

TAMILNADU PRECISION FARMING PROJECT OPERATIONAL GUIDELINES

Cluster approach

The cluster approach was adopted for operational conveniences and better logistics. The consolidation of holdings was not done in as much as the farm holding were too small and there was lesser compatibility among the farmers. The cluster approach rendered support to collective marketing through mutual consultations and discussions. There were proactive farmers, active farmers and indifferent farmers in each cluster at the beginning of the project but their awareness level at the end of harvest of 1st crop was satisfactory to accept the change in perception and mindset. There are ten registered Precision Farmers Associations and they regularly meet during first week of every month to discuss about the markets and interact with buyers and input suppliers. Every one of the association is slowly getting empowered in as much as it acts as redressal mechanism for the problems of the farming.

Precision Farmers Associations at Dharmapuri have established their own Agro Service to deal with seeds, fertilizer, pesticides etc., They are able to procure and deliver better inputs in required quantities at required time at reasonable prices (with a transparent margin) to the concerned association member farmers. The firm was incorporated under company's Act and started functioning from 01.02.07. It is a total empowerment of the farmers to become entrepreneurs.

Key technologies

Remote sensing technology

Making use of the GIS, the physiographic map, soil map and land use map for Dharmapuri and Krishnagiri districts were developed. The remote sensing programme enabled the scientists to exactly locate the actual field to scale map its boundary. Two sites were selected for the observations viz., field at Periyammittahalli and a field at Thorapalli. The data on N, P, K, Ca, Mg, Mn, Fe

and Cu were collected and variability for the field and in field variability were assessed. This enabled the scientists to precisely apply the required nutrient in accurate quantities to the root zone during critical phases of crop growth.

Chisel plough

The chisel plough technology ensures better aeration to root zone and effective drainage during rainy days. Further it helps the plants to develop root system with characteristic uniformity, pattern, and architecture and in adequate mass. The Chisel plough needs to be operated once in two years. Compared to single tine chisel plough five tine chisel is effective in hard soils.

Hi-Tech Community Nursery

The seedlings are to be raised in pro trays under net houses with insect proof netting making use of (EC and pH adjusted) coco peat media treated with pseudomonas. The seedlings produced will be strikingly uniform with similar physical and physiological age thus ensuring 100 per cent field stand and sustain 100 per cent productive plants. The root mass is on the outer surface of root ball and hence there is no causality. The Cabbage and Cauliflower seedlings are extremely sensitive to pH and EC of the media while chilli and brinjal Hybrid seedlings are hardy. One net house nursery (300sm) is recommended for every cluster consisting of 20 ha.

Drip and Fertigation System

Drip and fertigation system ensures water economy, precise application of water-soluble fertilizers to root zone and keep an ideal soil moisture regime of 60 percent and aeration of 40 %. In conventional system, immediately after irrigation, the air gradient of soil becomes zero and moisture gradient becomes 100 per cent. Before irrigation the gradients are reversed thus exerting stress over the root zone. In fertigated fields, the moisture regime was 60 per cent and air gradient was 40 per cent. Thus the growth became unchecked from seedling to harvest. Surface of the soil is dry during most part of the cropping season

hence less weeds which reduces labour expenses on weeding and less pathogen which reduces cost of plant protection. Further the row crop geometry renders effective spray of pesticides and residual toxicity is comparatively less than the conventional system. Fertigation ensures precise dosage at critical stages of the crop in the immediately available form and hence the crop growth is unchecked throughout the crop period. Extended harvest is possible with fertigation.

Growing crops and growing with the crops

The field scientists stayed at villages and extended the technical support to the farmers throughout the crop period. The growing with the crop has made all the difference.

Market support

The marketing scientists have taken the beneficiary farmers to market places like Cochin, Koyampedu, Bangalore-Safal and Coimbatore and sensitized them on the importance of minimal grading and sorting and timely delivery to the market (say 3.00 A.M). Further the buyers from the market were taken to the projects site and impressed them on the healthy, hi-tech production system, highlighted the best of the quality parameters and strengthened the supply chain. The farmers were provided with plastic crates and trained sufficiently on grading and sorting to different markets. The marketing scientists also studied the market situations and flow of vegetables and guided the farmers to select crop and variety for cultivation during particular season, thus making the market-led production in real sense.

Benefits of the project

- 60 to 80 % higher yield in all the crops (The highest possible yield records under Indian conditions)
- 90% plus first grade marketable produce
- Weight by volume is 25% higher

- 30% premium price in the market
- 5-6 days more shelf life
- Less labour dependence
- 30-40 % Water economy
- Extended harvest ensuring sales during the period of peak price
- Empowerment of farmers technically, economically and socially
- Establishment of Producer Company incorporated under Company Act

Special features

Empowerment of farmers and farmers' forum

The beneficiary farmers' were organized under various commodity forums and ten various associations were formed.

