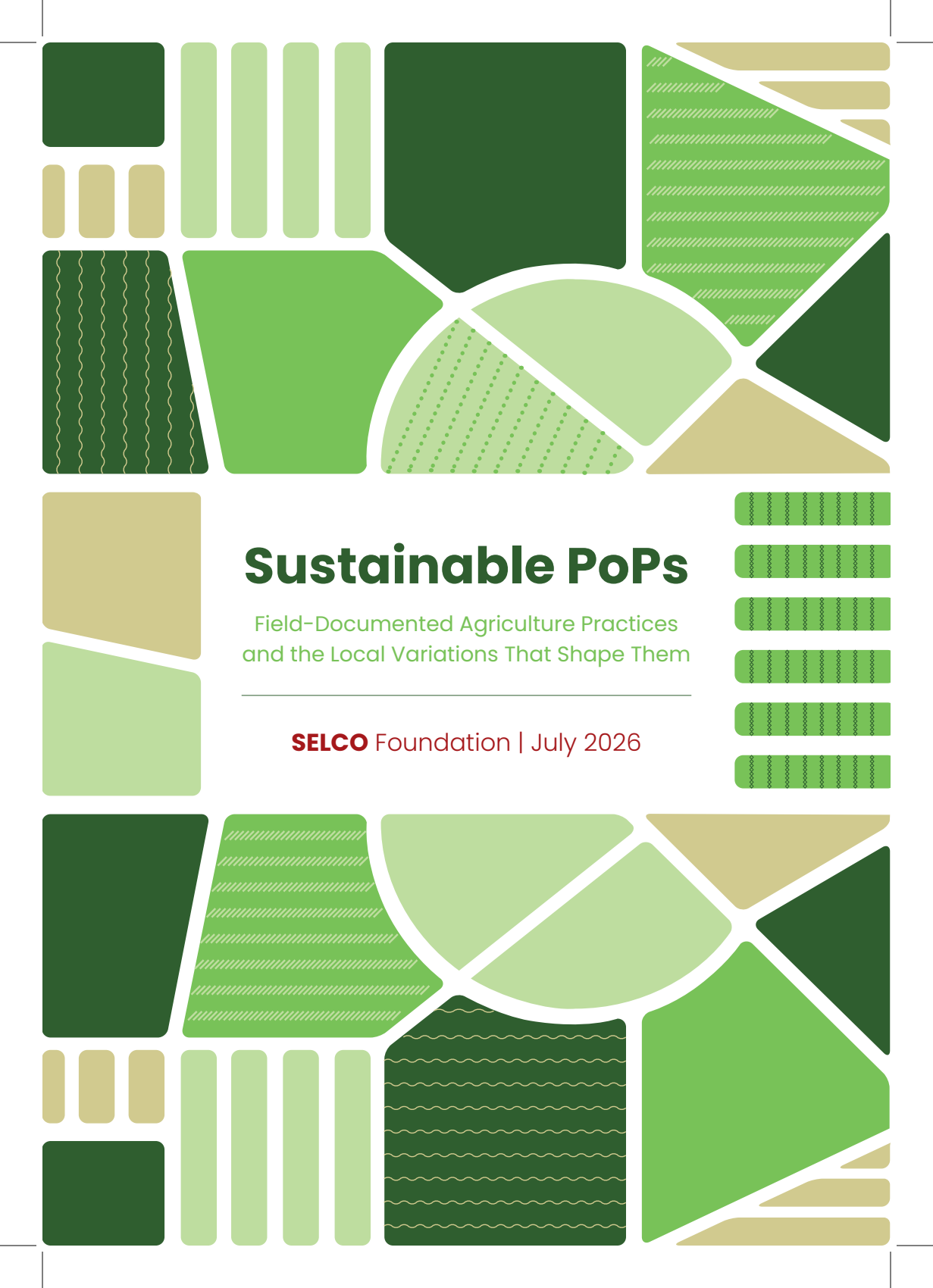




Sustainable PoPs

Field-Documented Agriculture Practices
and the Local Variations That Shape Them

SELCO Foundation | July 2026



Draft Report for Review

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The following practices were documented across six independent field studies and have been compiled by SELCO Foundation. They reflect what farmers are already practicing across geographies, along with the technology recommendations made in the studies.

All illustrations are indicative of practices & case stories.



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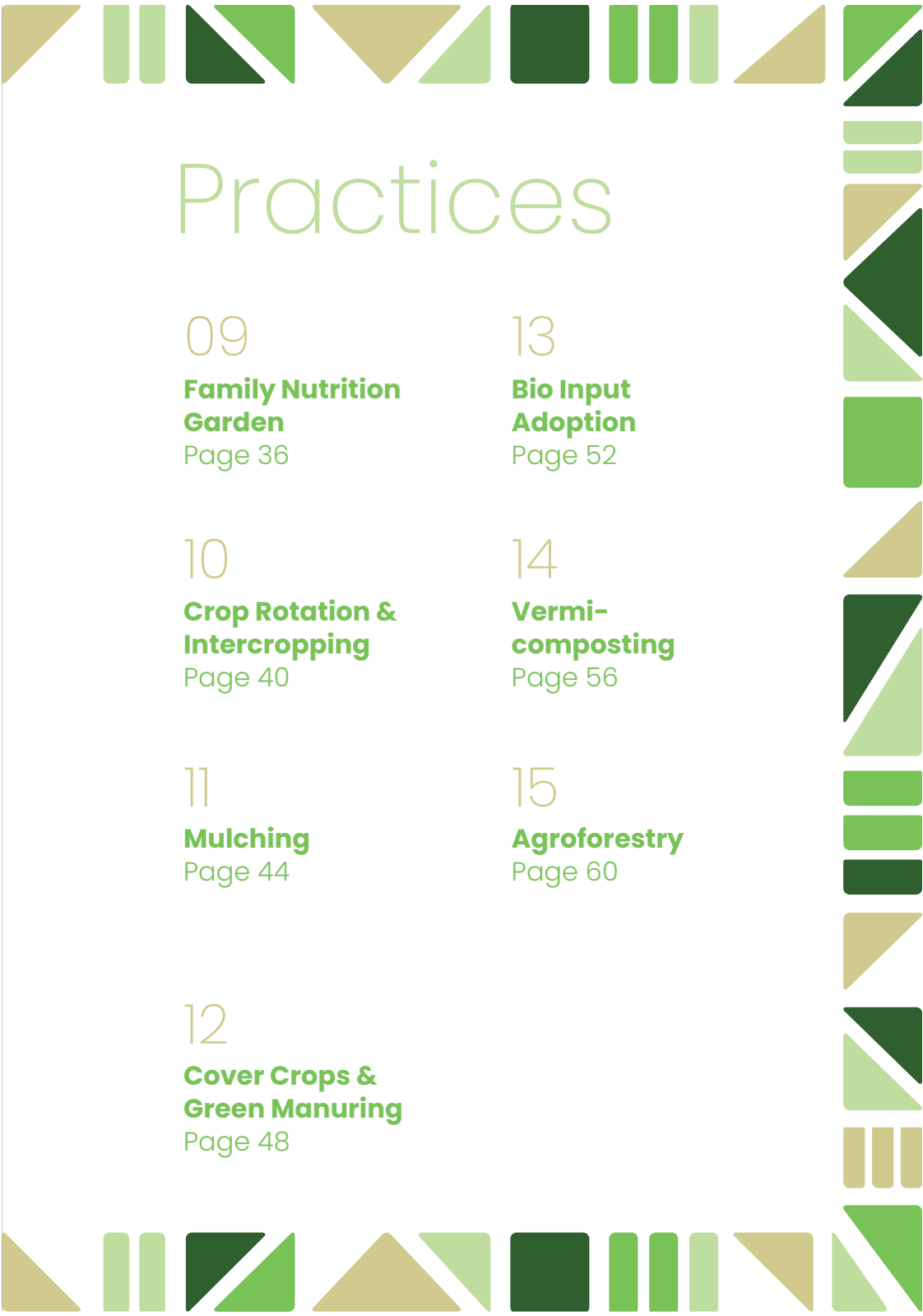
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Micro Irrigation



