

# **Manual**

**on**

**Low Pressure Drip Irrigation &  
Poly Nursery Management**



**Jharkhand State Livelihood Promotion Society**  
**GoJ-UNDP Supported Livelihood Promotion Strategies Project**  
**Rural Development Department**  
**Government of Jharkhand**





## संदेश

ग्रामीण विकास विभाग, झारखण्ड के अन्तर्गत गठित एवं यू.एन.डी.पी. संपोषित झारखण्ड स्टेट लाईवलीहुड प्रमोशन सोसाइटी द्वारा राज्य के किसानों के लिए नाबार्ड, बिरसा कृषि विश्वविद्यालय एवं हार्प पलान्डु के तकनीकी सहयोग से सुक्ष्म सिचाई तकनीक विकसित की गयी है।

इस तकनीक के उपयोग से किसान गैर मौसमी सब्जी का उत्पादन कर अपनी आय में काफी वृद्धि कर सकते हैं। झारखण्ड स्टेट लाईवलीहुड प्रमोशन सोसाइटी के अन्तर्गत चलाई जा रही आजीविका परियोजना द्वारा इसके सफल प्रदर्शन के काफी उत्साहजनक नतीजे प्राप्त हुए हैं। ग्रामीण विकास विभाग द्वारा इस तकनीक को एस.जी.एस.वाय. के माध्यम से किसानों को वित्तीय सहायता प्राप्त करा कर इसे पुरे राज्य में एक लाख किसानों के साथ किये जाने का लक्ष्य रखा गया है।

मैं सोसाइटी द्वारा किसानों के हित में किये जा रहे इस प्रयास की सफलता की कामना करता हूँ।



सुदेश कुमार महतो



## FOREWORD

'Don't earn enough to adopt TECHNOLOGY – Don't have technology to earn ENOUGH' Farmers in Jharkhand are caught up in this vicious cycle for years. It is generally believed that the benefits of modern farm technology have been availed of only by large farmers. However, the fact is that even small farmers can utilize selected farm technologies for efficient farm operations.

Pilot Projects at Nagri in Ratu Block and Janum Village at Angara Block of Ranchi District have successfully proven that a small intervention in the form of finance and technology can go a long way in improving cash flow of small and marginal farmers.

Conventional farming/agricultural methods based on flood irrigation and broadcasting of fertilizers, have made little headway in tackling the twin challenges of increasing productivity and optimal resource utilization. This assumes even more significance in a state like Jharkhand where the agricultural canvass is dotted with rain-fed farming, coupled with undulating land and skewed land holdings. Technology interventions, which address land productivity of marginal farmers, hold the key to usher in an effective means of addressing the issue of rural poverty alleviation.

Marginalized by remoteness, inaccessibility and traditional farming methods, upland farmers have the highest poverty and lowest quality of life indicators in the country. Cash income is very low in most upland areas and for many households the main problem is still to achieve basic food security. This project aims to generate a substantial cash flow round the year thus providing a breakthrough in income levels of rural households.

'**Gravity Based Drip Irrigation for Vegetable Cultivation on Raised Beds**' is a promising means to augment yield and income. The project size (on 1000 sq.m) is designed to optimise and '**Balance Investment Risk with Financial Returns.**'

This manual has been developed based on the ground experience of the pilot project conducted by UNDP supported livelihood promotion strategies project and information's given in this manual is based on the observations made in the farmers field.

I would also like to sincerely acknowledge the contribution of NABARD, HARP, BAU and MAATI in providing the technical inputs and handholding support in conducting the pilot and documenting the field observations to make this manual practical and user's friendly

I am also thankful to Dr. Balraj Singh Principle Scientist, IARI, New Delhi and Dr. Murtuza Hasan, Senior Scientist, IARI, New Delhi for visiting the field and contributing critical technical informations to enrich the contents of the manual

We propose to impart technology and training, to small / marginal, BPL and women farmers through R-SETIs, KVKs and experienced NGOs, in drip irrigation/fertigation technology in order to enable them to apply it to their farming practices, and reap the economic benefits of assured higher productivity.

(S. K. Satapathy)  
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## Project Concept

### Background :

Jharkhand is a severely food deficit and poor state with 44% of the population being BPL families, 67% of work force are engaged subsistence farming. Potential of water resource is poorly developed, less than 10% of gross cropped area is only irrigated, 85% of the cultivable area is mono cropped with very low productivity in comparison to other states and all India average. 84% of farmers are Small / Marginal category and there is a stagnation of yield of cereal crops, poor price realization & market linkages and low technical know how and use of technology are the prime reason for poor situation of farmers in the state.

However, the state has a conducive environment for vegetable cultivation and by using appropriate drip irrigation technology, vegetable crop productivity can be enhanced. This has been demonstrated at ANGARA Block of Ranchi by Jharkhand State Livelihood Promotion Society (JSLPS) & NABARD with help of a service providing agency MAATI Agrotech Private Limited, hence based on this evidence a detail scale up plan to reach 100,000 farmers is being planned. It was thought to publish a manual in the form of a practical guide book for farmers, KVKs facilitating agencies, Bankers and other practioners. This manual is on new technology i.e. Pressure compensated gravity flow based drip irrigation system, it will be useful as a ready reference material for those who are associated with promotion and use of this technology.

Development experts agree that poverty is the root cause of hunger and vulnerability in the backward districts of Jharkhand. High poverty is in the rural areas, where agriculture is the main income-earning option, but farming low-value grain crops on just an acre or two does not earn enough to eradicate poverty. Small land holders need additional options that work to their comparative advantages, generating higher value from mostly manual labor on a small land area.

Rain-fed cropping has been the mainstay of agriculture activity in Jharkhand for decades. Lack of irrigation infrastructure limits the usage of land for multi-cropping and productive cultivation. A year of poor rainfall therefore escalates the misery of our farmers to a much higher degree than that of other states.

Cereal grain quality and yield have stagnated for decades, which put pressure on small land holder farmers. They cannot expand their cropped area, mechanize their operations or raise finances to increase input levels to compensate for stagnating yields, in the way that large-scale farmers can. Better yield from other states have also undercut local agriculturalists' ability to earn a living from grain farming.

### Small-Holders face Major Challenges:

Small-holders using traditional irrigation methods on family plots face major problems in raising yields and improving crop quality. The main obstacles

confronting them are uneven distribution of water and nutrients, water wasted due to runoff and evaporation, and more intensive labor requirements.

## Bottlenecks

- Limited or inaccessible water supply
- Varying water sources that impact water quality
- Poor soil and undulating land on slopes
- Inadequate electricity supplies that hamper pump operation
- Lack of technical know-how and capital

## Project Objectives

The objective of the project is creation of livelihood opportunities in a rural areas of Jharkhand, focusing on underprivileged groups such as women, tribals, youth and other economically and socially backward communities through:



- Providing an efficient irrigation (water) management technology that empowers farmers to overcome drought situations.
- Maximizing the reach and impact of existing irrigation & water harvesting initiatives like Check Dams, Lift Irrigation systems, Ponds, Wells etc
- Ensuring a regular income mechanism – a round the year cash flow system for the farmer. Thus, **'Enabling Rural Poor to Overcome Poverty.'**

## Principles Of The Project

- a) To focus mainly on the poorest – the small and marginal farmers but simultaneously work with other village households.
- b) To create democratically run community institutions owned, managed and controlled by the poor that are essential to facilitate their integration with factor, financial and real markets.
- c) To focus on processes and systems that enable capacity enhancement of communities and other stakeholders
- d) Making investment risk worthy by building strong access to financial services, including savings, credit and insurance.
- e) Income generation would be the key through higher productivity as output.
- f) Input-output linkages in all sub-sectors to be taken up through aggregation process.

- g) Farm-diversification to be working as a risk mitigation strategy
- h) Intensive training and skill development of farmers on improved technologies and marketable skills
- i) Technical support to all sub-sectors through training, cross-visits, awareness camps, etc.
- j) Establishing results oriented monitoring and evaluation framework.

### Expected Outcome

- Increased farm productivity of participating farmers and an annual income generation of more than Rs. 50,000 per 1000sq.m of cultivation area.
- Increased local employment opportunities in on-farm and off-farm activities leading to reduce distress migration
- Increased livelihood options to participant families (>2 options per family).
- Inclusion in basic banking facility to build a capital base for self and family.
- Wider and easier access to finance for setting up village based enterprises.
- Better realization of price of farm products through post harvest management, value addition and market linkages.
- Empowered and vibrant people's organizations addressing their own developmental issues
- The project learning will provide quality inputs in formulation of programmes influencing the public policies addressing issues of poverty.