01. Adhiyaman Precision Farmer's Association, Dharmapuri
02. Thiruvalluvar Precision Farmer's Association, Dharmapuri
03. Moulayanoor Precision Farmer's Association, Dharmapuri
04. Mahatma Gandhi Precision Farmers' Association, Dharmapuri
05. Annamalaiyar Precision Farmers' Association, Dharmapuri
06. Bagalur Berigai Precision Farmers' Association, Krishnagiri
07. Sarvodaya Precision Farmers Association, Saragapally, Krishnagiri
08. Sri Sathya Sai Precision Farmers Association, Jakkeri Krishnagiri.
09. V.N.R. Precision Farmers Association, Rayakottai, Krishnagiri
10. Dharmapuri Precision Farmers Agro Services Ltd., Dharmapuri, (First Producer Company in TamilNadu)

The organizations were registered under societies act and they were imparted skills to develop awareness on latest state of art technologies. The forum has helped them to buy the inputs directly from the manufacturers cutting the cost down to minimum and strengthened their bargaining power while selling their produce.

Insurance cover

The crops and systems may be insured making use of the insurance scheme in operation both at Department end and insurance company end. The tomato growers feared most the hails storm during summer and theft of coils in the motors of the drip system. The Farmers' forum and the United India Assurance officials meeting were organized and eventually, the insurance cover was extended to the crop with a low premium of 4 per cent.

Reduction in pesticide usage

The farmers were now aware of the intricacies of pesticide quality, the dosage, the time of spray and method of preparation. The practice of going for 16 rounds of combination sprays have been avoided and judicious combination has been put into practice. The drip and Fertigation technology always maintain a dry soil for a depth of 3 cm and this helps to reduce the weed growth and spore multiplication.

Promotion of brand value

The Adhiyaman Precision Farmers' Association has developed a 'logo' and brand of their own and in each crate, the logo was pasted. The logo is now gaining popularity with the buyers offering higher rate for crated with such logo.

Farmers' corporate

The corporate have four virtues with which they are successful viz.

1. They have the capability to honour any order of high volume (Quantity)
2. They do the cultivation professionally there by the physical and nutritive qualities are ensured (Quality)
3. The 1st lot and last lot are strikingly uniform (Uniformity)
4. They are able to deliver in time (Timely delivery)

These virtues viz., quantity, quality, uniformity and timely delivery are inculcated in the minds of the farmers and the Farmers' forum is now gaining the corporate

qualities and thus becoming a Farmers' Corporate, a new model to emulate in countries like India where holdings are too fragmented and empowerment of Farmers' Forum is the only way.

Farm documentation and record maintenance

Each farmer has to maintain a weekly DMS to record all the activities of the week, including inputs used and the harvests made. (Annexure-VI a, b and c). This record also helps to work out the economics of production and arrive at cost benefit ratio. The farm records will be printed and supplied to the PIAs by Tamil Nadu Agricultural University based on their indent. The PIAs should send the money to TNAU towards the supply of farm records. The newer laws in EU demand traceability which is essentially through maintenance of records at farm level. The records are to be signed both by scientists / ADA or ADH and the farmers and are a fool proof document to ensure food safety in long run.

Selection process

Criteria for selection of beneficiary farmers

- a. Individual farmer owning minimum of one ha of land is eligible (For wide spaced crops like coconut and perennial horticultural crops, the unit size shall be more than 1 ha, adequate to avail Rs.40,000/- subsidy, i.e. the total estimate may be maximum of Rs.80,000/-)
- b. Two or three farmers having less than 1 ha also can join together (by mutual agreement duly registered) and avail one ha with common water facility.
- c. If the deed and title of the land is in the name of parents and if heirs who cultivate the land prefers to become the beneficiary, the legal land owner should tender a letter of authorization in favour of the heir who cultivates the land.
- d. Twenty farmers constitute one cluster.
- e. The selection of 20 farmers as cluster may be from one revenue village to the extent possible. If not from two neighboring villages but not in a scattered manner.

- f. The farmers who have availed drip under Micro Irrigation Scheme (MIS) and Precision Farming for an area less than 5 ha are also eligible.
- g. Farmers interest group having minimum 20 members owning 1 ha each commodity based associations having minimum of 20 members owning one ha each. The land / field need not be contiguous but with in a block is preferable.