A water efficient practice in which water is applied precisely where and when crops need it, instead of being flooded across a field. This minimises losses and improves crop health and resources efficiency. The research identifies two methods of micro-irrigation being practised across the study geographies.

Method 1

Gravity-fed conveyance irrigation (Diversion based irrigation)

Reported in East Singhbhum, Jharkhand

Here, water is carried via buried pipes from an elevated source (stream or spring) above the village level, to the field by gravity alone without any pump or external energy input. This practice does not reduce the volume of water delivered onto the field, however, it eliminates the requirement of a diesel/electric pump entirely and makes water available continuously, not just when the pump is operational.

- Farmers move from one crop to three crops/ year (Kharif, Rabi, Summer vegetables).
 - Elimination of OPEX on diesel, with one time capital expenditure at the village level.
 - Can be a community based system managed entirely by a village Water Users' Association.
-

Method 2

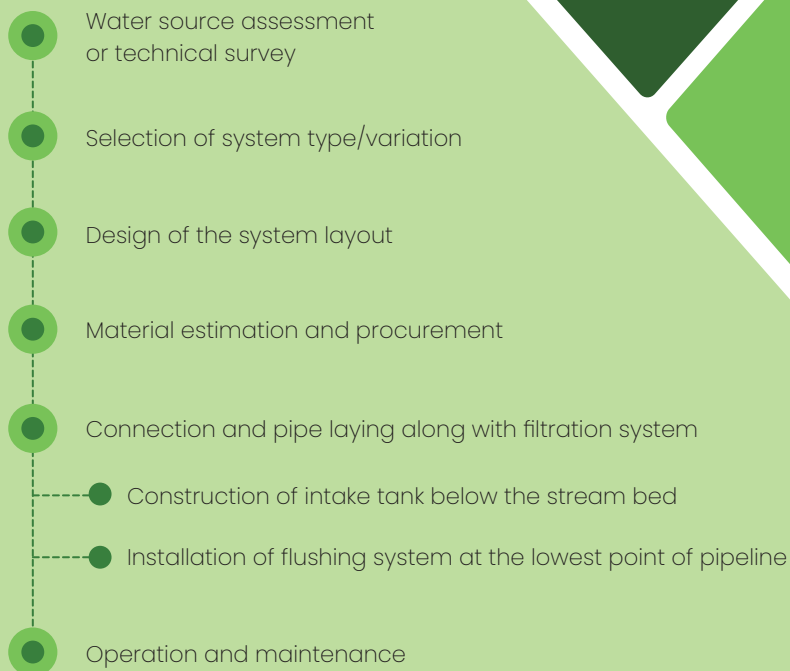
Drip or sprinkler irrigation

Reported in Pandhurna, Madhya Pradesh

In the second variation, where no elevated source exists, precision technologies such as drip lines, rainguns and sprinkler systems deliver water directly to the root zone in small controlled volumes, drawing water from either well, pond or tank instead. This practice is generally combined with solar pumping and rainwater harvesting practices. Farmers can avail a 45-55% subsidy under government micro-irrigation schemes.

- Inline drip emitters (2-4 litres/hour) on lateral lines, suited to row crops, vegetables and orchards.
- Overhead micro-sprinklers or rainguns (2-3m radius), suited to paddy, mustard and other broadcast crops.

Overall Steps



Applicable Tools & Technologies

1. Simple slope-measuring tool
2. Solar powered pump
3. Buried PVC pipe
4. Flushing outlet
5. Inline drip emitters or overhead micro-sprinklers
6. Fertigation injector
7. Raised tank for gravity-fed irrigation

Case Study **Mukunda Singh**

*Location: Mahatam Village, Ghatsila Block, East Singhbhum, Jharkhand
Landholding: 3 acres*

Through the Rural Development Association's programme, all households in Mukunda's village adopted the gravity-fed conveyance irrigation system. The system was easy to install with maintenance-free operation, no external energy cost and provided farmers the flexibility to move from one cropping season to three.

Earlier, Mukunda used to have only one crop during the Kharif season. Now, due to this irrigation practice, he has three cropping seasons earning three times his previous income through vegetable farming.

- Paddy yield increased from 8-12 quintals/acre to 15-20 quintals/acre.
- Additional 200 quintals/acre of vegetable yield together from Rabi and summer seasons.

Now, his family does not migrate for work after the Kharif season, and have stopped cutting firewood for sale as they earn more from year round vegetable cultivation. They do not have to pay for diesel to pump water, and are getting water for free through this irrigation practice. Mukund also compliments his farming with the use of Bijamrit and composting.





