

2024 August

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VOLUME : 2, No: 4

Tissue Culture: A Sustainable Solution for Banana Cultivation



Kerala provides a favorable environment and market for banana cultivation, and many farmers have long focused on growing bananas and plantains. Globally, bananas are grown in over 120 countries, with an annual production of 86 million tonnes. India leads with 14.2 million tonnes annually, accounting for 13% of the total area under fruit crops and 33% of fruit production. In Kerala, banana and plantain cultivation occupies 1,14,289 hectares, producing 8.85 lakh tonnes as of 2016-17. The state is home to a wide diversity of banana species. India benefits from year-round banana cultivation, with the potential to harvest three crops in two years, while Indian bananas previously faced export-quality issues and now that have been overcome by technological improvements which led to both increased domestic returns as well as from overseas markets.

However to many farmers are unaware of recent technological advancements in banana cultivation. There are misconceptions about modern farming techniques, particularly tissue culture, which is a valuable method that can boost productivity in bananas and various other crops, potentially increasing farmers' average income. Unfortunately, due to a lack of awareness and false beliefs, farmers

remain skeptical about the effectiveness of tissue culture. They wrongly believe that tissue culture is time-consuming and costly, which is in fact a prevalent myth.

Andhra Pradesh has emerged as India's top banana-producing state, with an output of 68.85 lakh tonnes last year. Banana cultivation in that state expanded by nearly 30% to 1.03 lakh hectares in 2019-20, up from 79,360 hectares in 2014-15, while productivity rose from 44 to 60 tonnes per hectare. This growth is attributed to the public-private partnership model under the Integrated Agriculture Development plan, where the government provides financial support and private firms offer technological assistance. Andhra horticulture officials credit this model for the surge in banana production and exports.

The PPP model facilitated fruit-care activities in banana clusters, enhancing production, productivity, and quality through farmer producer organizations (FPOs). These efforts improved fruit quality and raised the local market price ensuring better returns to farmers. Additionally, it created more employment opportunities for skilled labour.

FOREWORD

Banana cultivation has long been a cornerstone of Kerala's agricultural heritage. While farmers in the state are well-versed in traditional practices, recent advancements, particularly in tissue culture, offer a tremendous opportunity to revolutionise banana farming. However, many farmers remain unaware of these modern techniques, and misconceptions about tissue culture continue to hinder its adoption. Despite its proven ability to significantly increase productivity and farmer income, scepticism persists in Kerala's farming community.

Kerala has much to gain by embracing tissue culture to tackle challenges such as perishability, the shortage of quality planting materials, unorganised markets, and lack of infrastructure. The large-scale production of disease-free, high-yielding tissue culture plants offers immense scope and revolutionise the cultivation.

Tissue-cultured plants are more resistant to diseases and environmental stresses, making them a reliable and sustainable choice for modern farming. Moreover, tissue culture enables year-round seedling production, which ensures the availability of varieties of banana in the market throughout the year for internal consumption and to meet exports.

Recognizing this potential, the Centre for Innovation in Science and Social Action (CISSA) has made a significant contribution by establishing a state-of-the-art Tissue Culture Laboratory at Vilappilsala, Thiruvananthapuram. This facility has the capacity to produce over five lakh tissue culture plants annually, with plans for future expansion. The future of banana farming in Kerala lies in fully embracing tissue culture technology. With the support of institutions like CISSA, farmers can harness these advancements, ensuring a more prosperous and sustainable agricultural future for Kerala.

CISSA is also actively collaborating with Farmer Producer Organizations (FPOs) to support small and marginal farmers across Kerala. CISSA is empowering farmers to adopt modern farming techniques by organising series of training programmes on production harvest, value addition, marketing etc. The present issue contains several of such activities which I am sure will update our commitments and fulfil your expectations.

Dr. Sureshkumar C
General Secretary, CISSA

advancements have boosted banana productivity in the state from 50 to 60 MT/hectare and increased the price from Rs 8,000 to Rs 12,000/MT, resulting in an additional net benefit of Rs 2.90 lakh/hectare.