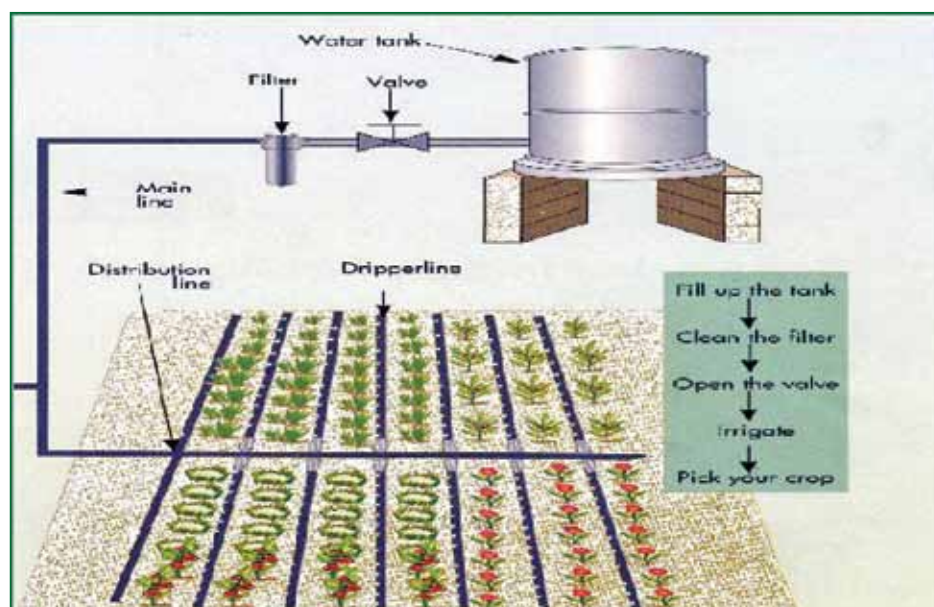
## Technology Intervention

### (A) Low Pressure Drip Irrigation System

#### Low Pressure/Gravity Based Drip irrigation system on Raised Beds for a 1000sq.m. (25 decimal) plot:

Drip irrigation helps to use water efficiently. This specially designed low pressure drip- irrigation system for 1000sq.m. of cultivation area, practically loses no water to runoff, deep percolation, or evaporation. Drip irrigation reduces water contact with crop leaves, stems, and fruit. Thus conditions may be less favorable for the onset of diseases. Irrigation scheduling can be managed precisely to meet crop demands, holding the promise of increased yield and quality. All fertilizers can be directly mixed in the water tank thus avoiding any wastage.

Drip irrigation uses specially designed pipes pre-fitted with advanced drippers. This discharges the exact amount of water and nutrients that crops need right at the root zone. Thus, every drop of water is effectively used to raise quality and increase year-round yields.



#### Raised Bed Cultivation:

Under high rainfall condition, raised bed (30-45 cm high) techniques can give better yield compared to traditional ridge and furrow system. Permanent raised beds of 90 cm width made of a mixture of sand, Farm Yard Manure (FYM) and soil is dug out on the entire cultivation area with 30 cm inter-bed spacing for drainage and movement. This system is ideally suited for round the year cultivation of vegetables with an integrated drip irrigation system.

Raised bed system allows for better soil arability and supports healthy root system. Residues of nutrients and chemicals are leached out efficiently without harming the soil properties.

### Key Benefits:

- Increases yield and quality of the produce
- Affordable and cost efficient
- Saves labor and reduces the need for electricity or other form of energy
- Enhances use of existing resources
- Prevents water run-off, deep percolation, leaching and soil erosion
- Reduces weed infestation due to very limited wet area
- Maximizes water efficiency
- Enables multi-seasonal application
- Easy operation and maintenance
- No special skills necessary

### Suits Wide Range of Crops:

- **Vegetables** : Tomato, Chilly, Brinjal, Cabbage, Cauliflower, Cucurbits...
- **Tuber crops** : Potato, Onion, Ginger, Carrots, Beet...
- **Fruits** : Melons, Strawberries, Papaya, Banana...
- **Flowers** : Marigold, Gladiolus, Tuberose...



Suitable crop rotations for vegetables cultivation under low pressure drip irrigation system.

S. No.	Name of Vegetable	Crop Rotation	Plant Spacing (L x P cm)*	Number of Plants / 1000m <sup>2</sup>	Expected yield (MT/1000m <sup>2</sup> )
1	Tomato (Semi-Indeterminate type)	June – September	120 x 30	2400 – 2600	6.0 – 8.0
	French Bean	October – November	45 x 15	18000 – 20000	1.0 – 1.5
	Cabbage	December – March	45 x 30	7000 – 7500	6.0 – 8.0
	Ladies Finger	April – June	45 x 15	18000 – 20000	2.0 – 2.5
2	Chilli	May – September	45 x 30	7000 – 7500	1.5 – 2.0
	Cauliflower	October – January	45 x 30	7000 – 7500	5.0 – 6.0
	Brinjal	February – May	120 x 30	2400 – 2500	6.0 – 8.0

\*L = Line to Line & P = Plant to Plant

S. No.	Name of Vegetable	Crop Rotation	Plant Spacing (L x P cm)*	Number of Plants / 1000m <sup>2</sup>	Expected yield (MT/1000m <sup>2</sup> )
3	Bittergourd	May – September	120 x 60	1200 – 1300	2.5 – 3.0
	Cauliflower	October – January	45 x 30	7000 – 7500	5.0 – 6.0
	Onion (only with two Laterals on each beds)	January – May	15 x 10	75000 – 80000	3.5 – 4.0
4	Bottlegourd	June – October	120 x 60	1200 – 1300	4.5 – 5.0
	Potato	November – January	45 x 15	18000 – 20000	4.0 – 5.0
	Cucumber	February – May	120 x 30	2400 – 2500	2.5 – 3.0
5	Garlic	October – April	15 x 10	75000 – 80000	1.5 – 2.0
	Bittergourd	May – September	120 x 60	1200 – 1300	2.0 – 2.5
6	Carrot	September – December	15 x 10	75000 – 80000	4.0 – 5.0
	Tomato	January – May	120 x 30	2400 – 2600	4.0 – 5.0
	Radish	June – August	15 x 10	75000 – 80000	4.0 – 5.0
7	Cowpea	June – September	45 x 15	7500 – 8000	1.0 – 1.5
	Capsicum	October – March	45 x 30	3600 – 3800	4.0 – 5.0
	Muskmelon	April – June	120 x 60	1200 – 1300	4.0 – 5.0
8	Watermelon	February – May	120 x 60	1200 – 1300	5.0 – 6.0
	Ridge gourd	June – September	120 x 60	1200 – 1300	2.0 – 2.5
	Potato	October – February	45 x 15	18000 – 20000	4.0 – 5.0
9	Knol khol	September-November	45 x 15	18000 – 20000	2.0 – 3.0
	Pea	November – February	45 x 15	18000 – 20000	1.0 – 1.5
	Cluster bean	March – June	45 x 15	18000 – 20000	1.0 – 1.5
10	Broccoli	September - December	45 x 30	7000 – 7500	2.0 – 2.5
	Radish	January – February	15 x 10	75000 – 80000	3.0 – 4.0
	Ridge gourd	March – June	120 x 60	1200 – 1300	2.0 – 2.5

## 12 mm Pressure Compensated Drip Line:

### Features and Benefits:

- Pressure Compensated (PC) system or pressure differential system works on low pressure, maintains uniform flow rate at different inlet working pressures (between 0.4 to 2.5/3.0 bar), ensuring exact distribution of the water and nutrients.



- PC drip labyrinth assures wide water passages, large deep and wide cross section improves clogging resistance. Wide cross-section allows large particles to pass through.
- Wide filtration area to ensure optimal performance even under harsh water conditions.
- Self-flushing system and wide filtration area provide improved resistance to clogging.

Given the topography of Jharkhand and the farmers' inability to invest in leveling of land, the Pressure Compensated Drip System is advised as standard equipment for efficient performance both on slopes and leveled land.

### Technical Specifications

- Drip Line Diameter : >12mm
- Dripper spacing : 30cm
- Dripper Discharge : 0.6-1.0 liter per hour
- Dripper Specification : Pressure Compensated
- Total drip line length : 840 m
- Main line : 32mm PVC (length 92m)
- Drip line spacing : 1.20m (single line)
- Working Pressure : 0.4 – 2.0 Bar
- Water Filter : Screen filter
- Water Tank 1000 liter : FRP (2 layer+) ISI
- Tank placement Level : >2 meters.

### Water Lifting Arrangement

The lifting of water from the available source to the water tank can be arranged through a 0.5 HP pump or even by a Peddle Pump depending on the energy source available to the farmer. It has been generally observed that most farmers already own one or the other water lifting mechanism hence it is better left to the farmer to select his method of filling up the tank. As a practice a 0.5HP pump takes approximately 15 minutes to fill up the 1000 litre tank.

### Poly Nursery Technology

This technique ensures that a large number of seedlings can be raised in minimum space under optimized and controlled conditions.

Scientific nursery techniques have the following advantages:

- Natural damages to tender seedlings at the nursery stage are greatly minimised

- Vigour of seedlings is increased.
- Reduces transplanting shocks and plant mortality at the field is extremely low.
- Success rate of the planting material is high.
- Overall operating costs are less, as labour cost is less.
- Inputs like water, fertilizers etc. are low.
- Germination and growth rates are enhanced.

### Land Preparation and Raised-Bed Cultivation

Each 1000 sq.m plot needs to be well ploughed and the soil has to be brought to fine tilth. Atleast one tractor trolley (approx 120-135 cft) of Farm Yard Manure (FYM) along with 50 Kgs of Neem or Karanj oil-cakes has to be mixed in soil for conditioning. The acidic nature of most of upland soils in our region demand



application of lime @ 50 Kgs for 1000 sq.m. Additional nutrients in forms of Phosphates (Single Super Phosphate) and Potash are advised for enriching the nutrient condition of the soil. Farmers are advised to maintain an annual soil health card for maximising the outputs from the land.