Rainwater Harvesting



A practice that captures and converts rainwater runoff into a stored asset that can be used during dry spells or when there is no rain at all. The type of structure depends on whether the water is meant to simply slow down and be held in the soil close to where it falls or if it is to be stored above ground, or sent deeper into the ground to recharge underlying aquifers. The research documents three rainwater harvesting and conservation practices.

- Irrigation potential: Year-round
- From 1-acre catchment: ~2 lakh Litres
- Payback period: 1-3 years

Method 1

In-Situ Conservation

Reported in East Singhbhum, Jharkhand

In this sub-practice, structures such as staggered trenches, 30x40 pits or field bunds, hold rainwater closer to the soil on a steeper or moderately sloped land rather than collecting it into a visible water body. The type and size of each structure is decided based on the slope and the volume of the expected runoff from its own catchment area at a typical local rainfall intensity. In-situ rainwater conservation enables Rabi and summer cropping in areas that were previously rainfed or Kharif only.

Method 2

Surface Storage

Reported in Jharkhand, West Bengal and Bihar

Here, a visible volume of water is held above ground either through household level farm ponds or village level ponds, check dams etc. and can be directly drawn for irrigation and other purposes. These structures are especially useful in areas with shallow laterite soils that drain water too fast without any retaining structures.

Larger village level ponds, requiring significant investment, are usually built with funding support either from NGOs or from state or central schemes. In many cases, farm ponds are designed not just for water storage but also for secondary businesses such as aquaculture.

Method 3

Groundwater Recharge

Reported in Karnataka

These structures are built to send surface runoff down through the ground to raise the water table itself rather than just creating surface storage, leading to an extension in groundwater availability by roughly 3 to 12 months. Some farmers reported annual savings of INR 3,000-5,000 in pumping costs due to higher groundwater levels, which reduced the energy required to pump water.

Overall Steps

- 
- 1. Need assessment, site survey and topographic mapping
 - 2. Structure type, design and sizing
 - 3. Construction of the system/structure
 - 4. Governance and water-sharing institution (such as Water User's Association)
 - 5. Structure and system maintenance

Applicable Tools & Technologies

1. Slope-measuring instrument
2. Manual or machine-assisted excavation equipment
3. Solar-powered pumps
4. Drip or sprinkler kits

Case Study

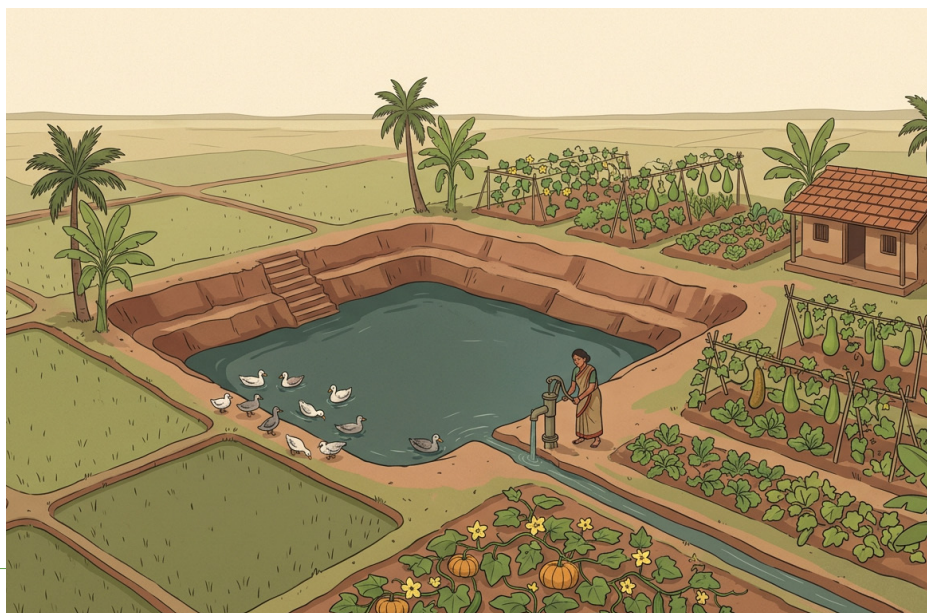
Jamuna Murmu

*Location: Bankura, West Bengal
Landholding: 3 bighas (2 bighas
paddy, 1 bigha elevated vegetable)*

In 2016, Jamuna and her husband built a 20-feet deep pond using INR 40,000 from their household savings, to capture and store the monsoon runoff from a naturally low-lying area on their farm. Later, in 2017, Jamuna Murmu, took over the active management of the farm from her husband, continuing the crop diversification that her husband began a year earlier. A shallower pond of the same layout would run dry by March, whereas this pond now allows her to continue a diversified three-season production system growing paddy and at least eight different types of vegetables.

- Year round irrigation for 15 kathas of land across three cropping seasons.
- Capital cost recovered in the first cropping season.
- Additional income of INR 60,000 from vegetable cultivation per season.
- ~4 quintals/month of pumpkin and cucumber during peak summer season.

Jamuna also uses the pond for duck rearing; ducks feed on mosquito larvae thus providing a chemical free control system alongside additional incomes through egg and meat sales. While currently using a manual pump to draw water, Jamuna now wishes to set up a sprinkler system to irrigate her crops.





Mushroom Cultivation



A practice that converts agricultural waste, mainly paddy straw, into a short-cycle, high value food crop, with minimal space requirement of either a 10x8 ft shed or a shaded outdoor bed rather than a farmland. Mushroom cultivation requires no fertile land, has a 3-4 week production cycle and produces income within one season.

A landless or marginal household can sustain entirely indoors through this low cost practice, as this also fills the agricultural lean season after Kharif when there is otherwise no livelihood beyond keeping a few sheep.

The research identifies three methods of mushroom cultivation documented in Korpat district of Odisha. The methods differ in where and when they are each practised depending on the infrastructure and space a household has and the season they are cultivating mushrooms in.

- Crop cycle: 25–30 days
 - No. of cycles: 3 flushes per bag
 - Yield: 600–800 grams per bag
 - Low capital cost up to INR 6,000 for a bamboo shed
 - High ROI of 200% + depending on method and season.
-

Method 1

Indoor Cultivation (Home or Community Building)

This is the smallest scale and least challenging method practised indoors during winters when the outside is too dry and cold for an open-air approach. Can be set up inside a home or inside a local panchayat provided community building using locally available materials.

