciate the remarkable diversity of the insect world. We could relate the displays to our classroom studies of insect morphology, classification, identification, and economic importance. The experience helped us better appreciate the role of insects in pollination, biological control, decomposition, and crop damage. It also reinforced an important lesson: understanding insects is essential for developing effective and environmentally responsible crop protection strategies.

 **Sugarcane Breeding Institute: Understanding Crop Improvement:** Our visit to the Sugarcane Breeding Institute was another valuable academic experience. Sugarcane is an economically important crop, and its improvement requires continuous research into yield, quality, disease resistance, and adaptability. The visit helped us appreciate the role of plant breeding and scientific research in developing improved crop varieties. We could connect the experience with the concepts we had studied in our plant breeding courses, particularly the importance of genetic improvement in increasing agricultural productivity. It was inspiring to see how agricultural research institutions contribute to the development of better crop varieties and support the progress of Indian agriculture. These institutional visits made our educational tour genuinely meaningful by connecting classroom concepts with the practical world of agricultural science.

 **Adiyogi: An Extraordinary Encounter with Nature and Spirituality:** Beyond our academic visits, we also explored some of the most beautiful attractions around Coimbatore. One of the most unforgettable experiences was our visit to Adiyogi, the magnificent Shiva statue situated near the Western Ghats. As we approached the destination, the surrounding landscape gradually captured our attention. The enormous statue, the open surroundings, and the distant mountains created a breathtaking view. Standing before the magnificent structure was an experience that was difficult to describe in words. The scenery was so beautiful that, for a moment, it felt as though we had entered another world. We clicked photographs, enjoyed the surroundings, and spent time with our friends, making memories that would remain special long after the tour. The peaceful atmosphere offered a refreshing break from our busy schedule of institutional visits and travelling. The beauty of the Western Ghats also reminded us of the importance of protecting India's natural landscapes and ecological heritage.

Discovering Coimbatore and Its People

Travelling to a new state is not only about visiting famous places; it is also about understanding its people, culture, and everyday life. During our stay in Coimbatore, we had opportunities to interact with local residents. We found many of them to be friendly, gentle, and welcoming.

Their behaviour made us feel comfortable despite being far away from our home state of Jharkhand. One particularly amusing observation was that whenever we mentioned Ranchi, some people immediately associated our city with the famous Indian cricketer Mahendra Singh Dhoni. It was exciting to discover that our hometown was recognised by people in another part of the country because of such a popular personality. These small interactions added warmth to our journey and helped us appreciate the cultural diversity of India. They also reminded us that travelling creates opportunities to connect with people whose languages, traditions, and lifestyles may differ from our own.

But our journey hasn't finished yet. The best moments of our tour are yet to come. Stay tuned for Part 2!

Micropropagation in Lentil

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Introduction

Lentil ($2n = 2x = 14$) is a high protein pulse legume (21-31% protein) rich in essential amino acids, iron and zinc. It belongs to the family fabaceae. It forms a staple food crop globally and enhance soil fertility through symbiotic nitrogen fixation with Rhizobium. Micropropagation (plant tissue culture) is utilized in lentil (*Lens culinaris*) production to address traditional agricultural limitations and accelerate research, breeding, and crop protection. While grain legumes like lentils are typically grown easily from seeds, micropropagation offers specific strategic advantages over conventional propagation.

Why *In Vitro* in Lentil?

1. **Rapid Multiplication of Elite Varieties:** Lentils have a relatively slow natural multiplication rate compared to cereals. Micropropagation allows breeders to rapidly scale up elite, high-yielding, or newly bred lines from a minimal amount of starting material within a short timeframe.
2. **Production of Disease-Free Plants:** Lentils are heavily susceptible to various fungal, bacterial, and viral pathogens (such as Ascochyta blight or rust) that can be transmitted via seeds. Meristem-tip culture can eliminate systemic pathogens, yielding clean, healthy planting stock.
3. **Support for Genetic Transformation and Breeding:** Grain legumes are notoriously "recalcitrant" (difficult to transform) using conventional genetic engineering methods. In vitro regeneration systems provide the foundation for introducing desirable traits—like drought tolerance, insect resistance, or enhanced nutritional profiles—via biotechnology.
4. **Germplasm Conservation and Rescuer of Rare Lines:** It offers a reliable mechanism to preserve endangered wild relatives of lentils or sterile hybrid lines that struggle to reproduce or set viable seeds naturally.