Criteria for selection of fields

- a. Soil is of moderate fertility and not a problem soil with extreme alkalinity or acidity or sodicity.
- b. Should have own water source or if the source is to be shared by the concurrence of other owners in writing to run the motor for two hours daily, needs to be produced.
- c. The land title should be in the owners name (Chitta, Adangal and RSR to be produced)
- d. Pumping system to ensure minimum of 1.5 kg / cm pressure and 12,500 litre discharge of water / hour.
- e. The pH of the soil should be relatively 6-8 and EC of irrigation water may be less than 1.5 mmhos/cm

Selection procedure

- a. Wide publicity about the programme through press meet, presentation at grievance day meet of the district and through the banners and hoardings.
- b. Call for applications from eligible farmers and farmers association (Form A: Annexure-I)
- c. Preliminary scrutiny of application by implementing departments to verify legal ownership.
- d. Land under tenancy should have a registered document as evident.

Selection Committee

District level

The selection committee for each district shall consist of the following members:

Joint Director of Agriculture	: Chairman
Scientist nominated by the university	: Member
Executive Engineer (Agrl.Engineering)	: Member
Deputy Director (Agrl.Marketing)	: Member
Deputy Director of Horticulture	: Convenor

The committee shall examine the legal ownership of the farm land and or his authourised cultivator. Before the selection, the committee shall ensure proper pumping system as given under 4.2. The copy of the selected beneficiary farmers list shall be sent to the DEE for monitoring and evaluation purpose by the JDA as and when the lists are finalized and approved by the committee.

Bilateral agreement

There should be a bilateral agreement between the beneficiary farmer and the PIA represented by the Heads of Stations and block level Assistant Director Agriculture, Assistant Director of Horticulture which indicates the role and responsibilities of both of them. (Annexure II)

How to apply

The farmer may make one application in the prescribed format and send to any one of the PIA of his choice.

Purchase procedure

Installation of drip system

TNAU: The firms approved under TANHODA shall be adopted for installation of drip system. The choice of the firm (from among the firms approved under TANHODA) is exclusively by the farmers.

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Awareness meetings may be organized by the PIAs for the benefit of the farmers on drip system and the firms at each cluster. The farmer shall install the drip system at his own initiative and pay to the firm directly deducting Rs. 40,000 (Rs forty thousand only towards subsidy) from the invoiced sum within the stipulated period by the PIA. The drip system should have all the components recommended by the Tamil Nadu Agricultural University as given in the Annexure III.

Purchase of inputs

Inputs like water soluble fertilizer, plant protection chemicals seeds and plants shall be purchased as per the approved rates of TANHOPE. TANHOPE shall finalize the rates for the newer items, if any, among the category of inputs indicated above.

If for any of the above category, TANHOPE rates are not available, KVK shall purchase as per norms of Tamil Nadu Agricultural University and departments shall purchase following the department norms.

Establishment of Net house nursery

Net house nursery of 300 m² shall be established by the PIA as a common facility for each cluster at a cost of Rs. 1.00 lakh as per the design developed by Tamil Nadu Agricultural University (Annexure-IV) and handed over to the legally registered beneficiary farmers Association of such cluster. The structure erection will be as per the design enclosed in the Annexure. Every 20 farmers can register an association and become eligible for one such net house. The association shall hire 10 cents of land for this purpose and the future profit goes to the association.

The net house nursery structure will be established by the Estate Officer, Tamil Nadu Agricultural University, Coimbatore for TNAU; State departments may follow their norms to establish the net house nursery.

Crops

Agriculture: Sugarcane, cotton, sunflower, maize, pulses, oilseeds, coconut (For coconut preferably 10 year old gardens may be selected) and mulberry or for any special crop suited to the block.

Horticulture: Annuals like vegetables, flowers, spices, medicinal plants and one year long season crops like banana, tapioca and turmeric and any special crop suited to the block.

Fertigation schedule for the crops

The detailed fertigation schedule is given in the Annexure V and trainings shall be organized to extension workers to have better understanding of the schedule and step by step procedure to compute for different sections of drip system with different population density.

Administration

Farm records and record of input supply

The farm record needs to be filled up every week and to be signed by either officers of the department (ADA/ADH or his nominee among the AOs or HOs) or SMS, KVK and not by the field consultants.

Release of inputs to beneficiary farmers

- i. At the start of the planting by few farmers, the input stock viz., Water Soluble Fertilizer, Soil Health Card, Seeds and Plant Protection chemicals must be made readily available at each centre.
- ii. To ensure synergy between the farm activity and supply of inputs in time (as and when farmers are ready for planting), it is advised to buy minimum quantity

of water soluble fertilizer and plant protection chemicals immediately and keep them as nucleus stock so as to supply the inputs **in time** to the farmers synchronizing with farm operations. Plant protection chemicals also may be ordered as below. Systemic and contact chemicals from the approved list of the TANHOPE as **uniform kit** (worth Rs.5000) to all the farmers

In case, if the farmer's choice is crops like tapioca, banana suckers, which farmers themselves mobilize, the budget towards seeds / plants components may be used to supply additional quantity of water soluble fertilizer in lieu of seeds and plants.