Method 2

Open-Orchard Cultivation (Under Tree Canopy)

This method was being practised outdoors in a Mango orchard, in the dry season, during February to April. The mango canopy provided shade and humidity, eliminating the requirement of an artificial shed.

Method 3

Bamboo Shed Cultivation

Here, a low cost shed is built using a bamboo frame, green mesh and tarpaulin, which created a controlled micro-climate without requiring an existing building or an orchard.

Overall Steps

-
- Substrate preparation (compost using paddy straw, 15-18 beds prepared at a time)
 - Substrate Sterilization
 - Spawn Inoculation (Oyster or Dhingri variety)
 - Bed or structure setup
 - Incubation (spawn running)
 - Casing
 - Fruiting and harvesting
 - Marketing

Applicable Tools & Technologies

1. Sterilisation vessel
2. Plastic bags or raised soil beds
3. Bamboo-frame shed with shade mesh and tarpaulin
4. Basic humidity and temperature management equipment

Case Study **Dhanurjay Guirea**

*Location: Nuaguda village,
Kundra Block, Koraput, Odisha*

After receiving training from MSSRF in 2016, Dhanurjay started a low-cost mushroom production unit suited to local conditions. When he started, he used to cultivate button mushrooms on raised soil beds in his mango orchard in February, which he would harvest within 20-25 days. In 2012, he started cultivating Dingri mushrooms during winter as well, inside a community building provided by the local Panchayat.

Dhanurjay harvests 600-800 kgs of mushrooms annually, earning between INR 1.2 and 1.5 L within two months. He has also trained several other farmers in his villages to start viable low cost mushroom cultivation as an alternative livelihood.





Integrated Pest Management



A low input cost stepwise practice of prevention first, monitor constantly and intervene only if economic losses may be incurred, to keep pest populations in check without chasing and obtain healthier soil biology. Instead of spraying chemical pesticides on a fixed schedule regardless of whether pests are actually present, this practice replaces or reduces chemical usage through a combination of bio pesticides and physical traps that both capture pests and monitor their populations.

The research documents two methods of pest management and also identifies various tools and techniques for improved pest management:

- Bio-pesticides such as Neemastra, Brahmastra, Mahulastra, Agneyastra, Handikhata, Panchagavya, multi-leaf herbal repellent etc.
 - Physical traps such as Yellow Sticky Trap, Light Trap, Pheromone Trap, Bird Perches, Trap Crops, Border Crops, Community Bonfires.
 - Diagnostic support such as the CABI-trained plant-clinic digital tool (portable USB microscope).
-

Method 1

Bio-Pesticide Spray Rotation

Reported in East Singhbhum, Jharkhand

In this method, farmers follow a fixed weekly preventative schedule of pest management using home prepared bio-pesticides instead of market purchased chemical pesticides.

Method 2

Trap-Based IPM with Digital Support

Reported in Tamil Nadu

This method aims to not only substitute sprays with physical traps but also reduce the number of sprays triggered by an actual observed pest occurrence, by using light traps, yellow sticky traps along with digital support through the CABI BioProtection Portal.

Overall Steps

- 
- 1. Foundation: soil and plant health
 - 2. Pest monitoring / detection (for method 2)
 - 3. Preparation of the bio-input sprays
 - 4. Physical pest controls
 - 5. Application/spray schedule
 - 6. Nutrient and pest management, ongoing

Applicable Tools & Technologies

1. Fermentation containers
2. Solar-powered light traps
3. Yellow sticky traps
4. Portable microscope
5. Bird perches

Case Study **Bablu Munda**

*Location: Balidih village, Ghatsila block, East Singhbhum, Jharkhand
Landholding: 2 acres*

Since 2017, Bablu has adopted an integrated pest management practice where he uses Neemastra, Brahmastra, Agneyastra, Handikhata, Bijamrit and Jibamrit, across his farm for chilli, brinjal, tomato, beans, maize, cucumber, pumpkin and paddy. Supported by RDA training, he integrates these bio-inputs with rainwater harvesting and gravity-flow irrigation to reduce dependence on synthetic inputs.

This practice has enabled Bablu to produce chemical-free food, maintain soil health, and eliminate reliance on external chemical pesticides and fertilizers.





Seed Saving & Sovereignty



A practice where farmers keep or save their own seed to conserve regional genetic diversity, ensure household food security and, over time, produce seeds adapted to the specific micro-climate of one farm.

Farmers and institutions are regaining control over seeds from the commercial seed market, by selecting and testing varieties on their own land instead of accepting a single recommended cultivar. The research identifies three methods for seed saving.

Method 1

Participatory Varietal Selection (PVS)

Reported in Karnataka

A comparative trial method, where farmers evaluate both traditional landraces and improved/released varieties (sourced from KVKs or agricultural universities) directly on their own fields under real growing conditions. The farmers then judge the varieties against their own criteria and decide whether to adopt, reject or keep growing what they already have. Three practitioner categories are further identified:

- Farmers running structured, institutionally supported trials.
- Independent farmers testing entirely on their own initiative.
- Women's SHGs conducting collective conservation as a group.

Method 2

Community Seed Bank and Germplasm Conservation

Reported in Odisha

Rather than a separate practice, this method serves as the infrastructure for method 1. The method is documented as part of MSSRF's seed conservation programme under which a collection of landrace seeds are institutionally maintained, to ensure wider availability and access for farmers to grow instead of relying on individual farmers to preserve their own seed stock indefinitely (as in Method A).

This collection is used for parent/stock seed production, on-farm research, revival of traditional crops and also as the germplasm base for Participatory Plant Breeding (PPB) and PVS work conducted elsewhere.

Method 3

Autonomous On-Farm Landrace Conservation

Reported in Odisha

In this method, individual farmers maintain multiple indigenous landraces side by side on their own land, purely on their own initiative and household knowledge, without any external trial process (unlike A) and no institutional seed bank driving or supplying the practice (unlike B). Here, multiple landraces are grown side by side as an ongoing, settled practice rather than a comparison exercise with a defined endpoint.