5. Year-Round Production: Tissue culture bypasses seasonal constraints, allowing researchers to propagate material continuously in controlled environments regardless of external weather or climate shifts.

Procedure:

1. Appropriate explants are selected and surface sterilization is carried out.
2. Explants such as plumule apices, epicotyl, shoot tip, and mature/ immature zygote can be used. Embryo axes yield optimum organogenesis responses.
3. Explants are thoroughly rinsed with tap water and then autoclaved distilled water to remove surface dirt and spores.
4. Disinfection is carried out with -70% ethanol for 30-60 sec followed by 4% Sodium Hypochlorite
5. Basal media used is – MS media supplemented with 3% sucrose and 0.8% agar. The pH is adjusted to pH 5.7-5.8.
6. PGRs are added and then the media is sterilized in autoclave for 15 min.
7. PGR used - Cytokinins like BAP, Kinetin, Zeatin (Shooting) and Auxins like IAA, NAA, IBA for (Rooting)

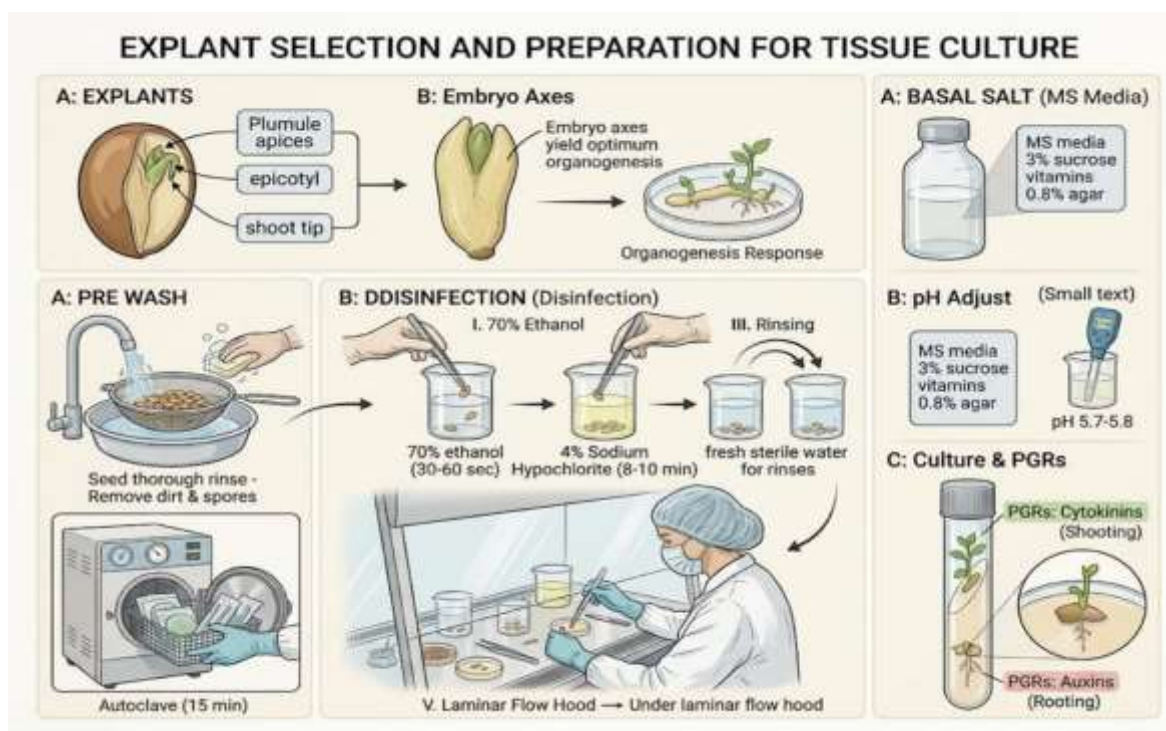


Fig. 1: Micropropagation workflow in Lentil.

