



ABSTRACT

Agriculture and Farmers Welfare Department – Tamil Nadu Agricultural University - Announcement made by the Hon'ble Minister for Agriculture and Farmers Welfare during Agriculture and Farmers Welfare Department Demand 2021-2022 – Implementing the scheme **“Digital Agricultural Solution for increasing Crop Productivity in Tamil Nadu”** - Financial Sanction of Rs.2,00,00,000/- from Tamil Nadu Agricultural University fund– Approval - Accorded – Orders – Issued.

AGRICULTURE AND FARMERS WELFARE (AU) DEPARTMENT

G.O.(Ms).No. 254

Dated: 21.12.2021

திருவள்ளூர் ஆண்டு 2052

பிவை வருடம்

மார்கழி திங்கள் 6-ஆம் நாள்

Read:

From the Vice chancellor, Tamil Nadu Agricultural University, dated 25.10.2021.

ORDER:

During the Agriculture and Farmers Welfare Department Demand 2021 – 2022, among others, the Hon'ble Minister for Agriculture and Farmers Welfare has made the following announcement on the Floor of the Assembly :-

“22. தொழையணர்வு தொழில்நுட்பம் மூலம் இயற்கை வளங்களை ஆராய்ந்து பயிர், மண் மற்றும் நீர் குறித்த தகவல்கள் ரூ. 2 கோடி மதிப்பில் கணினிமயமாக்கப்படும்”

2. Based on the above announcement, the Vice-Chancellor, Tamil Nadu Agricultural University in his letter read above has sent revised proposal wherein he has putforth the following:-

(i) Title of the Project:-

Digitalising Remote Sensing based Information on Crop, Soil and Water Resources and Developing Digital Agriculture Technologies.

(ii) Background:-

Digitalization of agriculture will lead to (i) overcoming some of the long lasting constraints faced by farmers and other economic

agents and unlocking the potential of the sector, (ii) improving the overall performances resulting from reduced costs, increased sales in newly penetrated markets and better price arbitrage. It would include devising the right mix of incentives, the infrastructure, technological, legal and financial requirements, the capacity development/ training challenges at both individual and institutional levels.

For the benefits of digital agriculture to be realized, huge amounts of data need to be captured, stored, transferred and analyzed. This requires highly developed and efficient telecommunication infrastructures (mobile networks, effective data transfer facilities, etc.) at a competitive cost for operators. The policy is therefore expected to also look at the costs and benefits of alternative options on infrastructure development and/or upgrading. One critical point will relate to the scope for real time data mobilization, management, use, and maintenance at various levels of governance and decision making: farmers, intermediate governance (e.g. farmers organizations, water associations), local and state level Government.

Tamil Nadu Agricultural University has generated large database on spatial Agriculture information for Tamil Nadu viz., Land use land cover map, Soil Data, Environmental Covariates, Length of Growing Period, Soil moisture and Potential Evapo Transpiration, Normalized Difference Vegetation Index, Normalized Difference Water Index, Standardized Precipitation Index, Rainfed area map, Salt affected soils, Land degradation, Impacts of Agriculture disasters- Drought, Flood, cyclone, Digital maps of Water bodies Crop information and Weather data for >500+ stations besides Admin boundaries of state, District, villages for entire state and Cadastral maps for Tiruvarur, Perambalur and Cuddalore which will form basis for the digital agriculture initiative.

One of the primary objectives of digital agriculture technologies should be to gain the trust of farmers. Farmers are expected to react according to their profit maximization and risk minimization rationality. It is therefore central to create awareness that explain and demonstrate how digital technologies applied to agriculture can lead to increased profits and substantially improved family livelihoods. In view of this background, the project is designed for the expected outcome viz.

- i. An acceleration of the digital shift, leading to rapid productivity gains for the sector.

- ii. A faster and better feedback loop on the performance and pace of transformation for policy makers as well as for analysts. The potential benefits of specific digital application for farmers are the following: better informed decisions on price realization, access to quick pay-outs from crop insurance based on transparently generated and reliable estimates of crop losses, ability to gauge average demand, estimate peak versus low-demand season, closer link with and connection to the consumers.
- iii. A more digital agriculture with strong public sector presence could maximize the returns for society as a whole and, at the same time, help to ensure that the digital transformation benefits the poorest farmers/consumers as well.

(iii) Justification / Rationale of the Project :-

- a) Need for a Digital Agriculture platform for data acquisition from Satellite and Drone Imageries, near real time crop information, collection of farm data, soil, climate.
- b) Validating spatial datasets using in-situ field data from proximal sensors, devices and equipment.
- c) Empowering real time image processing, data analytics, data storage, cloud processing and big data analytics.
- d) Augmenting crop advisories and notifications incorporating digital information on natural resources.
- e) Requisite for developing protocols on automated field operations integrating digital information.

(iv) Objectives:-

To generate Remote Sensing and drone based agricultural information for effective governance and increasing productivity integrating Internet of Things, Sensors and Artificial Intelligence tools.