Overall Steps

Method 1 -

- Identify farmer needs and selection criteria
- Source seed varieties
- On-farm trial
- Farmer evaluation
- Selection, saving and storage
- Dissemination

Method 2 -

- Source landrace seed from farmers
- Conserve in institutional germplasm bank
- Support research and revival
- Disseminate seed and training back to farmers

Applicable Tools & Technologies

1. Seed storage infrastructure (dry, sealed containers, moisture control)
2. Institutional cold or dry storage at community seed bank scale
3. Basic seed processing equipment- cleaning, grading, moisture testing

Case Study **Rukhmani Khillo**

*Location: B.Jhalaguda Village,
Kundra Block, Koraput, Odisha
Landholding: 2 acres*

Rukhmani cultivates four indigenous finger millet landraces namely Bada Mandia, Riska Mandia, Kundra Bati and Dusra Mandia across her farm using traditional practices with zero chemical inputs. Rather than replacing local varieties with a single high-yielding crop, she continues to grow and conserve these traditional landraces side by side, helping preserve the region's agricultural biodiversity.

She has been recognized as a Custodian Farmer of Agro-biodiversity for safeguarding valuable indigenous genetic resources that might otherwise disappear from cultivation, thereby building long-term resilience of local farming systems.





System of Rice-Millet Intensification



Instead of broadcasting seeds directly into the field, this practice manages existing crops by using younger seedlings, single plants per hill, wide spacing and intermittent wetting to trigger profuse tillering. The farmer raises seedlings in a nursery for 15-25 days, then transplants them into a wide, evenly spaced grid. This wide spacing gives each plant room to develop far more tillers (side-shoots), and in some versions the young plant is physically disturbed at the base a few weeks after transplanting to force even more tillering. The research identifies two distinct methods of Millet intensification across two states of Odisha and Karnataka..

Method 1

Standard Grid Transplanting

Reported in Odisha

In this method, seedlings are raised for 15-20 days and transplanted onto a comparatively tight grid, with weeding done by a mechanical cycle weeder rather than by hand.

- Seedlings transplanted at 18-20 days, with roots and soil intact, with a spacing of roughly 10" between rows and 8" between plants (≈25×25 cm)
 - Yield of 12-15 quintals/acre, compared to 2-2.5 quintals/acre under traditional broadcast sowing
 - Seed usage reduced by 80-90% relative to broadcast sowing
-

Method 2

Guli Ragi (Wide-Grid Transplanting, Forced Tillering)

Reported in Karnataka

This method was developed independently by farmers and named after the 'guli' which is a small put at each grid intersection where seedlings are transplanted. The grid is much wider than the standard technique, and deliberate, more forceful mechanical disturbance of the young plants is conducted to drive higher tillering. Despite being high yielding, this is also the more labour intensive method since the transplanting and disturbance steps cannot be mechanised. This practice is the millet-crop equivalent of the System of Rice Intensification (SRI) and has a high replication potential in parts of Andhra Pradesh, Chhattisgarh, and Tamil Nadu, where finger millet is grown under rainfed conditions.

- Seedlings transplanted at 15-20 days, with 1-2 seedlings per guli
- Yield of 18-20 quintals/acre typical, compared with 12-15 quintals/acre under conventional practice (even with improved varieties and chemical inputs)
- Seed usage as low as 1 kg/ acre, compared to 8-10 kgs/acre under broadcast sowing and roughly 4 kgs under conventional transplanting
- 40-80 tillers per plant compared to 5-6 under broadcast sowing

Overall Steps



Applicable Tools & Technologies

1. Nursery beds for raising seedlings
2. Rope marker
3. Wheel hoe for mechanical inter-row weeding
4. Wooden roller or ox-drawn plank

Case Study **Vijay Kumar**

*Location: Ramanagara
District, Karnataka*

Vijay cultivates finger millet (ragi) using the traditional Guli Ragi transplanting method and achieves a yield of 20 quintals/acre, which is on the higher end of all documented cases. The practice eliminates the use of chemical fertilizers and pesticides, and Vijay uses Jeevamrutha instead to improve soil health and crop productivity.

Vijay is a member of Sundara FPO's, where 150 farmers including himself are certified under the Participatory Guarantee System (PGS) to scale the adoption of Guli Ragi and Jeevamrutha-based cultivation across the region.





Integrated Farming System



A farm level integration combining fish ponds, poultry, horticulture, vegetables and vermicomposting into a closed loop system, where the waste of one component becomes the input of another. Pond silt fertilizes trees, poultry waste feeds the pond fish and vermicompost feeds crops, so nothing leaves the farm as waste, and the farm produces several income streams instead of depending on one crop. The research identifies three methods of integrated farming that are being practiced.

Method 1

Fisheries–Poultry–Horticulture–Vermicompost Loop

Reported in Odisha

This is a closed-loop model built around a fish pond as the core asset, with poultry, horticulture on the pond bunds, and a vermicompost unit where each component's waste feeds another. This variation is designed for minimum landholding of 2 acres, 0.75 to 1 acre of pond with a fish output of 500kg/year. Unlike standalone fish farming, where feed and fertilizers are externally sourced, with a single income, this system reuses farm resources, minimizes waste and diversifies income.

Method 2

Multi-Tier Bio-Conservation Farm

Reported in Odisha

An integrated farming system that maximizes vertical growing space by cultivating up to six layers of trees, shrubs, crops and root vegetables on the same plot, alongside dairy, sheep and poultry. This model promotes biodiversity, improves soil health and reduces production risks by diversifying farm enterprises rather than relying on a single crop. This practice is documented as a long-term practice reaching a mature, self sustaining state after 13 to 15 years.

Method 3

Sequenced Multi-Stage Integration (Kolinji Model)

Reported in Tamil Nadu

The system was devised after a documented failure in 1992–93 where trees were planted directly onto bare soil, with only 70–80% surviving with no growth for two years, until sheep were introduced specifically to inoculate the soil with microbial life, after which growth resumed. Each stage is a precondition for the next rather than a flexible checklist:

- water-harvesting infrastructure
- livestock-driven soil biology
- drought-tolerant trees, productive fruit/timber species
- crops under developing canopy
- livestock integration

Overall Steps

- 
- 1. Land and water assessment
 - 2. Core infrastructure construction
 - 3. Planting design
 - 4. Livestock integration
 - 5. Nutrient cycling
 - 6. Harvest and income realisation

Applicable Tools & Technologies

1. Pond excavation and basic fish-stocking
2. Small poultry shed
3. Vermicompost bed
4. Tree-pit preparation
5. Large storage tank for collecting and processing cow urine

Case Study **Prabhakar**

Location: Koraput, Odisha

Prabhakar has developed a multi-tier bio-conservation system (across ~ 3 acres) integrating six layers of vegetation with dairy, sheep and indigenous poultry to create a self-sustaining and diversified farming ecosystem. The farm was developed over 13 years and now functions as a mature system with minimal dependence on external inputs. Through his dairy, Prabhakar not only collects 30 litres of milk daily but also prepares bio-inputs from cow urine that he stores in a unit separately.