Raised beds up to a height of 30-45 cms need to be dug on the entire cultivation area. For most vegetables the width of the bed has to be maintained at 90cms. (3 ft) with a inter bed spacing gutter of 30cms width for ease of movement and drainage.

### Planting Density, Irrigation and Fertigation

The modern technology aims to maximise the benefit of irrigation technology by ensuring nutrient availability at the root zone. Modern cropping patterns mould itself to the dripper spacing and the most accepted planting distance is 30cms for solanaceous/cole crops and 60cms for cucurbits. Single row cropping is practiced for larger root systems of solanaceous (tomato, chilly etc.) and cucurbit crops. Whereas, cole crops and tubers are mostly planted on double row spacing with single drip line. Thus we normally get 3.3 plants per meter of drip line for crops like tomato, chilly etc. 1.6 plants per meter for cucumbers, melons etc and 6.6 plants per meter for cabbage, cauliflower or broccoli.

The Fertigation technology has evolved by leaps and bounds under the drip irrigation methodology. Modern fertilizer applications are completely dissolved in

the irrigation water and the dosages are calculated based on the nutrient uptake by per ton of the crop under cultivation. Typically a MT of tomato will uptake 4 Kgs of Nitrogen, 1.1 Kg of Phosphate and 5.5 Kg of Potassium along with micronutrients like Calcium, Boron, Magnesium, Iron, Zinc etc.

The project aims to design specific fertigation plans suited to the target yield of the prevailing crop in a soluble NPK mode along with micronutrient combos for maximum benefit and output to the farmers.

### Fertigation for different vegetable crops

S. No.	Vegetable Crop	Crop Duration	Name of Fertilizers	Quantity (kg/1000m <sup>2</sup> )	Remarks
1.	Tomato	4 months	Urea phosphate	20.0 kg	Calcium Nitrate 3.0 kg depending upon soil test
			Urea	25.0 kg	
			MOP	25.0 kg	
2	French Bean	2 months	Urea phosphate	10.0 kg	
			MOP	20.0 kg	
3	Cabbage	4 months	Urea phosphate	20.0 kg	
			Urea	25.0 kg	
			MOP	20.0 kg	
4	Ladies Finger	3 months	Urea phosphate	20.0 kg	
			Urea	20.0 kg	
			MOP	20.0 kg	
5	Brinjal	4 months	Urea phosphate	25.0 kg	
			Urea	25.0 kg	
			MOP	20.0 kg	
6	Cauliflower`	4 months	Urea phosphate	25.0 kg	Ammonium Molybedate or sodium Molybedate if soils are acidic in nature (2.0 kg)
			Urea	30.0 kg	
			MOP	25.0 kg	
7	Chilli	4 months	Urea phosphate	20.0 kg	Calcium Nitrate 2.0 kg depending upon soil test
			Urea	20.0 kg	
			MOP	20.0 kg	
8	Capsicum	5 months	Urea phosphate	30.0 kg	Calcium nitrate 3.0 kg depending upon soil test
			Urea	30.0 kg	
			MOP	25.0 kg	
9	Bittergourd	4 months	Urea phosphate	20.0 kg	
			Urea	25.0 kg	
			MOP	25.0 kg	

S. No.	Vegetable Crop	Crop Duration	Name of Fertilizers	Quantity (kg/1000m <sup>2</sup> )	Remarks
10	Onion	4 months	Urea phosphate	25.0 kg	Magnesium Sulphet 5.0 kg depending on soil test
			Urea	30.0 kg	
			MOP	30.0 kg	
11	Garlic	6 months	Urea phosphate	25.0 kg	Magnesium Sulphet- 5.0 kg depending on soil test
			Urea	30.0 kg	
			MOP	30.0 kg	
12	Carrot	4 months	Urea phosphate	30.0 kg	
			Urea	25.0 kg	
			MOP	25.0 kg	
13	Radish	2 months	Urea phosphate	15.0 kg	
			Urea	20.0 kg	
			MOP	15.0 kg	
14	Potato	3 months	Urea phosphate	30.0 kg	Magnesium Sulphet - 5.0 kg depending on soil test
			Urea	30.0 kg	
			MOP	25.0 kg	
15	Cucumber	3 months	Urea phosphate	20.0 kg	Calcium Nitrate 3.0 kg and Magnesium Sulphet - 3.0 kg
			Urea	25.0 kg	
			MOP	20.0 kg	
16	Melon	4 months	Urea phosphate	20.0 kg	
			Urea	20.0 kg	
			MOP	25.0 kg	
17	Ridge gourd	3 months	Urea phosphate	20.0 kg	
			Urea	20.0 kg	
			MOP	20.0 kg	
18	Cowpea and Cluster Bean	3 months	Urea phosphate	15.0 kg	
			MOP	20.0 kg	
19	Knol khol	3 months	Urea phosphate	15.0 kg	
			Urea	20.0 kg	
			MOP	15.0 kg	
20	Beet root	3 months	Urea phosphate	20.0 kg	
			Urea	20.0 kg	
			MOP	20.0 kg	

\* Well decomposed FYM @ 1.5 – 2.0t/ 1000m<sup>2</sup> should be added before preparation of beds.

Urea phosphate can be substituted by DAP only as basal dose (soil application).



### **Integrated Pest Management:**

In the past few decades over-dependency and indiscriminate use of pesticides have resulted in development of pesticide resistance in pests, pest resurgence, secondary pest outbreaks, elimination of beneficial insects, environmental pollution (pesticide residues) and health hazards. Therefore, several components of pest management approaches are being used singly or in combinations for managing pests. An IPM approach, therefore, is the best mix of various pest control options such as cultural practices, biological control agents such as *Trichoderma* during nursery raising, and use of chemical sprays. Regular monitoring, pruning and burring of the affected shoots and fruits in brinjal, okra and tomato, the exploitation of host avoidance mechanism through manipulation of sowing dates, mixed/inter-cropping, utilization of crop specific pheromone traps for insect monitoring, use of nuclear polyhydrosis virus (NPV), and neem (*Azadirachta indica*) seed kernel extract and development of resistant cultivars are some of the major components of IPM.

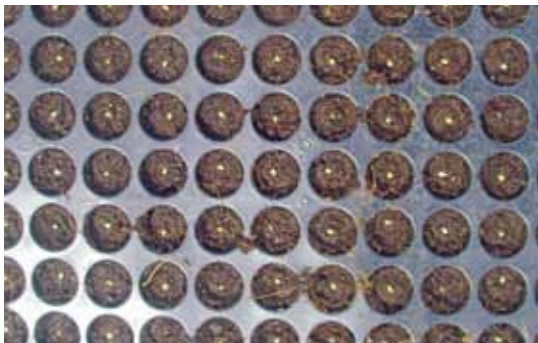
## (B) POLY NURSERY

### Nursery Growing Techniques

#### Why do we need Nursery?

A Vegetable nursery is a place or an establishment for raising or handling of young vegetable seedlings until they are ready for more permanent planting. Some vegetables require special care during their early growth period. There are some vegetables with very small sized seeds. These are first sown in the nursery for better care and to combat with the time for the field preparation and after about one month of seed sowing, transplanting is done in the main field. Quality planting material holds the key to horticulture development. Seeds of crops like cauliflower/Cabbage/Tomato/Chilli/Capsicum are sown in raised nursery beds of sterilized soil. For early season crop, the seeds should be treated with mercurial fungicides to save the young seedlings from damping off. Polyhouse can be vary suitable to provide favourable climate for germination of seeds and protection of seedlings from adverse weather condition. Four to six weeks old seedlings are transplanted in the field.

The vegetable which need such care are Tomato, Brinjal, Chillis, Capsicum, Cauliflower, Cabbage, Knol-khol (kohl rabhi), Chinese cabbage, Cabbage, Brussels sprouts, Sprouting broccoli, Endive, Chicory (red and green), Celery, Kale etc.



#### Advantages of Nursery Management:

- It is possible to provide favourable growth conditions i.e. germination as well as growth
- Better care of younger plants as it is easy to look after nursery in small area against pathogenic infection, pests and weeds.
- Crop grown by nursery raising is quite early and fetch higher price in the market, so economically more profitable.
- There is saving of land and labour as main fields will be occupied by the crops after 1 month. More intensive crop rotations can be followed.
- More time is available for the preparation of main field because nursery is grown separately.
- As vegetable seeds are very expensive particularly hybrids, so we can economize the seed by sowing them in the nursery.

## Nursery Management

### Site Selection

Site selection is the first important consideration for nursery management. The following critical points need to be considered while selecting nursery area.

- Area selected should be well drained and free from water logging.
- There should be proper sunlight.
- The nursery should be near the water supply so that irrigation can be easy.
- The area should be well protected from pet and wild animals.