In case, if the pests and diseases require new chemicals to be purchased, the farmers may be allowed to buy on his own and the budget towards plant protection chemicals may be used for supplying additional quantity of water soluble fertilizer in lieu of seeds and plants.

The total cost of inputs to individual farmer should not exceed Rs.25,000/-

Drip and fertigation system

- a. The farmer may indicate his preference of Micro Irrigation (MI) Company in his application (Annexure-VII)
- b. The MI Company so preferred shall prepare the estimate and submit it to the Professor and Head, KVK/ADA/ADH.
- c. After scrutinization, Professor and Head KVK/ADA/ADH shall give the work order to the company with a copy marked to the farmer concerned
- d. The company shall execute the work after collecting the balance money from the farmers over and above the subsidy portion.
- e. TNAU: On completion of installation of drip system, the firm shall prepare the invoice (triplicate) which shall be verified at site for the correctness of the physical quantity by the ADH/ADA or Head KVK. Both farmer and ADH/ADA/Head KVK shall sign on the back of the invoice and forward to JDA for release of subsidy. The Head, KVK shall retain the 2nd copy of the invoice to release the subsidy from university and forward the same to DEE.

Department: ADA/ADH shall submit all these copies of the invoice to JDA for release of subsidy. The Director of Extension Education shall authorize trained staff of Tamil Nadu Agricultural University to check verify the system and JDA shall do the same by authorizing a trained staff of department to check verify the system and release the subsidy on satisfactory installation of the system.

- f. The invoice / bill for drip and fertigation system should be from the approved firms only and **not from the dealers**.

Recruitment of field consultants

TNAU shall place field consultants on contractual service as per TNAU norms and Joint Director / DDH may appoint field consultants by following department norms.

Such field Consultants shall be assigned with the responsibilities like assisting the farmers in carrying out all the field operations. They are not authorized to sign any document related to supply of inputs.

Bench Mark Survey & Measurables

The following are the measurables

01. 80-100% yield increase over the benchmark level
02. 30-35% water economy
03. 70-80% marketable high quality produce
04. 30-40% reduction in pesticide use
05. 60-70% increase in market awareness among the farmers

Training the farmer at Project site

12,800 beneficiary farmers and all the extension functionaries are to be provided with hands on training on precision farming at Dharmapuri and Krishnagiri project site before July 2008. Hence the resource farmers of the all cluster level registered associations and Dharmapuri Precision Farming Agro Services Ltd

shall be involved in the training programme. Further the farmer to farmer mode of training has immediate impact. The following are the associations and limited company who shall be involved in the training.

Training shall be organized at Regional Research Station (RRS), Paiyur for the farmers from different districts as well as for the development functionaries jointly by the TNAU & Cluster level Associations and Agro Services Ltd., as given below.

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Exposure visit

The exposure visit to markets shall be conducted by the staff of Directorate of Agri-Business and Marketing.

General

- a. Application of organic manures before planting must be compulsory for all crops. The quantum may vary from crop to crop.
- b. The seedlings requirement may be planned well in advance and prior arrangements may be made with nurseries available at Dharmapuri if no shade net house is available for the first crop in all the districts.

- c. Fix time limit to selected farmers for installation of drip in writing and beyond the time limit remove the farmer name from the list and include one from the wait listed farmers.
- d. The farmers may be advised not to use straight fertilizers though the fertigation system.
- e. Any contingency measures during implementation could be met from the overall savings as recommended by the District Level Committee.

Monitoring and Evaluation

Monitoring and evaluation of the programme implemented by three different agencies shall be monitored and evaluated by TNAU by the following mechanism:

- a. All Heads of KVK and ADH or ADA shall submit the monthly progress report (Annexure VIII a & b) to DEE and DDH/JDA respectively for consolidation and the DDH/JDA shall submit the consolidated report to the respective PIAs with a copy to Director of Extension Education, TNAU, Coimbatore for monitoring and evaluation.
- b. DEE or the technical Directors / hired Project Scientists authorized by the University shall undertake periodical inspection of field and field records in all the districts under all three PIAs of the programme regularly at monthly periodicity.
- c. Workshops shall be held at TNAU to discuss about the process of implementation of the programme once in two months.
- d. DEE shall conduct periodical meetings at the JDAs / DDHs office to review the progress of the programme.

Technical Cell at DEE office: A technical cell shall be created at DEE`s office. Any technical issues either from the farmers or from the Extension Staff may be referred to the cell in writing either by fax (0422 6611433) or by e mail (nadppf@tnau.ac.in) for immediate clarifications.