Orchard Rejuvenation

A practice to restore an existing orchard's productivity through a structured three-year protocol of heavy pruning, soil restoration, micro irrigation and bio pest management with productivity at 80% of peak within 2 years.

- 30-40% of canopy removed as part of the rejuvenation protocol
- Productivity reaches roughly 80% of prior peak within 2 years of starting the protocol
- Rejuvenating an existing orchard costs roughly 40% less than replanting from scratch

Overall Steps

- Heavy pruning
- Soil restoration and micro-irrigation
- Bio-pest management

Applicable Tools & Technologies

1. Pruning tools
2. Micro-irrigation





Family Nutrition Garden



A family nutrition garden is a small, organically managed plot of land located near the home/ backyard or inside a dedicated area within a larger field, and follows seasonal crop rotations across Kharif and Rabi. It is a direct route from soil to the family's plate, providing a year-round supply of diverse nutritious vegetables for household consumption.

The garden can also become the family's seed bank and conserving traditional crop varieties. Garden sizes can vary from 5 gunta to 0.5 acres. As documented, a 100% organic garden can fetch ~INR 10,000/year from surplus sales.

Farmers usually manage the garden using farmyard manure, vermicompost, bio-pesticides etc. to improve household nutrition, reduce dependence on purchased food and also create opportunities to sell surplus produce.

The research also documents two types of implementation systems for nutrition gardens depending on household resources and access to irrigation.

- A pond irrigation unfenced garden
- A tube-well or drip irrigated fenced (green mesh) garden

Overall Steps

- 
- Site and layout selection
 - Water and perimeter infrastructure
 - Seasonal crop planning
 - Staking (for climbers)
 - Soil fertility management
 - Pest management
 - Seed saving
 - Post-harvest storage (documented in one case)

Applicable Tools & Technologies

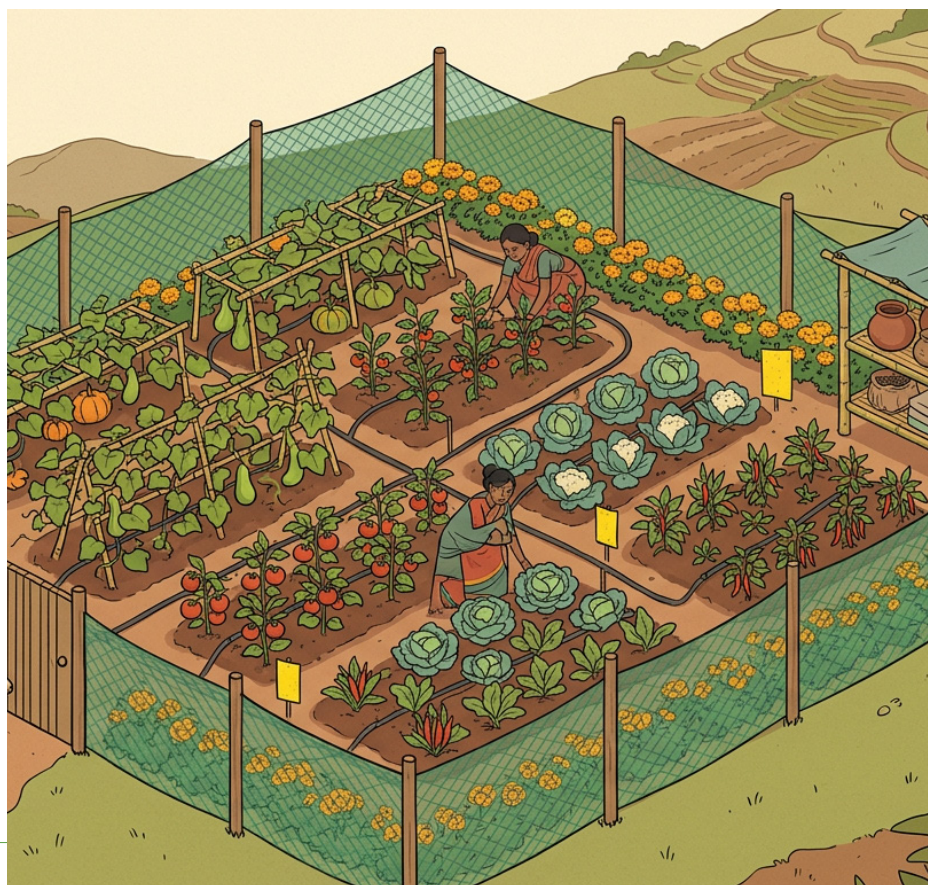
1. Farm pond or a tube well
2. Drip irrigation
3. UV-stabilised mesh fencing
4. Bamboo poles or wooden stakes
5. Yellow sticky traps

Case Study **Radha Guriea**

*Location: Nuaguda Village,
Kundra Block, Koraput, Odisha*

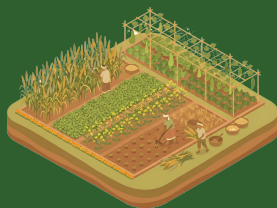
Radha established a protected and well designed family nutrition garden comprising green-mesh fencing, a tube well and drip irrigation to enable year-round cultivation while protecting crops from livestock. In her garden, she combines home saved desi seeds such as cowpea, pumpkin and bottle gourd with market purchased seeds including tomato, cabbage, cauliflower and chilli, ensuring both crop diversity and household nutrition.

She uses organic inputs, yellow sticky traps and marigold as a trap crop for her garden which is also a household seed bank, with locally adapted seeds such as cowpea saved and replanted each season.





Crop Rotation & Intercropping



Instead of growing one crop across an entire field in one season, this practice maximizes vertical, horizontal and temporal space by mixing crops in the same rows, arranging them in alternating row bands or stacking them vertically while rotating across botanical/crop species to break pest cycles.

If one crop fails to pests, disease or erratic weather, the others still produce, and staggered maturity times mean the household has something to harvest and sell across most of the year rather than all at once. The research identifies two methods of intercropping.