Kerala should follow Andhra Pradesh's example by adopting advanced banana cultivation technologies. Tissue culture, in particular, has been a game-changer for banana farmers, addressing many challenges. By using corm buds from high-yield, disease-free mother plants, tissue culture produces thousands of uniform seedlings. Although these plants may appear small initially, they experience rapid growth within two months, ensuring synchronized maturation and harvest. Additionally, this technique allows for year-round seedling production, customized to specific needs.

The key challenges of banana cultivation are perishability, lack of quality planting materials, unorganized markets, inadequate infrastructure, natural disasters, and climate change which can be addressed through the large-scale production of disease-free, high-yielding varieties. Tissue culture also supports the intercropping of bananas with horticultural, medicinal, and aromatic plants, enhancing farmer income and sustainability in the long run.

Higher Yields, Higher Income

One of the most significant advantages of tissue culture is its potential for substantially higher yields. By selecting high-yielding mother plants and maintaining uniformity, tissue-cultured bananas produce larger and more consistent crops. This increased productivity directly correlates with higher income for farmers, as tissue-cultured plants tend to generate more fruits per plant, and the fruits themselves are of better quality. Farmers benefit from increased marketable yields, shorter cultivation periods, and greater resistance to diseases, pests and environmental stresses, making banana farming more profitable.

CISSA's Role in Mass Production of Banana seedlings

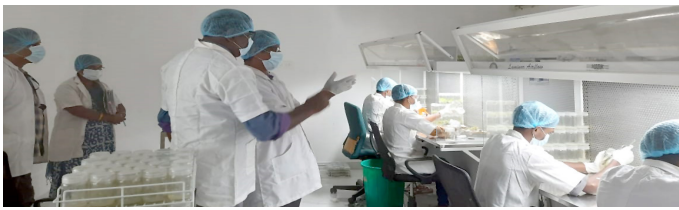
Recognizing the potential of large-scale tissue culture production to uplift rural communities, the State Horticulture Mission approved a project for the mass production of high-quality tissue culture plants, with financial support. In response, CISSA established a state-of-the-art Tissue Culture Laboratory at Vilappilsala, Thiruvananthapuram, in July 2023. This facility, led by experienced scientists, adheres to specifications from the Department of Biotechnology (DBT) under the Agricultural Infrastructure Facility

New technological interventions have been introduced as part of improving packages of practices, such as tissue culture saplings, precise drip irrigation and fertigation, dry tip removal to prevent staining, ribbon tagging for harvesting, and proper grading and packaging at integrated pack houses. These

(AIF) scheme for accreditation. The lab currently has the capacity to produce five lakh tissue culture plants annually.



Lab Operations



CISSA's tissue culture laboratory is focused on producing high-quality planting materials, including high-yielding banana clones, horticultural plants, medicinal plants etc. The lab also develops tissue culture protocols for rare, endangered, and threatened (RET) species to support conservation efforts. An experienced officer oversees the entire production process, ensuring quality control, managing materials, equipments and maintaining production records. The lab's R&D efforts are aimed at expanding its range of products and future growth.

The first batch of tissue culture banana plants, including popular varieties like G9, Nendran, Njalipoovan, and Red Kappa, is already started for distribution. These plants are offered in different stages, from primary to secondary hardening, based on customer requirements. The mother plants used to produce tissue culture clones are carefully selected from disease-free, high-yielding stocks, ensuring that all plants are suitable for Kerala's diverse agro-climatic zones. In addition to banana varieties, the laboratory can produce tissue culture plants for ornamentals, medicinal plants, vegetables, and fruit plants on demand. This diversity helps meet the growing demand for high-quality planting materials across the agricultural sector.

Cultivation and Productivity

Tissue-cultured banana seedlings are more vigorous and produce higher yields compared to conventionally propagated plants. These plants have smaller root systems that absorb only essential nutrients, leading to increased weight and improved

fruit quality. Tissue culture technology enables the production of 2-4 lakh plants from a single corm or bud, compared to just 10-15 plants through traditional vegetative means. In as little as 2-4 months, tissue culture produces healthy planting materials, while traditional methods may take 6-8 months. By selecting mother plants with high-yielding traits, CISSA ensures that tissue-cultured offspring maintain these desirable characteristics, benefiting farmers through consistent and improved production. Furthermore, a large number of true-to-type plants can be propagated within a short time and space, allowing for year-round cultivation.