### Soil Quality

- Raising of vegetable seedlings requires fertile and healthy soil.
- Preferably, the soil for nursery should be loam to sandy loam, loose and friable, rich in organic matter and well drained.
- The soil pH should be close to the neutral i.e. about 7.0

### Soil preparation

- It needs a deep cultivation of the nursery land either by soil turning plough or by spade and subsequent 2-3 hoeing with cultivator.
- After that all the clots, stones and weeds from the field should be removed and land should be leveled.
- Mix 2 kg well rotten and fine Farm yard manure/compost or leaf compost or 500 g vermi compost per square meter and mix in the soil. If the soil is heavy mix 2-3 kg sand per square meter so that the seed emergence may not be hampered.

### Soil treatment for getting healthy seedlings

For raising the healthy seedlings, soil must be treated to make it pathogen and pest free. Different methods of treatment of soil against pathogens adopted for this purpose are as under:



#### A. Soil solarization

- Suitable Time Period: May-June as temperature rises up to 45°C at this time.
- Wet the soil with water, or saturate it with water
- Spread white polythene of 200 gauges on the whole nursery area for about 5-6 weeks.

- The margin of the polythene should be covered by wet soil (compressed mud) to check the entry of air.
- After 5-6 weeks remove the polythene sheet
- Prepare the beds for seed sowing.

#### **B. Formalin Solution Treatment:**

- This treatment should be done 15-20 days before seed sowing.
- Prepare formalin solution (1.5 to 2%) in one container and drench the soil @ 4-5 litre of water per square meter soil surface to saturate it up to a depth of 15-20 cm.
- Cover the drench area with polythene sheet of 200 gauges.
- Put the wet soil on the margin of the covered polythene sheet so as it does not allow the polythene film blown away by the wind and air from the covered area to come out side.
- Remove the cover (polythene) after 15 days.
- Prepare the beds for seed sowing.

#### **C Application of Fungicides:**

- Generally used fungicides: Captan, Thiram which kill the soil borne pathogens.
- Use 5-6 g of any of the fungicides per square meter nursery area.

#### **D. Insect Control:**

- Reason of such application: Presence of certain insect pest and their egg or secondary stage insects infect the seedlings in the later stage.
- To save the seedlings some insecticides are also used as soil treatment. Recommended insecticide is Chlorpyrifos @ 2 ml/ liter of water.
- The nursery soil to be depth of 15 to 20 cm for prepatation of beds for seed sowing.

#### **E. Steam Treatment:**

- Hot steam can be used to treat the soil against harmful insect pest.
- For this, cover the required area with the help of polythene sheet and stop the movement of air in the covered area.
- Supply the hot steam for at least 4-6 hours continuously.
- This way all the harmful pathogen and insect pest will be killed.

### **Nursery Bed Preparation**

- Nursery bed should be prepared according to the season and crop.
- In the rainy season raised beds are prepared but in the winter and summer season flat beds should be prepared. Similarly onion in the winter

(rabi) season requires flat beds. For the uniform and high percentage of germination the soil must be fine and moist enough.

- If the seedlings are to be raised in boxes during unfavourable weather condition, the flower pots, polythene bags, potting plugs, wooden treys, earthen pots etc. may be used. Prepare soil mixture in the ratio of 1:1:1 of soil, sand and well rotten FYM/leaf mould etc. and fill the mixture in these seedlings raising structure. Arrangement should be made to drain excess water from these structures by making a hole in the bottom of all types of pots.

### Raised Nursery Beds

- Length of the bed may be kept 3 to 5 meter; however, width is restricted to 1 meter only which facilitates intercultural operations.
- The beds are raised 15 to 20 cm high from the ground level. A space of 30 - 40 cm is left in between two beds.
- The space between two beds helps in weeding, nursery care against diseases and insect pest and also for draining out the excess rain water from the nursery beds.
- The number of beds depends on the particular crop, season and growing area of crop.
- The beds should be prepared in the east and west direction and line should be made from north to south direction on the beds.

### Sowing of Seeds in the Nursery

After the seed bed preparation seeds are sown in the nursery bed either by broadcasting or in lines depending upon the nature and season of crop.



### Broad Casting Method:

In broadcasting method seeds are broadcasted on the well prepared nursery beds and later on the seeds are covered with well rotten fine sieved and treated FYM or compost. The major disadvantages of this method are:

- Uneven distribution of seeds in the nursery beds.
- Growth and development of seedlings is poor.
- Nursery becomes dense and looks like a patches of grasses. In such cases there is more possibility of **damping off disease** occurrence.

### Line Sowing

- Line sowing is the best method of seed sowing in nursery.
- Lines are made 0.5 to 1.0 cm deep parallel to the width at an distance of 5.0

cm from the line and seeds are sown or placed singly at a distance of about 1.0 cm apart.

- Cover the seeds with fine mixture of sand, soil and well rotten and sieved FYM or leaf compost etc. (1:1:1). After the seed sowing and covering a light irrigation must be given.

## **Seed Covering Material and its Treatment**

### **Seed Cover**

After seed sowing the seed that are sown either by broadcast method or line sowing method require cover for better emergence. Therefore, a mixture of sand: soil: FYM in the ratio of 1:1:1 is prepared, well mixed together and treated with any method of soil treatment as discussed above. It will be better to treat this mixture while treating the nursery soil. Apply 3-4 g thiram or captan per kg mixture if it is not treated. Care should be taken that every seed is well covered by seed covering material.

### **Use of Mulch**

To maintain the soil moisture for seed germination cover the seed bed with a thin layer of mulch of paddy straw or sugar cane trash, or sarkanda or any organic mulch during hot weather and by plastic mulch (plastic sheet) in cool weather. It has following advantages:

- It maintains the soil moisture and temperature for better seed germination.
- It suppresses the weeds.
- Protects from direct sunlight and raindrops.
- Protects against bird damage.

### **Removal of Mulch**

Due attention is given to remove the covered mulch from the seedbed. After three days, observe the seed beds daily. As and when the white thread like structure is seen above the ground, remove the mulch carefully to avoid any damage to emerging plumules. Always remove mulch in the evening hours to avoid harmful effect of bright sun on newly emerging seedlings

### **Use of Shed Net**

After seed germination during the seedling growth, if there is very high temperature (> 30°C) then beds should be covered by 50% or 60% shedding nets of green/green + black coloured, about 60 - 90 cm above ground by the use of suitable support.

### **Watering**

- The nursery beds require light irrigation with the help of rosecane till the seeds get germinated.
- Excess rainwater or irrigated water should be drained out from the field as and when it is required otherwise plants may die due to excess of water.
- Watering in the beds depends upon the weather condition. If temperature is high, open irrigation is applied. Need not to irrigate the beds during rainy days.

## Thinning

- It is an important operation to remove weak, unhealthy, diseased, insect pests damaged and dense plants from the nursery beds keeping distance of about 0.5 to 1.0 cm from plant to plant.
- The thinning facilitates balance light and air to each and every plant. It also helps in watching the diseased and insect pest attacked plants while moving around the nursery.

## Weed Control

- Timely weeding in nursery is very important to get healthy seedling. If there are some weeds in the seed bed, remove them manually either by hand or by hand hoe (thin forked Khurpi).
- Pre emergence herbicides can also be sprayed soon after seed sowing to control the weeds. Stomp @ 3 ml/litre of water should be sprayed on the nursery beds after the seed sowing and seed covering with mixture of FYM, soil and sand.

## Plant Protection

Adaptation of plant protection measures in the nursery against the incidence of insect pest and diseases is very important task to get the healthy seedlings. Damping off seedlings, leaf curl, leaf blight diseases and leaf miner and borer infect the seedling in the nursery. The care for controlling them time to time is essential.



## Damping off

- This is very serious disease of nursery.
- Pre-emergence death of seeds is seen.
- In first instance girdling takes place on the stem near base of the stem and seedlings bent down near the ground and die.
- The causal organisms are pythium, phytophthora, rhizoctonia and **Fusarium** fungi.
- Treat the nursery bed either by soil solarization, formalin solution or formalin dust or fungicides like thiram or captan as discussed earlier.
- Treat the seeds as discussed in seed treatment. If the disease appear after the seed emergence drench the nursery beds with 0.1% solution of brassicol or 0.7% captan or thiram after germination, it will be better to remove and burry the affected seedlings from the beds otherwise spread will be more.

The disease can be controlled to some extent by applying treated sand, soil and FYM mixture up to the level from where the seedlings are falling.

## Leaf Miner

It is a very small sized insect that enters in the leaves from margin side and move from one place to other by eating the chlorophyll. Initially the infected part of the

leaves become brown and later on dry. The control mechanism involves spraying 4% neem seed kernel extract on the plants (crush 40 g of neem seed kernel, add some water and allow them for overnight. In the morning filter the extract and makeup the volume 1000 ml.). Spray Monocrotophos or Metasystox 1.5 ml/litre of water.

### **Leaf Curl**

Leaf curl is a white fly transmitted viral disease, infestation starts from seedling stage and continue till harvest of the crop. The disease is specially seen in the tomato and sometime in chilli too and causes great loss of the crop. The leaves of affected plants show curling, mottling, rolling puckering etc. It can be controlled by the following ways:

- Treat the soil of the nursery by carbofuran 3-5 g/sqm.
- Seed treatment with Imidachloprid @ 2.5 g/kg seed
- Cover the seed bed after seed sowing by Agronet making a tunnel like structure.
- Spray the nursery beds 15 days after seed germination at 7 days interval with Metasytox or Monocrotophos @ 1.5 ml/litre of water. Last spray is done 2 days before transplanting.
- Remove the infected plants if any in the field and burried in with soil or burn.