Method 1

Akkadi Millet-Based Multicropping

Reported in Karnataka

This traditional dryland based practice alternates 6-12 rows of a main crop, such as ragi, sorghum or groundnut, with a distinctive “Akkadi row” which is a deliberately mixed combination of crops such as pigeon pea, foxtail millet, black gram, cowpea and sorghum repeated across the field. Border rows of crops such as castor, red gram or roselle act as natural pest barriers while providing additional yield.

Although NGOs are increasingly documenting and reviving the practice, its adoption is declining among younger farmers, many of whom are shifting towards market-oriented monocropping of cotton, sugarcane and hybrid maize for higher short-term returns, despite Akkadi offering greater food security and resilience to climatic risks.

Method 2

Multi-Layer Trellis Intercropping & Crop Rotation

Reported in Bihar, Jharkhand, West Bengal and Assam

This practice combines raised trellises (machans) supporting climbing crops such as bitter melon, bottle melon and cucumber with ground-level vegetables including spinach, onion and leafy greens, alongside crops such as maize and pigeon pea. The system follows a multi-year crop rotation across botanical families to improve soil health, break pest and disease cycles, and enhance nutrient availability.

Crops with staggered maturity (40-150 days) provide continuous harvests over 60-120 days, creating 6-8 simultaneous income streams and enabling regular weekly market sales. Alternating deep-rooted crops such as maize and pigeon pea with shallow-rooted crops like onion and spinach further improves soil structure, while legume rotations naturally enrich soil fertility. Field-validated systems report 20-100% more output from the same land while reducing irrigation, weeding and input costs compared to monocropping.

Overall Steps

- 
- Land preparation and structural setup (in case of method 2)
 - Sowing and spatial arrangement
 - Rotation planning across seasons
 - In-season management
 - Staggered harvest
 - Season-end transition

Applicable Tools & Technologies

1. Seed funnel
2. Raised trellis structure
3. Hand tools (hoe, wheel hoe, cycle weeder)

Case Study

Prabhakar Buddappa

Location: Kolar, Karnataka

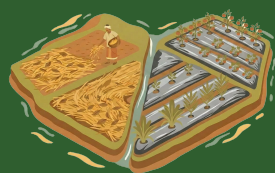
Prabhakar adopted the traditional Akkadi millet-based multicropping system, alternating rows of a main crop with mixed-species Akkadi rows and protective border crops. Compared to conventional cultivation on the same land, the system reduced his cultivation cost from INR 15,000 to INR 9,000 per acre, resulting in a 40% saving (INR 6,000 per acre).

Recognized as a pioneer farmer and resource person for Akkadi farming in Kolar district, Prabhakar has played a key role in promoting the practice through farmer-to-farmer knowledge sharing across Kolar.





Mulching



A practice that addresses moisture loss, declining organic matter and weed pressure in rainfed run-off prone landscapes by reducing soil exposure. This is done by placing a protective layer, either organic material (straw, dried leaves, crop residue) or plastic sheeting over bare soil. The type of protective material depends on the crop; root crops need a breathable, decomposing cover; high-value surface crops benefit from a more complete moisture and weed barrier, even at higher cost and no soil-building benefit.

- 35-45% cut in soil water evaporation, documented across mulch types.
- Roughly 90% reduction in manual weeding, a task that falls disproportionately on women.
- 20-150% yield increase depending on crop and mulch type.

Method 1

Organic Mulching

Reported in Odisha

In this long-term regenerative method, locally available biomass such as Sal leaves, paddy straw, crop residue is laid over the soil, chosen specifically for root and rhizome crops (turmeric, ginger) where the soil needs to stay loose and porous, and where the slow decomposition of the mulch itself becomes a long-term soil-building input rather than just a barrier.

Sal leaves are used as they decompose slowly, providing a season-long protective cover through heavy monsoon while releasing nutrients gradually rather than all at once.

Method 2

Inorganic (Plastic) Mulching

Reported in Odisha

Here, UV-stabilised polythene sheet (25–30 micron) is used for high-value, water-sensitive surface crops such as tomato or strawberry to create a near-total evaporation barrier. This method leads to 90–95% weed suppression, which is higher than organic mulch's moderate suppression, since weeds can grow through thin organic layers.

This method is beneficial for short-term yield maximisation on high-value crops, which often outweighs the fact that the material adds nothing to the soil other than plastic residue.

Method 3

Hybrid Mulching

Some farmers use plastic mulch on the raised bed itself while applying organic mulch in the furrows/walking paths between beds, thereby suppressing weeds in the paths while still allowing rainwater to infiltrate through the organic matter and recharge groundwater, rather than sealing the whole plot under plastic.

Overall Steps

- 
- 1. Crop and mulch-type selection
 - 2. Material preparation
 - 3. Application
 - 4. In-season function
 - 5. Complementary bio-input use
 - 6. Season-end handling

Applicable Tools & Technologies

1. Mechanical cutter
2. UV-stabilised polythene sheet
3. Basic drip or inline irrigation
4. Simple fermentation containers

Case Study **Damyanti Kanhar**

*Location: Tandrigaon Village,
Phiringia Block, Kandhamal, Odisha
Landholding: 1 acre*

Damyanti adopted organic mulching by applying dried straw across her 1 acre vegetable farm where she cultivates tomato and brinjal. The mulch helped conserve soil moisture, improve soil porosity and enhance soil fertility, while reducing dependence on chemical fertilizers. The practice increased her tomato yields by 38% from 65 to 90 quintals/acre and brinjal yields by 44% from 45 to 65 quintals/acre.





Cover Crops & Green Manuring



A practice where a farmer grows a crop specifically to be cut and returned to the soil for building organic matter, biologically fixing nitrogen and feeding microbial diversity. The end goal is not a single-season yield bump, instead, it is improving the soil year over year, at a labour cost that can be weighed against the fertiliser and pesticide expenditure it displaces.

The practice incorporates a multi-species mix (commonly greengram, horsegram, blackgram, cowpea, sesame) which is sown ahead of or alongside the main crop and grown for 40-45 days. After this, it is cut and incorporated via rotavation or manual turning into the soil, where it decomposes and releases nitrogen and organic matter. The documented decomposition time under this approach is 20-25 days, against 2-12 months for unmanaged crop residue breakdown.

The practice is adapted to local needs, with farmers using anywhere from 7-8 to over 100 species, including variants designed specifically for paddy cultivation without synthetic inputs. (Reported in Karnataka)

- Requirement of 15-25 kg seed/acre with minimal irrigation, standard land preparation.
- 40-60 kg N/acre and 7-10 tonnes of biomass per acre.
- 10-30% yield increase in a typical case.
- INR 3,000-6,000/acre saved in fertiliser cost per season.