(v) Duration of the project:-

one year (2021-2022)

(vi) Activities:-

(A) Developing Spatial Agriculture Information Platform for Tamil Nadu linked to National Geo Spatial Agri Platform to provide insight on crop condition using Geo-spatial analytics

- Crop Acreage Estimation

- Crop condition monitoring
- Crop Yield
- Soil Moisture
- Weather Projections
- Agricultural Water availability and irrigation decisions
- Agriculture disasters: Drought, flood and cyclone

(B) Generation of real time crop statistics on acreage, yield from satellite and Drone images using Deep learning and Crop growth models and developing automated crop information system:

- High resolution Sentinel 1A/1B Synthetic Aperture Radar Satellite imageries will be used to determine cropping extent, track crop growth in irrigated and rainfed conditions. Tamil Nadu Agricultural University will process the satellite data using automated processing chain and deep learning algorithms and generate Crop area maps, Seasonality maps viz., Start of Season and Peak of Season maps at once and Crop phenology maps at 12-16 days interval. Tamil Nadu Agricultural University will estimate rice and maize yields at district, block, cadastral level and farm level by integrating remote sensing products viz., Rice area, Start of the Season and decibel Stack into the crop growth simulation models viz., ORYZA for rice in Tiruvarur district and Decision Support System for Agro Technology Transfer for maize in Perambalur District. Field observations and data collection will be carried out using smart phones throughout the season at sample locations and will be updated on real time basis. Observations on latitude and longitude, photos of the status of the crop, plant height, water depth, weather condition, crop stage and Leaf Area Index (LAI) from seedling and flowering stages will be made on the image acquisition dates. Crop Cutting Experiments will also be made in these continuous monitoring sites to validate yield estimates derived through crop growth models. Besides the Crop Cutting Experiment's from State department of Agriculture generated using mobile application will also be used for validation.

(C) Developing web/mobile based dynamic decision support system integrating remote sensing, Drone images and ground based observations on crop, water and soil variables

- The knowledge acquired and data generated through the research activities has to reach the beneficiaries in time for effectiveness and better adoption. This area of extension is lacking many times by developing a gap between the

availability of technology and its usability. Real time updates of information are a must for any decision making strategies. Web portals and mobile technologies are potential tools in bridging the gap between the technologies and the end users. Timely and real time updates of the findings and publishing of statistics and other crop related information will be of immense use to the beneficiaries. The information will be linked to the web portal to be developed for dynamic map query and information retrieval.

(D) Digital farming with Internet of Things and sensors

- Digital Farming to leverage technology to gather insights on all aspects of crop during the lifecycle using plant, soil and micromet sensors and Nodes and gateway communicate over ZigBee to trigger appropriate actions at farm level. Demonstration will be conducted in five locations

(E) Data analytics for Effective Knowledge transfer to farmers

- Setting up Agriculture knowledge base using historical datasets from satellite derived products, Drone images, Tamil Nadu Agricultural University Automatic Weather Station and Public Works Department network, National Resource Information System soil information, Crops practices and technology packages from Tamil Nadu Agricultural University.

(F) AI and image based stress detection

- It is necessary to reduce the utility of chemicals to safeguard the environment and improve the economic status of farming community. In this context, the proper diagnosis of weeds requires strong professional experience in precise diagnosis. The adverse effects due to application of chemicals can be avoided by early weed detection, crop surveillance and effective treatments. Most of the weeds are identified based on the visual observation by agricultural experts. In recent years, computer based model are highly useful in detection of weeds using artificial intelligence programs. Farmers can immediately and appropriately pick out weeds and get solutions with a mobile app by photographing. A model based on smart phone assisted weed identification will be developed using the vast number of images of weeds. In the present proposal, new models will be developed through artificial

intelligence for the early detection of weeds in rice and maize and to be validated under field conditions.

(vii) Beneficiaries:-

No. of farmers: 50,000 (Fifty thousand)

(viii) The budget requirement for the project is as given below:-

(Rs. in Lakh)

Sl.No.	Activity	Budget
1.	Generating historical and real-time datasets (Satellite and drone images, soil, water and crop data)	20.00
2.	Developing and Maintenance of Tamil Nadu Agri spatial platform	40.00
3.	Digital tools – Internet of Things, drone and field sensors	45.00
4.	Artificial Intelligence based tool for automatic detection of weeds and Mobile applications for knowledge transfer	25.00
5.	Establishing digital agriculture data lab, Cloud space - dashboard, digital tools and web applications	35.00
6.	Demonstrations on Sensor based Automated irrigation technologies	15.00
7.	Contingencies and field work	20.00
	Total	200.00

(ix) The source of funding for the project is as follows:-

(Rs. in Lakh)