Share certificate distribution by FPCs

Vamanapuram FPC



The distribution of share certificates of the Vamanapuram Farmer Producer Company was held on August 10, 2024, at the Thalayatumala Agricultural Marketing Centre in Pullampara Panchayat. The event opened with a welcome speech by Director Board member Mrs. Akhila and was chaired by fellow Director Board member Sashidharan Nair. Mr Ramachandran, representing CISSA, conducted an informative session on agricultural enterprises, loans facility and addressed farmers' questions. Attukal Ashokan, a shareholder of Vamanapuram FPC, expressed vote of thanks

Kshoni FPC



The distribution of share certificates of Varkala Kshoni Farmer Producer Company was held on August 25, 2024, at the company's office premises in Dalavapuram, Varkala. The event was presided over by the company's Chairman, Sajeev K. The welcome speech was delivered by Binu Kumar, Director.

Dr. Sureshkumar C, General Secretary of CISSA, inaugurated the program, Dr. Peethambaran C K, former director of research of Kerala Agriculture University, honored the best farmers of Kshoni Farmer Producer Company with gold awards. Sureshkumar T, National General Secretary of Kissan service society also participated and engaged with the farmers. Satyapal, member, Board of Directors member, expressed gratitude to all who attended. Other directors and CEO Athira S were also participated in the event

Entrepreneurship workshop by Vamanapuram FPC



Vamanapuram Farmer Producer Company organized an entrepreneurship workshop on August 10, 2024, at Green Auditorium, Nandiyode.

Mrs. Aparna, Senior District Resource Person from the Industries Department, conducted a session on entrepreneurship and interacted with the farmers. Mrs. Soumya, representative from Canara Bank offered guidance on various loan-related queries from the farmers. Mr Prasanth PV, a former agriculture officer representing CISSA, addressed farmers' concerns and distributed share certificates. Husqvarna Company showcased its agricultural equipments and explained their applications. Mr. Ratheesh V R, Chairman of Vamanapuram FPC, provided insights into the company's activities. Mr. Suresh Kumar, Board member discussed the future activities of the Company. The program concluded with a vote of thanks by Mrs Swapana

Premium Agro Bazaar by Kottarakkara Agro Farmer Producer Company



Kottarakkara Agro Farmer Producer Company celebrated the opening of its Premium Agro Bazaar on August 17, 2024. The event was inaugurated by Dr. Sureshkumar C, with Chairman Rajagopalan Nair who presided over the ceremony. Directors Anil Malail, R. Venu, and CEO Greeshma G offered their greetings, while Parassala FPO Chairman Ramachandran facilitated the first sale.

Market Development Committee members, farmers and employees attended the function. Agricultural implements and products are made available for distribution at subsidized rates. The bazaar offers many varieties of fruits and vegetables, flowers, fertilizers, pesticides, company's agricultural implements such as coconut dehusker, soil mixer, plastic sutli, tapping knives, sickles, ropes, grow bags, baskets, decorative items, and other tools.



Vegetables for sale at Kottarakkara

In addition to the Premium Agro Bazaar, the Kottarakkara Agro Farmer Producer Company operates two agricultural markets in the Kareepra and Pooyappally panchayaths. These markets are organized to allow farmers to sell their products and receive payment on the same day. The market in Pooyappally panchayat operates every Monday, while the one in Kareepra panchayat operates every Thursday. On an average, the farmers bring products worth around 2 lakh rupees to these markets. Having operated in this manner for the past one year, the company has decided to offer farmers a two percent bonus on their sales this Onam. A special Onam market will also be held from

September 12th to 14th. The management of both agricultural markets is overseen by two FIG groups, each consisting of 15 members.