### **Selection of Seedlings for Transplanting**

After attaining proper growth, seedlings are transplanted in main field. At the time of transplanting, seedling should be stocky and sturdy; should have good root system; should be free from any insect pests and diseases.

### **Hardening of the Plants in the Nursery**

- The term hardening includes "Any treatment that makes the tissues firm to withstand unfavourable environment like low temperature, high temperature and hot dry wind."
- Hardening is physiological process .Plants accumulate more carbohydrates reserves and produce additional quiticle on the leaves.
- In this process seedlings are given some artificial shocks at least 7-10 days before uprooting and transplanting. These shocks includes
  - Exposure to the full sunlight,
  - Removal of all the shedding nets, polythene sheets
  - Irrigation is stopped slowly and slowly.

### **Techniques of Hardening**

**The hardening is done by the following ways.**

- By stoping the water supply to the plant by 4-5 days before transplanting.

- Lowering the temperature also retards the growth and adds to the hardening processes.
- By application of 4000 ppm\* Sodium Chloride (common salt) with irrigation water or by spraying of 2000 ppm of cycocel(Chadhdha,2006).

### **Duration and Degrees of Hardening**

- It is very necessary that plants should be hardened according to their kind so that there is an assurance of high percentage of survival and slow growth under the condition to be expected at the time of transplanting.
- Hardening should be gradual to prevent or check the growth.
- Warm season crops like tomato, brinjal and chillies do not favour severe hardening. In Indian condition allowing the soil to become dry for 5-6 days does the hardening.

### **Effect of Hardening**

#### **The following effect may be observed by the hardening**

- Hardening improves the quality and modifies the nature of colloids in the plant cell enabling them to resist the loss of water.
- Hardening increases the presence of dry matter with regards to the plants but decrease the percentage of freezable water and transpiration per unit area of leaf.
- Decreases the rate of growth in the plants
- Hardened plants can withstand better against unfavourable weather conditions like hot day winds or low temperature
- Hardening of the plants increases the waxy covering on the leaves of cabbage.

### **The Advantages of Scientific Nursery Technology:**

The Proposed technology has been developed and tested in local conditions and has been found to be highly suitable for small and medium level plant growers. This technique ensures that a large number of seedlings can be raised in minimum space under optimized and controlled conditions. The method ensures an even germination of seeds and with quality seeds a germination rate of over 90% is easily achieved.



\* ppm = Parts per million

### **Scientific Nursery Techniques Have The Following Advantages:**

- Seed procurement is done from authentic sources thus maintaining performance under local soil and weather conditions
- Manual labour and drudgery of women is reduced.
- Uncertainties of natural damages to tender seedlings at the nursery stage are greatly minimised
- Vigour of seedlings is increased.
- Reduces transplanting shocks and plant mortality at the farmer's field is extremely low.
- Success rate of the planting material is high.
- Overall operating costs are less.
- Inputs like water, fertilizers etc. are low.
- Growth rates and crop yield are enhanced

### **Features:**

- Span 12 meter length and 8 meter wide arch structure
- Tubular galvanized structure, fitted with GI clamps & nut bolts.
- Total headroom of poly house is 4/ 4.5 mtr. with top vent opening 300 to 500 mm.
- Spacious enough to allow maximum sunlight & air.
- Aluminium reusable poly lock for glass like fitment of polythene.
- Telescopic Insertion type concrete foundation up to 400 mm depths.
- Brick Flooring with sand & cement soling
- Designed for 120 KMP wind velocity.
- Collapsible shade nets screens under the roof.
- Mechano type galvanized nut bolted structure easy for erection & assembly.
- 200 micron UV resistant clear, poly covering as per the requirement.
- Bottom skirting 200 micron UV resistant poly film upto 500mm height

### **Structure's Details**

- **Columns:** Hot dip galvanized 2 mm thickness.
- **Arch:** Hot dip galvanized, 2 mm thickness.
- **Entrance door:** Sliding FRP door serving the tunnel.

### **Covering: Polyethylene multi layer sheet**

Polyethylene - thickness 200 micron UVA.

### **Polyethylene Specifications Description:**

- Multi -layer, co extruded, long-life (3 years)
- RESIN - LDPE

- Thickness Tolerance  $\pm 15\%$  at any point  $\pm 5\%$  on nominal thickness

#### **Mechanical properties**

#### **Typical Values**

- Tensile strength at break (mpa)  $\geq 18$
- Transverse Direction  $\geq 18$
- Machine Direction  $\geq 350\%$
- Transverse Direction  $\geq 450\%$

#### **Optical Properties**

#### **Typical Values**

- Total light transmission  $\geq 87\%$

### **Anti-insect Net**

Fine nets are used to cover the side vent in order to prevent insects from entering the polynursery, while allowing for reasonable ventilation. These nets are especially important in areas known to suffer plant damage due to disease carrying insect.

**50 mesh insect proof netting** refers to 50 plastic ropes per square inch.



Air permeability: 50%, Shade level: 40%

### **Shade Nets**

Fine nets, 50% shade, are used to cover the structure ceiling in order to cool the structure during the hot season.

### **Other Inputs:**

- |  |            |
|--|------------|
| 1. Watering Can (10+ liters)             | 2 units    |
| 2. Seedling Germination Trays(98+ cups): | 1000 units |
| 3. Sterilised Compressed Cocopeat:       | 500 Kgs    |
| 4. Vermi-Compost:                        | 200 Kgs    |

### **Fertilisers & Pesticides:**

- |                                  |             |
|----------------------------------|-------------|
| 1. Trichoderma. PSB & Azobactor: | 200gms each |
| 2. Soluble NPK 19:19:19:         | 2 Kgs       |
| 3. Bavistin/Mancozeb M-45:       | 500gm       |
| 4. Immidachloropid (Confidor):   | 100ml       |
| 5. Ridomil:                      | 100gm       |

## Farmer Identification & Eligibility

### Farmer Identification

Any individual farmer can adopt this technology and get subsidy support under SGSY; families 'Below the Poverty Line' (BPL) in rural areas are the major constituent and target group.



### Social Mobilisation of the Poor

The programme focuses on organisation of the poor at grassroots level through a process of social mobilisation for poverty eradication. Social mobilisation enables the poor to build their own organisations like Self Help Groups (SHGs), in which they participate fully and directly and take decisions on all issues that will enable them to cross the poverty line. Efforts have to be made to form women SHGs.

### Eligibility Criteria for Farmers under Micro-Drip

- Practicing Farmer with homestead farm land of at least 25 decimals.
- Proximity to operational water source like – well/bore-well/pond/check-dam etc.
- Not declared as a willful defaulter with Banks

For ease of training and monitoring, a minimum of 20-25 Beneficiaries to be identified and organized in each village /cluster and form a collective of their own. The collective may be a SHG, farmers group and village level federation of SHG or farmers group. A minimum of 100 beneficiaries in each Block should be identified and supported initially.

### Activities to be Undertaken

1. Concept Introduction to potential farmers or their collective
2. Short-listing interested and eligible farmers
3. Verification of Land Records
4. Completion of Bank Loan Application Process

### Eligibility Criteria for Farmers under Poly Nursery

- Any women who is a member of SHGs could be a farmer for installation and management of poly nursery
- A group of 5 to 10 women members of a SHGs shall be eligible for getting the financial and technical support under this programme

## Capacity Building (Training & Monitoring)

The key to the success of this project is intensive training and practical guidance. The project implementation has to begin with a baseline survey on markets and existing cropping patterns, practices and a skill survey of selected participants. Eminent practitioners and researchers have to provide training as well as support for action planning and phasing schedule. Linkages need to be established with local farmer Clubs/bodies and relevant Government organizations through a planned programme. Improved practices on seed selection, crop rotation, integrated nutrient management (INM) and integrated/biological pest management (IPM) need to be introduced. Demonstrations have to be on different composting methods and green manuring. Rates of fertilizer and manure application in demonstrations and INM intervention will be based on soil analysis. ***The entire improved agriculture component should be linked to the Water Resource Management activity so that the main constraint of water for crops will be addressed.***

### Training and Development

Training Programme and Workshops to be conducted by professional agronomists and experts drawn from eminent corporate bodies, NGOs and research organizations. Effort will be taken to build the capacity of agronomist and CRPs for wide scale implementation.

### Training Workshop (Subjects)

- Introduction to the new Technology
- Land Preparation – Bed preparation
- Crop Planning & Rotation
- Modern Nursery Raising Techniques
- Irrigation System – Operations & Maintenance
- Fertilizer and Nutrition Management
- Integrated Pest Management
- Post-Harvest Management



### Crop Management & Monitoring

- Field visits to monitor crop health, agronomy practices and advisory support on irrigation, fertigation and pest management to be provided to each individual farmer on a weekly basis.
- Assistance to be provided to ensure smooth availability of fertilizers, pesticides and other crop related information.
- Based on proximity and commonalities farmers to be divided into training batches (groups) comprising of 20-25 farmers in each batch, so that efficacy of training is maintained across every member.