Sl.No.	Source of fund	Amount
1.	Tamil Nadu Agricultural University Revolving Fund – Remote Sensing based information for Insurances in Emerging Economies Project technology products and services in crop insurances	52.64
2.	Tamil Nadu Irrigated Agriculture Modernization Project - Monitoring Water resources, Crop Area and diversification and Green House Gas Emissions using Remote Sensing and Geographic Information System.	102.38
3.	Government of India –Mahalonobis National Crop Forecasting Centre – Gram Panchayat Level Crop Yield Estimation using Synthetic Aperture Radar Satellite and Optical Satellite Data Integrating Crop Growth Models for Non Cereal Crops*	44.98
	Total	200.00

(* It is reported that project approval, fund release are awaited)

(x) The outcome of the project will be as follows:-

- Spatial Agriculture Information Platform for Tamil Nadu using satellite derived spatial information on Crops.
- Mobile applications on soil information, Artificial Intelligence based weed detection.
- Technology for automated irrigation integrating Internet of Things (IoT) sensors and satellite information on Potential Evapo Transpiration (PET) and Soil moisture.
- Digital agriculture solutions for effective management of soil, water and crops for enhanced agriculture productivity.

3. The Vice Chancellor, Tamil Nadu Agricultural University has therefore requested the Government to accord approval for implementation of the Digital Agricultural Solution for increasing crop productivity in Tamil Nadu (i.e) to computerize data natural resources using Remote sensors Techniques for which funds shall be utilized from the above mentioned source of Tamil Nadu Agricultural University funds.

4. The Government has carefully examined the above proposal and decided to accept the same. Accordingly, the Government accords approval to the Vice Chancellor, Tamil Nadu Agricultural University for implementing the scheme **"Digital Agricultural Solution for increasing Crop Productivity in Tamil Nadu"** at an outlay of Rs.2.00 crore (Rupees Two crore only) which shall be incurred from the Tamil Nadu Agricultural University funds mentioned at para 2 (ix) above as per components detailed below:-

(Rs. in Lakh)

Sl.No.	Activity	Budget
1.	Generating historical and real-time datasets (Satellite and drone images, soil, water and crop data)	20.00
2.	Developing and Maintenance of Tamil Nadu Agri spatial platform	40.00
3.	Digital tools – Internet of Things, drone and field sensors	45.00
4.	Artificial Intelligence based tool for automatic detection of weeds and Mobile applications for knowledge transfer	25.00
5.	Establishing digital agriculture data lab, Cloud space - dashboard, digital tools and web applications	35.00
6.	Demonstrations on Sensor based Automated irrigation technologies	15.00
7.	Contingencies and field work	20.00
	Total	200.00

5. The approval accorded above is subject to the following conditions:-

- Tamil Nadu Agricultural University, shall engage Tamil Nadu e-Governance Agency for the project as most of the components require Information Technology/ Information Technology enabled Services.
- Under Tamil Nadu Innovation Initiatives, Anna University is doing Internet of Things /Sensor based farm inputs customization. This could be linked with that project to avoid overlapping.
- Geographic Information System map of Tamil Nadu is available with Tamil Nadu e-Governance Agency with multiple academic, administrative and satellite imageries. The proposed project could utilize the same.

6. The Vice Chancellor/Registrar, Tamil Nadu Agricultural University is requested to furnish a compliance report to the Government on the implementation of the above project.

7. This order issues with the concurrence of the Finance Department vide its U.O.No. 49284/Fin.(Agri.& F.W) /2021, dated.07.12.2021.

(BY ORDER OF THE GOVERNOR)

**C. SAMAYAMOORTHY
AGRICULTURAL PRODUCTION COMMISSIONER
AND SECRETARY TO GOVERNMENT**

To

The Vice Chancellor, Tamil Nadu Agricultural University, Coimbatore -3.

The Registrar, Tamil Nadu Agricultural University, Coimbatore - 3.

The Director of Agriculture, Chepauk, Chennai-5.

The Chief Engineer (Agricultural Engineering), Chennai-35.

The Tamil Nadu e-Governance Agency, Chennai-2.

The Principal Secretary / Project Director, IAMWARM Project, Multi-Disciplinary Project Unit (MDPU) Office, Chepauk, Chennai-600 005

The Registrar, Anna University, Chennai-600 025.

The Treasury Officer concerned.

The Joint Director of Agriculture, Coimbatore-3.

The Principal Accountant General (A&E / G&SSA / E&RSA / AAD),
Chennai-18.

The Resident Audit Officer, O/o Principal Accountant General (G&SSA),
Chennai-9.

Copy to

The Special Personal Assistant to the Hon'ble Minister for Agriculture and Farmers Welfare, Chennai-9.

The Senior Private Secretary to Agricultural Production Commissioner and Secretary to Government, Agriculture and Farmers Welfare Department, Chennai-9.

The Finance (Agriculture and Farmers Welfare / BG-I /II / W&M-I) Department, Chennai-9.

The Agriculture and Farmers Welfare (AP.2 / WD.1) Department, Chennai-9.



The Agriculture and Farmers Welfare (OP.3) Department, Chennai-9.
(For Indexing purpose)

The Assistant Programmer, Agriculture and Farmers Welfare Department, Chennai-9.

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SECTION OFFICER

21.12.2024