Innovative Agricultural Drone Spray in Thiruvananthapuram district



The Grama Samrudhi FPC, Parassala, conducted micronutrients drone spray over approximately 80 hectares of paddy fields on August 2, 2024, in Thiruvananthapuram district. This initiative was carried out under the directive of the Assistant Executive Engineer (AXE) from the Agriculture Engineering Department, Thiruvananthapuram. The areas covered included Varkala-Elakamon Sangetham Paadasekharam, Kizhakkepuram Padinjattumuri Paadasekharam, Chirayinkeezhu-Mudakkal Pirapama Madu Paadasekharam, Kadakkavur Ilapuram Paadasekharam, Kulappadam Paadasekharam, and Chenkal-Keezhammakom, Melemmakom Paadasekharam.



Drone demonstration

At Kadakkavur-Ilapuram Paadasekharam, the drone spray was overseen by Mr Sabir, Mudhakkal Agriculture Officer, Mr. Ramachandran Nair, Grama Samrudhi FPC Chairman, Mr. Muneer Sha, Drone Pilot and local farmers. The operation at Mudakkal-Pirapama Madu Paadasekharam was attended by Jasmy Y, Agriculture Officer and Chairman of the Grama Samrudhi FPC. The drone spray at Chenkal-Keezhammakom Paadasekharam was supervised by AXE representative Mr. Jenlet Raj and Drone Pilot Mr. Syamkumar.

Additionally, Grama Samrudhi FPC conducted an agricultural drone demonstration for students of Lourdes Matha College of Science

and Technology, Kuttichal, on August 16, 2024. Technical guidance and flight training were provided by Mr. Sherbin, a drone pilot from Garuda Aerospace, with the presence of Grama Samrudhi FPC Accountant Mrs. Praveena Kumari M.L.



Inauguration of Agricultural procurement and Marketing Center



The newly established agricultural procurement and marketing center at Elanthoor, managed by Sabarigiri Farmer Producer Company Limited was inaugurated by Mrs. Indira Devi, Elanthoor Panchayat President on August 22, 2024. The first procurement and sale of value-added products was done by Dr. Sureshkumar.C, the General Secretary of CISSA.

The meeting was chaired by Company Chairman Mr. Prasannakumaran Nair, and graced by Mr. M.S. Anil Kumar, Mr. K.R. Sreekumar, Mrs. Nishakumari, Mr. K. Ajikumar etc, representing Board of Directors. Mr. Suresh and Mr. Uthaman, Panchayat Member of Elanthoor and Mallappuzhassery Panchayat respectively offered felicitations

Honouring PMs Initiative : Ek ped maa ke naam- A Plant For Mother



Prime Minister Narendra Modi urged citizens to plant trees as a way to protect the environment. On World Environment Day, during the 111th episode of Mann Ki Baat, PM Modi launched the 'Ek Ped Maa Ke Naam' campaign, encouraging everyone to plant a tree in honor of their mother, highlighting the profound significance of the mother-child relationship. PM Modi himself planted a tree in his mother's name. Farmer Producer Organizations (FPOs) have embraced and supported this initiative, recognizing it as a valuable investment in agriculture and a step toward a sustainable future for the next generation.

They followed the advice of the honourable PM by planting saplings on their office premises. Other FPOs like Ekatha, Kallada Rivervalley, Chengannur, Masters, Mukhathala, Grama Samrudhi, Desinganadu and Vellanad Rural etc were followed the programme and planted saplings in their surroundings.

Ekatha Farmer Producer Company



Chengannur Farmers Producer Company



Kallada River Valley FPC



Masters Farmer Producer Company



Mukhathala Farmer Producer Company



Grama Samrudhi Farmer Producer Company



Desinganadu Farmer Producer Company



Vellanad Rural Farmer Producer Company



Organizing a Training and Interactive Sessions

Pandalam Farmer Producer Company



Pandalam Farmer Producer Company, organised a training session on homestead poultry unit project on August 21, 2024, at the company's office in Aranmula Kidangannoor. The session was led by Mr. Suresh Kumar T, National General Secretary of Kissan service society. Ceo shareholders participated in the event attended by Priya Prasad, Company Chairperson, Mr.Ajith Kumar N.C, M.N. Ramachandran, Mathew Varghese from Board of Directors, Ashwanth Raj, CEO of the company etc.