## Product Marketing

There has been concern in the recent years regarding the efficiency of marketing of fruits and vegetables in India. It is believed that poor marketing channels and poor marketing infrastructure is leading not only to high and fluctuating consumer prices, but also to only a small proportion of the consumer rupee reaching the farmers. There is also substantial wastage, deterioration in quality, and frequent mismatch between demand and supply spatially and over time. With growing demand and the accompanying supply response, fruits and vegetables have assumed great importance, and India now ranks second in the world in the production of vegetables and third in production of fruits



### The Off-Season Market

The off - season vegetable market in the entire region is a key focus area. For example during monsoons the local production of tomato is negligible and all major market in the eastern zone depends on supplies from the southern states. The tomato prices between June- October ranges between Rs. 15-20 per kilo and the demand in big towns touches 30-40 tonnes per day. Whereas, the tomato prices in peak season (Nov -Mar) comes down to Rs. 1-2 per kilo, providing no commercial gains to the farmers.

The other emerging market is the mushrooming organized retail sector. The demand for quality produce at a premium price from this sector can only be catered through organised cultivation. This project has the potential of monopolizing this sector in the region.

The Project aims to organise farmers into grower collectives either producer companies or cooperatives and access markets through a well-organised wholesale

format where the sanctity of weight, prices and logistics are maintained. As project aims at supporting 100,000 farmers, it wishes to create alternate market mechanism like Rythu bazaar, Andhra Pradesh.

## **Creation of Farmers' Market: (Rythu Bazar)**

### **Introduction**

Direct marketing is a long felt need of the farmers and consumers of the country as it goes a long way in ensuring higher remuneration to the farmers and meeting the satisfaction level of the consumers through direct sale of the agricultural commodity by the farmers to the consumer at affordable prices. The Rythu Bazar (Farmers' Market) is one of the farmers' friendly direct marketing systems in operation in the country.



Direct marketing of agricultural produce helps in complete elimination of middle men and commission agents who charge high level of commission fee from the agriculturists/farmers coming to the market yards for selling their produce and then artificially inflate the retail prices. The efficacy of direct agricultural marketing infrastructure facility can be increased by providing market user common facilities for proper weighing, cleaning, grading and packaging of agricultural produce being brought to the market yard by the farmers for sale.

In order to give a big boost to the development of direct agricultural marketing infrastructure facilities in the country, the Government of India, Ministry of Agriculture has announced the "Scheme for Development/Strengthening of Agricultural Marketing Infrastructure, Grading and Standardization." The scheme is reform linked, i.e. desires the states to amend their state specific APMC acts for enabling development of direct agricultural marketing infrastructure facilities, contract farming and participation of private and cooperative sector in creation of market yards.

### **Concept**

Rythu Bazars were introduced with a view to eliminate the middlemen and arrange facilities for the farmers to sell their produce directly to the consumers at reasonable rates fixed every day. On account of the scheme both the farmers and the consumers are benefited.

Regulated market yards for fruits and vegetables are functioning only at a few centres. The marketing system for fruits and vegetables is now in the hands of middlemen. Middlemen exist at various levels between the farmers and the consumers and exploit through malpractice in weight measurement, handling and payments. Large numbers of small farmers are unable to effectively bargain for better price in the wholesale market. Inefficiencies in the wholesale markets results in a long chain of intermediaries, multiple handling, loss of quality and increase the gap between the producer and consumer prices. Large number of small retailers, each handling small quantities, create high overheads leading to high margin on produces.

It is, therefore, felt necessary to evolve an alternate marketing strategy where both growers and consumers are benefited through Rythu Bazar. Rythu Bazar is thus planned for direct interface between the farmers and the consumers eliminating middlemen. Rythu Bazars, if function effectively, can act as price stabilization centres. Rythu Bazars will operate outside the purview of the Agriculture Market Committees and are to be managed by Estate Officers under the control of Revenue Department of the State Government.

The producers/farmers collectives are supplied properly calibrated weighing scales with weights for selling their produce. All these facilities are provided to the farmers and customers free of cost. The Estate Office is equipped with all the latest facilities like telephone, fax, and computer with Internet facility etc.

## **Objectives**

The objectives of Rythu Bazar are mainly:

- a) To ensure remunerative prices to the farmers and provide fresh vegetables to the consumers at reasonable rates fixed every day.
- b) Facilitate prompt realization of sale proceeds to the farmers without any deductions.
- c) Curb malpractice in weight measurement.
- d) Provide direct interface between farmers and consumers- eliminating intermediaries in trade.

## **Factors of Success**

Successful operation of direct agricultural marketing infrastructure facilities viz. Rythu Bazars depend upon location of the bazars, number of customers visiting the bazar per day, nature, type, quantity and quality of agricultural produce being brought by the farmers for sale, systematization of the retail price fixation mechanism, allotment of stalls to the farmers on farmers' group/ mandal basis, design of the stalls based on the nature, type and quantity of saleable items brought by the farmers, availability of functional infrastructure facilities viz. cleaning, grading, weighing, packaging, short term storage etc., price display mechanism, loud speakers and broadcasting system, availability of utilities viz. electricity, water, garbage disposal/ cleaning facilities and last but not the least services/ facilities for the convenience of the consumers viz. parking, coin changing machines, grievance redressal mechanism etc.

## Project Financials

PARTICULARS	In Rupees
<b>Establishment of one unit of drip irrigation in 25 decimal of land (drip system, agriculture input, pumpset and labour component)</b>	<b>38736</b>
<b>Drip system</b>	25436
Pump	4500
<b>Agriculture input</b>	5800
<b>Labour</b>	<b>3000</b>
<b>Total cost</b>	<b>38736</b>
<b>BANK LOAN</b>	
FIXED COSTS (drip system)	25436
FIXED COSTS (pump)	4500
CULTIVATION EXPENSES ( Input)	5800
Labour	3000
<b>OWNERS CONTRIBUTION</b>	
Labour	3000
<b>COST OF PROJECT*</b>	
Establishment of one unit of drip irrigation in 25 decimal of land (drip system, agriculture input only)	31236

\* Project cost of Rs. 31236 is the total amount to be financed by banks as per the norms of SGSY

## Poly Nursery

S.No	PRODUCT/ITEM DESCRIPTION	UNITS	PRICE (INR)
1	Poly nursery structure with poly films and shading. Size 12m x 8m x 4 m with top and side vents covered with insect nets	1	86000.00
2	Installation and Commissioning including concrete foundations and brick soling	1	25000.00
3	Seedling Trays	1000	10000.00
4	Sterilized compacted Coco-peat	200Kg	3000.00
5	Vermi Compost and additives (Trychoderma, azobactor etc.)	500 kgs	3000.00
6	Transport and logistics	LS	2000.00
7	Taxes @ 4% (on nursery and trays)	LS	3840.00
<b>Component A: TOTAL</b>			<b>1,32,840.00</b>

## Project Funding

### Financial Assistance under SGSY (Guidelines)

Assistance under the SGSY, to individual Swarozgaris or Self Help Groups, is given in the form of subsidy by the government and credit by the banks. Credit is the critical component of SGSY, subsidy being a minor and enabling element. Accordingly, the SGSY envisages greater involvement of the banks. They are to be involved closely in the Planning and Preparation of Project Reports, identification of activity clusters, infrastructure planning as well as capacity building and choice of activity of the SHGs, selection of individual Swarozgaris, pre-credit activities and post-credit monitoring including loan recovery. The SGSY also seeks to promote multiple credits rather than a one-time credit injection. The credit requirements of the Swarozgaris need to be carefully assessed. The Swarozgaris need to be allowed and, in fact, encouraged to increase credit intake, over the years.

Subsidy under the SGSY to individuals is uniform at 30% of the Project Cost subject to a maximum of Rs. 7500/-. In respect of SCs/STs subsidy is 50% of the Project Cost, subject to a maximum of Rs.10,000/-. For groups of Swarozgaris, the subsidy is 50% of the cost of the scheme, subject to per capita subsidy of Rs.10, 000/- or Rs.1.25 lakh whichever is less. **There is no monetary limit on subsidy for Irrigation Projects.**

In this project subsidy for installation of drip system and agricultural inputs will be available for each farmer for cultivating in 25 decimal of land. The cost of entire project is Rs. 38736/-, out of which Rs. 31236/- is towards installation of drip system and agricultural inputs. This does not include the cost of water lifting device and labour cost. As most vegetable growers having water resource have pump of their own. However if pump is not available then can avail a Kissan credit card for this purpose. Subsidy will be available on Rs.31236/- under SGSY scheme. It is envisaged each farmer will employ his and family labour for this vegetable project. Hence, in the project outlay the labour component of Rs.3000/- has not been included and it is kept out of subsidy and bank loan purview.

### Capacity Building of Farmers:

There is an emphasis on skill development through well-designed training courses for those, who have been sanctioned loans in SGSY Scheme. The design, duration of training and the training curriculum is tailored to meet the needs of the identified key activities. Agronomist to be appointed for every 100 farmers cluster and Agronomist in turn will train Community Resource Persons (CRPs). There will be a pool of CRPs for every 25 farmer cluster. This training shall be a combination of class room session and on the job field training for at least 2 crop cycle for each farmer. Every week there should be a visit to each farmers plot by Agronomist to

guide the farmers and CRPs for necessary package of practices implementation ie fertilizer,pesticide application, water management, weeding and other intercultural operation like staking, pruning of leaves, bed management etc. Hence emphasis should be to hand hold farmer in such a way that they design their crop based on market demand, earn enough by selling the surplus after meeting the family food requirement. A net profit of Rs.50,000/- is targeted to achieve for each farmer by providing an end to end solution from planting till selling of vegetable.