The Protection of Plant Varieties and Farmers Right Act, 2001

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Introduction

The Protection of Plant Varieties and Farmers Right (PPV&FR) Act ,2001 is an Indian law that establishes an intellectual property system to encourage the development of new plant varieties while protecting the rights of farmers and plant breeders.

Why Need for this?

To recognize and protect the farmers right in respect of their contributions made by growing crops preserving the genetic resources for improvement of varieties and development of new ones and also to encourage and facilitate the growth of agriculture sector in our country an act is made to protect these rights - The Protection of Plant Varieties and Farmers Right Act 2001

- It is the only act in the world which gives the commercial palnt breeders and the farmers an equal recognition towards conservation of plant genetic resources.
- This act is based on *sui generis* system
- PPV&FR Act rules notified in 2003 and its authority is established in 2005 and the act was enforced in the same year 2005 in two phases 1st phase in 2005 and 2nd in 2006. From the year 2007 registration of plant varieties were started.

Features /Objectives of PPV&FR Act

1. To recognize and protect farmers right for their contribution towards the improvement & conservation of plant genetic resources
2. To encourage the development of new varieties for better agricultural improvements
3. To facilitate the growth of seed industry, thereby ensuring the production of good quality seeds.
4. To accelerate the development and protection of plant breeders right thereby stimulating research and development in both public as well as private sector.

- **Rights Breeders can get:** -They will have an exclusive right to produce, sell, market, distribute, import and export the protected varieties. These rights last for 18 years for trees and 15 years for field crop.
- **Rights Farmers can get:** - Farmers variety can also be registered as an extant variety and they can save, use, sow, re-sow, exchange, share or sell his farm produce including seed of a variety protected under PPV&FRA (2001).

Need for PPV&FRA for farmers: -

- ✓ Protects farmers right over seeds
- ✓ Allow save, use, sow, re-sow, exchange, share and sell seeds
- ✓ Give recognition to farmers for developing varieties
- ✓ Provide rewards for conserving traditional varieties
- ✓ Prevent exploitation by seed companies
- ✓ Maintains seed quality

Benefits of PPV&FRA

For Farmers: -

- ☺ Right to save, use, sow, re-sow, exchange, share or sell seeds
- ☺ Rewards for conserving traditional varieties
- ☺ Protection against exploitation by seed companies
- ☺ Benefit given if the varieties they develop will commercially use
- ☺ Gets compensation if seeds fail to perform
- ☺ Access to good quality seeds

For Plant Breeders: -

- ☺ Provide exclusive rights to produce, sell, market, distribute, export and import
- ☺ Encouragement for new innovation and research
- ☺ Legal protection against unauthorized use of their varieties

A variety will be called a new variety only when it fulfils the criteria of NDUS and in PPV&FRA NDUS criteria gets prioritized over DUS criteria.

- **N (Novelty):** - a variety must be new
- **D (Distinctiveness):** - variety must be clearly different from other existing known varieties

- **U (Uniformity):** - plants must be similar/uniform
- **S (Stability):** - characters should not segregate or remain unchanged over generations

The Central Government notifies information regarding PPV&FRA in official website www.plantauthority.gov.in The government issue notification specifying the genera and species for registration purpose of varieties.

Fee for Registration

S.no.	Type of variety	Fees
1	Extant Variety notified under section 5 of the Seeds Act ,1966	Rs. 2000/-
2	New Variety/ Essentially Derived Variety(EDV)/ Extant Variety about which there is common knowledge (VCK)	Individual Rs.7000/- Educational Rs.10000/- Commercial Rs.50000/-
3	Farmer Varieties	No fee

Registration of a variety is **compulsory** in PPV&FRA