Masters Farmer Producer Company



Masters Farmer Producer Company conducted a training session for homestead poultry on August 22, 2024, at their office. The session was conducted by Mr. Suresh Kumar, National General Secretary of Kissan service society. The event was attended by Mr. Biju, Chairman; Mr. Ajayakumar, Director; Divya T Nair, CEO and Sreeja V, Accountant.

Desinganadu Farmer Producer Company



Desinganadu Farmer Producer Company had organised a business orientation discussion with Dr.Kamalasanan Pillai, Head Biotechnology and Research division, Stella Maris Institute of Development Studies, Kanniyakumari on August 25, 2024, at Chathannoor. He shared numerous innovative ideas and insights into current market expectations that can enhance the business success of our FPOs.

Celebration of Kerala's Farmers' Day by FPOs



Chingam 1, marking the start of the Malayalam New Year (Kollavarsham), is a significant celebration in Kerala. On this day, Kerala observes Farmers' Day to acknowledge the vital contributions of farmers to society and to maintaining the state's agricultural legacy on this auspicious occasions

Koyikalnadu FPC



The Koyikalnadu FPC honored Mr. G. Muraleedharan, a shareholder and best farmer in Anadu Panchayat. The event was attended by Satheeshan B, Director. Bindu Sreekumar, Director and Nikhila Jayan, CEO

Kallada Rivervalley FPC



Kallada Rivervalley FPC celebrated Farmers' Day with participation of numerous farmers associated to Thamarakudy market. The event was chaired by Mr. P. Unnikrishnan, Chairman and introduced the contributions of Mrs. Deepa Sreekumar, Ward Member in the presence of Market Committee President Mr. Unnikrishnapilla and other members. The chairman

and president honored distinguished farmers of the panchayat, including Mr. Raghavan Peelikkod and Mrs. Geetha Parayidukkal. The event was also featured the company's CEO Stefini Alex and Women Director Geetha Devi.

Mukhathala FPC



Mukhathala Farmer Producer Company Limited celebrated farmers day by presenting awards and gifts to farmers. Farmers from various panchayats within the block—Nedumpna, Kottankara, Thrikkovilvattom, Ilampalloor, and Mayyanad—were recognized as the best farmer, dairy farmer, senior farmer, and mixed farmer in their respective areas. The event was attended by company directors Anil Kumar R, Priya P, Sunith Das, CEO Akhil, and ward members from the nearby panchayats.

NDDDB Board Review Meeting



Review meetings of FPOs in various districts was arranged NDDDB. The meetings were attended by Mrs. Romy Jacob, Deputy General Manager of NDDDB, Malithi Nataraj, Deputy Director of NDDDB and respective board directors. Review meetings were held for Pridhwi on August 5, 2024 Pamba Valley FPC on August 7, 2024, Kochi Agro FPC on August 13, 2024 and Alappuzha FPC on August 12, 2024 respectively. The officials reviewed the achievement so far, inspected records and gave direction for future work.



Mrs. Romy Jacob also emphasized the importance of AGM meetings. It is mandatory for every FPO, as per the Companies Act, to conduct an Annual General Body Meeting (AGM) each year. During the AGM, the Directors present the FPO's work, including financial details such as the balance sheet and budget, and seek member approval for key decisions made by the board. Typically, FPOs must complete their AGMs by September 30th of each year. She reminded the directors.



At AGM, the FPO should circulate the annual report highlighting the year's activities. The report should also list all the licenses and certificates obtained by the FPO, and explained why they were required. This will help to build awareness among FPO members about the regulatory compliances the FPO adheres to and the services it offers. It also reinforces the image of the FPO as a professional organization that operates both for the benefit of its farmer members and as a business-like, professionally managed company within the regulatory framework Mrs. Romy Jacob explained.



Arunkumar S and Ajithkumar G, both members of the CBBO participated in the meetings.