## **Financing Mechanism: - Process and procedure to be followed for availing the bank loan and subsidy under SGSY programme**

Funding for installation of micro-drip unit under SGSY can be availed for both individual beneficiaries and group of beneficiaries. A minimum of five farmers can avail this project as a group. However in the case of poly nursery the financing under SGSY can be availed for the 5 or more members of SHGs in a group. The farmer as an individual or as a group have to apply for bank loan and subsidy, in a specific form given as Annexure-1 through block office. A form with complete information in all respect with verification of beneficiaries and availability of land as per the land record will be processed by the bank for financing under SGSY programme. In case the SHG wants to avail the financing either for micro-drip or poly nursery then they have to provide the details of the group as per Annexure-2 SHGs at least qualifying the first grading as per the parameters given in Annexure-2 will be eligible to apply for financing under SGSY programme.

Along with the duly filled application form, farmer has provide the following for rapid processing of the application.

- 1) Quotation for the items / material to be procured
- 2) Two copy of the passport size photograph
- 3) Photo identity of the farmer- voter id card, driving license etc

## Suppliers, Associates & Trainers

### Drip Irrigation Infrastructure

Farmer is to be guided to decide and select the hardware required for the drip irrigation system as per the given technical specifications based on the price, quality and service available in their areas.

Few major manufacturers of the required system are listed below

**1. Netafim Irrigation India (P) Ltd.**

S 1 & S10, Plot No:16

2<sup>nd</sup> Floor, Pankaj Arcade

Sector-5, Dwarka. New Delhi – 110 075

Ranchi Rep: M/s Floratech – 94311 01915

**2. Premier Irrigation Equipments Ltd.**

17/1 C Alipore Road, Kolkata – 700 013

Ranchi Rep: Mr. S. Sharma – 94315 77056

**3. Jain Irrigation Systems Ltd.**

Flat No. G-67, Sarvamangla Apartment,

P. N. Bosh Compound, Lalpur, Ranchi - 834001

Phone : 91-651-2532246, Mob. : 91-9470590437

**4. R. S. Products (P) Ltd.**

A-22, Okhla Ind. Area, Phase-I. New Delhi-110020

Ph: 011-26810413, 26813189. Fax: 26466134

### Procurements of Equipments, Seeds, Fertilisers & Pesticides

Farmers should decide and select the required equipments, crop inputs based on the price, quality and service available in their areas or as guided by the agronomist and trainers. Emphasis Should be laid on using the best quality equipments, seed and soluble fertilizers and environment friendly crop protection products.

## **FAQs**

### **1. How does the system benefit the farmer?**

The system has been designed to balance investment risk and financial return for the farmer. The 1000sq.m.plot size ensures the farmer a low financial burden as well as a high net earning which is substantial to meet their annual cash requirements. The system uses maximum 2000 litres of water per day, thus enabling the farmer to grow crops round the year with available water. It also helps increasing the yield 3-4 times from present levels. The cultivation method reduces drudgery and hard labour; hence the entire activity can be performed by the farmer alone.

### **2. How does the system save costs?**

The system does not need any labor for irrigation and fertigation of crops. Even some pesticides applied to root zone of crops can be delivered through the drip. It reduces weed growth and prevents any wastage of water, fertilizers and energy.

### **3. Where does the Farmer source the required water?**

The farmer has to source the water from existing water bodies in and around his cultivation area. This can be existing Wells, Check Dams, bore wells, canals etc.

### **4. What will the Drip system consist of?**

The system consists of 840 meters of 12 mm pressure controlled drip line with drippers placed at 30 cm spacing. The maximum discharge capacity of each dripper will be 1 liter per hour. The drip line will be connected to 40 mm PVC mainline of length 92 meters (maximum). An FRP water tank of capacity 1000 liters along with a screen filter is required to clean the water. All accessories, valves and connectors are included in the system cost.

### **5. Why do we need Pressure Compensated Drip lines?**

Pressure Compensated (PC) drip system unlike other drip lines, works on very low pressure ranges and ensures uniform discharge of water even in slopes or unlevelled land. The farmer benefits from uniform crop size and yield.

### **6. How long will the system function?**

With regular maintenance and flushing the system can serve the farmer for almost 10 years.

### **7. How will the loan be disbursed?**

The loan will be disbursed in the individual farmer's bank account. The Drip Infrastructure expenses will be reimbursed directly to the supplier on the basis of his quotation to the farmer. **Choice of supplier is completely the sole decision of the farmer.**

**8. How much loan does the farmer have to pay back to the Bank?**

The effective loan amount after disbursement of subsidy will stand as actual Term Loan. The farmer has to repay this amount along with an interest as per the norms of SGSY within 3 years or as committed to the banker.

**9. What are the requirements and equity participation of the farmer?**

Farmer needs to own at least 25 decimals (1000 sq.m) of cultivable land to engage in the project. His equity contribution will be in the form of pump-set (Manual or energy driven) along with the pesticide sprayers, farm tools and harvesting baskets and equipments. The Farmer to provide/construct the raised platform for the 1000 liter water tank at his own cost.

**10. What training will be provided to the Beneficiaries?**

Training and handholding is critical to the success of the project. Provisions can be made to provide training by RSETIs or by the selected agencies in the state for at least two crops continuously. Workshops should be conducted to initiate beneficiaries to various aspects of nursery, crop management and modern fertigation and crop protection techniques. On-field agronomy guidance on Crop Management should be provided at the farmer's field to guide him practically at ground level.

# स्वर्ण जयंती ग्राम स्वरोजगार योजना अन्तर्गत

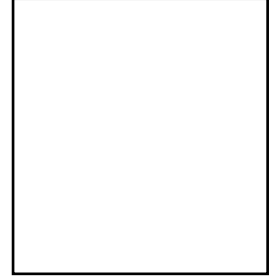
ऋण हेतु आवेदन-सह-मूल्यांकन फार्म  
प्रथम ऋण/पूरक ऋण

आई आर डी पी पहचान क्र० .....

प्रबन्धक

बैंक का नाम :

..... शाखा ।



फोटो अभिप्रमाणित करने वाले

पदाधिकारी का हस्ताक्षर

पदनाम .....

दिनांक .....

प्रिय महोदय,

मैं/हम, जो एक ही परिवार के सदस्य हैं, एतद्वारा निम्न उद्देश्यों हेतु रु० .....  
रुपये ..... के एक ऋण हेतु आवेदन करता हूँ/करते हैं  
तथा नीचे आवश्यक विवरण प्रस्तुत करता हूँ/करते हैं :

स्वयं सहायता समूह के विषय में : समूह का नाम .....

ऋण उद्देश्य बताएँ

राशि रु०

क)

ख)

ग)

घ)

योग :

क. सामान्य जानकारी

क्र०	आवेदक का/के नाम	आय	पिता/पति का नाम	पहचान संख्या
	1	2	3	4
1.				
2.				
3.				

स्वयं सहायता समूह के विषय में सदस्यों का नाम, पदनाम अलग से संलग्न करें।

ख. निवास का पता :

गाँव/डाकघर/तालुका/जिला

ग. 1. परिवार के मुखिया का नाम :-

2. परिवार के सदस्यों की संख्या :-

3. परिवार का वर्तमान वार्षिक आय रु०

1. वयस्क :-

2. अवयस्क :-

घ. क्या आवेदक अजा/अजजा का है  
(कृपया उल्लेख करें।)

ङ. क्या आवेदक लघु कृषक/सीमांत कृषक/कृषि श्रमिक/ग्रामीण कारीगर/अन्य है (कृपया उल्लेख करें।)

च. क्या आवेदक अथवा उसके परिवार के किसी अन्य सदस्य ने सग्राविका/एस०जी०एस०वाई० अंतर्गत पहले कोई ऋण लिया है, यदि हाँ तो विवरण दें।

स्वरोजगारी ऋणी का नाम	निवेश का प्रकार	प्राप्त अनुदान की राशि (रु०)	संवितरित ऋण राशि (रु०)	बकाया राशि (रु०)
1	2	3	4	5

1.

2.

छ. जुताई अंतर्गत भूमि का विवरण

1. खुद की जमीन

गाँव	सर्वे क्र०	कुल एकड़			भू राजस्व (रु०)
		शुष्क	आर्द्र	कुल	
1	2	3	4	5	6

2. पट्टे/किराये आदि पर भूमि

गाँव	सर्वे क्र०	हम का स्वरूप	शुष्क	कुल एकड़ आर्द्र	कुल
1	2	3	4	5	6

जोत के उपकरणों का विवरण :

आवेदन की तिथि की स्थिति के अनुसार

#### उपकरण

#### ब्योरा/विवरण

1. जोत पशु
2. दुधारु पशु
3. आयल इंजन पम्पसेट विद्युत जेनरेटर आदि
4. अन्य कृपया उल्लेख करें।

(1) परिवार की मौजूदा देयताओं, यदि कोई हो, का विवरण

आवेदन की तिथि की स्थिति के अनुसार

ऋण का नाम	एजेन्सी कृपया नाम दें	बकाया राशि रु०	इसमें से बकाया रु०	ऋण का उद्देश्य
1	2	3	4	5

प्राथमिक कृषक ऋण सोसाइटी/भूविबैं/सरकारी ऋण तकाबी/वाणिज्य बैंक/भारिबैं/शहरी बैंक/अन्य कृपया नाम दें।

मैं/हम एतद् द्वारा घोषित करता हूँ/करते हैं कि ऊपर दिए गए विवरण मेरी/हमारी सर्वोत्तम जानकारी तथा विश्वास के अनुसार सही है। मैं/हम वसूली हेतु राज्य वसूली अधिनियम अंतर्गत निर्धारित संक्षिप्त प्रक्रिया के लिए भी सहमत हूँ/हैं।

आवेदकों का/के हस्ताक्षर  
दिनांक

बीडीओ/डीआरडीए की संस्तुति

मैं प्रमाणित करता हूँ कि उक्त परिवार सग्राविका पहचान सं ..... अंतर्गत एसएफ/एमएल/एएल/गैर-एल/आरएल के रूप में निर्दिष्ट हैं, आवेदक को/के आवेदन में शामिल निवेशों की अनुदान/ऋण प्रदान करने हेतु संस्तुति की जाती है। सरकारी दिशानिर्देशों के अनुसार आवेदक ऋण की दूसरी मात्रा दिए जाने हेतु पात्र है, आवेदक किसी सहकारी ऋण संस्था का/के चूककर्ता नहीं है/हैं।

हस्ताक्षर  
अधिकारी का नाम व पता

वंशावली :

नाम

--	--

## अंचल अधिकारी द्वारा भूमि स्वामित्व संबंधी प्रमाण पत्र

यह प्रमाणित किया जाता है कि खाता नं० .....  
सर्वे संख्या ..... ग्राम ..... कुल रकबा .....  
श्री.....के नाम से दर्ज है। आवेदक श्री .....  
रजिस्टर 11 में दर्ज रैयत श्री ..... का .....  
(संबंध) है। वंशावली अनुसार आवेदक के हिस्से में ..... (रकबा) भूमि आती है।

दिनांक : अंचल अधिकारी का हस्ताक्षर  
अंचल :  
मुहर :

### मूल्यांकन

- क. जिग्राविआ/बीडीओ से आवेदन प्राप्त होने की तिथि :  
ख. क्या प्रस्तावित कार्यकलाप तकनीकी व्यवहार्य है  
ग. क्या बैकवर्ड तथा फारवर्ड संबद्धता उपलब्ध है  
घ. वित्तीय संभाव्यता :

निवेश का प्रकार	योजना की कुल लागत (रु०)	सकल आय (रु०)	नए निवेश से प्रत्याशित आय आस्ति के रखरखाव आदि पर व्यय (रु०)	शुद्ध आय (रु०)
1	2	3	4	5

जहाँ लागू हो कार्यशील पूंजी घटक का उल्लेख अलग से किया जाय,

ड. परिवार का प्रत्याशित वार्षिक व्यय : रु०

च. निवेश का प्रत्याशित वार्षिक व्यय : रु०

1.

2.

छ. संस्तुत ऋण राशि जहाँ लागू हो कार्यशील पूंजी सहित

निवेश का प्रकार

राशि रु०

ज. संस्तुत अदायगी अवधि

..... से प्रारम्भ रु० ..... प्रति किस्त की .....  
मासिक/तिमाही/अर्द्धवार्षिक किस्तों तथा रु० ..... की अंतिम किस्त की शेष राशि  
द्वारा चुकाया जाय।

झ. ब्याज दर :

ज. प्रतिभूति

1. प्राथमिक :

2. अतिरिक्त यदि कोई हो :

ट. अन्य शर्तें व निबंधन

1. बीमा

2.

ठ. क्या ब्याज दर, इकाई लागत, पवचवनावधि, चुकौती अवधि, आदि संबंधी भारिबैं/नाबार्ड मानकों का पूरी तरह पालन किया गया है।

प्रोसेसिंग अधिकारी के हस्ताक्षर

ड. उक्त शर्तें व निबंधनों के अनुसार स्वीकृत

अथवा

अस्वीकृत/कम राशि स्वीकृत, इस हेतु कारण दर्ज किए जाएँ।

दिनांक :

शाखा प्रबंधक के हस्ताक्षर

## स्वयं सहायता समूह द्वारा दी जाने वाली सूचनाएँ

1. समूह का नाम :-
2. स्थान/पता :-  
जिला :  
प्रखण्ड :  
गाँव :
3. स्थापना की तिथि
4. अध्यक्ष :
5. सचिव :
6. कोषाध्यक्ष :
7. मुख्य संस्थापक का नाम :-
8. सदस्यों की सूची :-

- | क्र० सं० | नाम   | पिता/पति का नाम | उम्र | लिंग | हस्ता० | सर्वेक्षण न० |
|----------|---|-----------------|------|------|--------|--------------|
| 9.       | सदस्यों द्वारा मासिक/साप्ताहिक दी जानेवाली योगदान राशि :  |                 |      |      |        |              |
| 10.      | दण्ड राशि अगर सदस्यों के योगदान में चूक हो तो :   |                 |      |      |        |              |
| 11.      | समूह द्वारा एकत्रित बचत राशि :  |                 |      |      |        |              |
| 12.      | नगद हाथ में बचत राशि :  |                 |      |      |        |              |
| 13.      | उद्देश्य, जिसके लिए समूह द्वारा ऋण प्रदान किया जाता है।   |                 |      |      |        |              |
| 14.      | ऋण लिए हुए सदस्यों की संख्या :  |                 |      |      |        |              |
| 15.      | सदस्यों द्वारा दी गई ऋण : न्यूनतम   |                 |      |      |        |              |
| 16.      | कुल वितरित ऋण आज तक :   |                 |      |      |        |              |
| 17.      | कुल बकाया ऋण राशि :   |                 |      |      |        |              |
| 18.      | चूक राशि कब से :  |                 |      |      |        |              |
| 19.      | सामान्य प्रस्तावित वसूली अवधि   |                 |      |      |        |              |
| 20.      | चूककर्ता सदस्यों की संख्या एवं कब से :  |                 |      |      |        |              |
| 21.      | समूह द्वारा प्रभारीत ब्याज की दर :  |                 |      |      |        |              |
| 22.      | चूक राशि पर दण्डात्मक ब्याज :   |                 |      |      |        |              |
| 23.      | प्रस्तावित बैंक राशि एवं इसका औचित्य : रू० 1000.00 मियादी ऋण तथा रू० 25000.00 परीक्रमी निधि ऋण कृषि व्यवसाय आदि के लिए। |                 |      |      |        |              |
| 24.      | सदस्यों की संख्या जिन्हें ऋण देना प्रस्तावित है एवं उद्देश्य : सभी को कृषि व्यवसाय आदि के लिए।                          |                 |      |      |        |              |
| 25.      | नियमावली, आय-व्यय विवरणी एवं ट्रायल बैलेंस की एक प्रति विगत 1-2 साल की संलग्न।  |                 |      |      |        |              |

जनसेवक

म० प्र० पदा०

प्रखण्ड विकास पदा०

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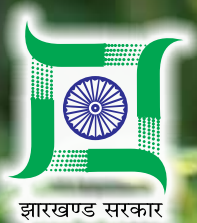
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## Acronyms

<b>APMC</b>	- Agriculture product marketing Cooperative
<b>BAU</b>	- Birsa Agriculture University
<b>BDO</b>	- Block Development Officer
<b>BPL</b>	- Below Poverty Line
<b>BRGF</b>	- Backward Region Grant Fund
<b>CRP</b>	- Community Resource Person
<b>FRP</b>	- Fibre Reinforced Plastic
<b>FYM</b>	- Farm Yard Manure
<b>GoI</b>	- Government of India
<b>HARP</b>	- Horticulture Agro-forestry Research Programme
<b>INM</b>	- Integrated Nutrient Management
<b>IPM</b>	- Integrated Pest Management
<b>JSLPS</b>	- Jharkhand State Livelihood Promotion Society
<b>KCC</b>	- Kisan Credit Card
<b>KVK</b>	- Krishi Vigyan Kendra
<b>MIS</b>	- Management Information System
<b>MT</b>	- Metric Ton
<b>NABARD</b>	- National Bank for Agriculture and Rural Development
<b>NGO</b>	- Non Government Organisation
<b>NPK</b>	- Nitrogen Phosphors Potash
<b>NPV</b>	- Nuclear Poly Virus
<b>PC</b>	- Pressure Compensated
<b>RDD</b>	- Rural Development Department
<b>RSETI</b>	- Rural Self Employment Training Institute
<b>SGSY</b>	- Swarnajayanti Gram Swarojgar Yojna
<b>SHG</b>	- Self help group
<b>SSP</b>	- Single Super Phosphate
<b>TSA</b>	- Technology Support Agency
<b>TPA</b>	- Technology Promotion Agency
<b>UV</b>	- Ultra Violet



झारखण्ड सरकार



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