Saturation camp for FPOs



A licence saturation camp for Farmer Producer Organizations (FPO) in Thiruvananthapuram district was held on August 30, 2024, organized by ATMA and NABARD. The program featured sessions on FSSAI, fertilizer and pesticide regulations, commercial establishment licenses, and Agmark certification. Additionally, NABKISAN conducted sessions on bank credit

Consultative meeting with ADB officials



A Consultative meeting was organized between CISSA General Secretary Dr. Sureshkumar C and Mr. Harikrishnan S Pillai, Chairman of Ekatha FPC, met with Mr. Ganesh PG, Chief Consultant for the Asian Development Bank's (ADB) Agri Division, in Bangalore on August 13, 2024. During the meeting, Mr. Ganesh, an agribusiness consultant and advisor to numerous FPOs across the country, provided valuable insights on crop selection, procurement, value addition, funding, and marketing strategies for FPO products. He also emphasized the potential of forming a consortium of all FPOs under CISSA and

Yadavakulam FPC Awaits Bountiful Harvest



Yadavakulam FPC took a proactive move to combat the growing shortage of cattle feed. They had taken 8 acres of leased land in Tirunelveli District for large-scale fodder cultivation. This initiative is set to provide a consistent supply of high-quality, nutritious feed for cattle, offering significant relief to dairy farmers across the region, who have been struggling with feed shortages in recent months. To ensure sustainable and efficient farming, Yadavakulam FPC undertook extensive land preparation, incorporating modern drip irrigation systems across the entire area.



On July 12, Yadavakulam FPC began trial farming on one acre. The trial phase involves planting three high-yield maize varieties across one acre of the land, with the objective of identifying the best-performing crop in terms of both yield and nutritional value. The drip irrigation system, combined with careful seed selection, is expected to optimize crop growth and ensure consistent, high-quality output.

MIS training session



A training session on MIS updates, led by CISSA, was held on August 31, 2024, at the Kottarakkara Rural Training Centre for the eight FPOs operating in Kollam district. Mr. Sudheesh Kumar and Mr. Ajith Kumar, Directors of FPOs provided insights into the MIS system, with Sudheesh Kumar highlighting the importance of MIS updates. Ajith Kumar G addressed the CEOs' queries, and marketing expert Mr. Ashwindharan also participated in the session.

Review Meeting of Sahasradhalam



The fourth review meeting of the entrepreneur development program-Sahasradhalam 2024 was held at the CISSA office in Thiruvananthapuram on August 10, 2024. The event was attended by the CEOs of FPCs from Koyikkalnadu, Kshoni, Vamanapuram, Vellandu, Pothencode, Yadavakulam, Vellayani, Chirayankeezhu, and Neyyar. CISSA's General Secretary Dr. Sureshkumar C presided over the meeting, Mr. G. Ajithkumar (former Head of the Botany Department at MG College, Trivandrum) and Dr. C.K. Peethambaran (former Director of Agricultural Research), were also graced the occasion.

Director Board meeting of Pothencode FPC

The Director Board meeting of Pothencode Farmers Producers Company was held on August 20, 2024, at their office. The meeting was attended by the Chairman and CEO, where they discussed the company's progress. It was also decided to increase the number of shareholders beyond the current 413, and the same had been informed to the Board of Directors as well as other members.

The board had directly marketed several spices and condiments such as chillies, turmeric, coriander etc along with chips, jaggery, and coconut. During Onam celebration locally sourced vegetables were procured from farmers and sold to the public. In addition there was a discussion on the current status of the company's strategies to expedite the licensing process

KRVFPC-Thamarakudy Agriculture market visit



The Kallada River Valley Farmer Producer Company is supporting local farmers by operating an agricultural market at Thamarakudy.

On 21, August, 2024, Mr. Ajithkumar G, Agriculture expert from CISSA visited Thamarakudy agriculture market. This market serves as a key platform where farmers can bring their fresh produce directly, ensuring access to buyers and securing fair prices for their commodities. The system ensures transparency and fairness in pricing, providing immediate settlement of prices. By the end of each trading day, farmers receive the value of their produce, which eliminates any delay in payment.

Office Inauguration



The office inauguration of the Pattanakad Block Farmer Producer and Marketing Cooperative Society Ltd under NCDC was held on 17 August 2024, on the first day of Chingam.

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