Overall Steps

- 
- Species selection (chosen by soil, climate, terrain, and the target crop)
 - Sowing
 - Growth and live mulching
 - Incorporation
 - Repetition

Applicable Tools & Technologies

1. Simple slope-measuring tool
2. Solar powered pump
3. Buried PVC pipe
4. Flushing outlet
5. Inline drip emitters or overhead micro-sprinklers
6. Fertigation injector
7. Raised tank for gravity fed irrigation

Case Study **Suresh Desai**

Location: Belgaum, Karnataka

With over 40 years of experience in organic farming, Suresh developed “Aerogreen”, a 7-8 species green-manuring and live-mulching system adapted from Narendra Dabholkar’s multi-species green manuring approach. The system combines crops such as greengram, horsegram, blackgram, cowpea, sesame, chilli and coriander to improve soil fertility and continuously replenish organic matter.

Suresh Desai is also a resource person and trainer, spreading the Aerogreen model across Karnataka through farmer-to-farmer demonstrations. The practice has been associated with 40-60 kg N/acre, 10-30% higher crop yields and cost savings of INR 3,000-6,000 per acre across the farmers documented in the study.





Bio-Input Adoption



A natural zero-budget farming practice of preparing, fermenting and applying cow-dung based ferments such as jeevamrutha, bijamrutha to restore soil microbial life at a fraction of the synthetic fertilizer and seed treatment cost. These bio-inputs are formulated entirely from localized on-farm resources such as cow dung, cow urine, jaggery, agricultural lime, soil etc. Farmers use a combination of seed treatment (Bijamrut), soil activation (Jeevamrutha) and crop-stage botanical formulations such as Dashparni Ark (multi-leaf extract), Neemastra, Brahmastra. The research documents three types of preparations used across different points of the cropping cycle.

Type 1

Bijamrut (Seed Treatment)

Reported in Karnataka and Jharkhand

In this method, a fermented preparation (cow dung/urine/lime) is used specifically to treat seed, seedling roots or vegetative propagules before planting for protection against pests and for improving germination.

A standard 20-litre batch treats roughly 100 kg of seed, and should be used within 24-48 hours of preparation. Two formulations are currently in practice, a liquid Bijamrut for hard-coated or large seeds and vegetative propagules and a Ghana (dry/solid) Bijamrut specifically for tiny vegetable seeds that would stick together or rot if treated wet.

Type 2

Jeevamrutha (Ongoing Soil and Plant Bio-Fertiliser)

Reported in Karnataka

A fermented preparation applied repeatedly through the season as a soil drench or foliar spray that releases beneficial microbes into the root zones and supports ongoing nutrient cycling. Two formulations are currently in practice: Drava (liquid) Jeevamrutha, which should be used within a week of preparation, and Ghana (solid/dried) Jeevamrutha which once dried, can be stored for 6-12 months and can be applied without water. Farmers frequently use Bijamrut and Jeevamrutha together as complementary parts of the same overall input strategy.

Method 3

Gokrupamrutha

This fermented probiotic multi-strain culture is developed and promoted by the Bansi Gir Gaushala in Gujarat. Rather than remaking the culture fully from raw ingredients each time, farmers propagate it forward as a “mother culture,” using a portion of the previous batch to start the next. Farmers trained by Bansi Gir Gaushala initially received the mother culture free of cost, and now propagate it independently or source it from local resource persons.

Overall Steps



Applicable Tools & Technologies

1. Simple fermentation containers
2. Cloth pouch
3. Sun-drying and crushing equipment
4. Jute bags

Case Study **Malleshappa Bisirotti**

*Location: Hiregunjal
village, Dharwad,
Karnataka*

Malleshappa is the person behind the development of Ghana Jeevamrutha, a solid, shelf-stable version of the traditional liquid Jeevamrutha. By converting the liquid formulation into a dry powder, he addressed key limitations of the original practice, including its short shelf life, transportation challenges and dependence on water for application. His innovation has extended the product's shelf life to 6-12 months, making it easier to store, transport and use.

The system has since been adopted by multiple women-led SHGs across Dharwad and Haveri, who manufacture it as scale to promote the adoption of bio-inputs based farming practices.





Vermi-composting



A continuous on-farm input generation practice, where organic waste such as crop residue, kitchen scraps, poultry litter, farm biomass is converted into a nutrient rich compost using earthworms. The research identifies two models of vermicomposting.

- Standard bed dimensions are 10 ft (L) × 4 ft (W) × 1.5–2 ft (H)
- Compost is ready for incremental harvest at 45–60 days and a full bed harvest in 90 days
- Vermicompost can sell at a retail price of INR 10–20/kg

Model 1

Household/Farm-Scale Vermicomposting

Reported in Bihar, Jharkhand and Assam

Here, the compost is produced for the farm's own use, in a simple bed, using standard on-farm waste materials. A base layer of coarse material (twigs) or sand/forest soil (roughly 1 inch), is followed by layers of pre-decomposed organic matter mixed with cow dung in a 3:1 ratio, repeated until the bed is full.

- Basic infrastructure cost INR 15,000-16,000 for a standard 4-bed unit.
 - Expected yield of 500-800 kg/year from a single 10×4 ft bed.
-

Model 2

Enriched Commercial-Scale Vermicomposting

Reported in Jharkhand and Tamil Nadu

While the core processes remain the same, the compost is microbially enriched (Trichoderma, Pseudomonas, NPK-fixing consortia added to the finished compost), and sold under a brand name to a wider farmer base. Commercial-scale infrastructure costs roughly INR 1.70 lakh for a 20-bed Bio-Resource Centre unit.

Overall Steps



Applicable Tools & Technologies

1. Raised bed under a simple shed roof
2. Fine mesh sieve, manual or machine-driven
3. Jute covering

Case Study

Manonmani Vadakkadu

Location: Tamil Nadu
Landholding: 2.5 acre

For over 25 years, Manonmani has combined vermicompost production with pepper-coconut intercropping on her farm. Using coco peat, neem cake, groundnut cake, earthworms and agricultural residues such as sugarcane trash, she produces around 2 tonnes of vermicompost. She has converted her on-farm practice into a successful enterprise serving nearly 700 regular customers, including farmers and urban terrace gardeners. Depending on market demand, she sells vermicompost at INR 10-30 per kg.





Agro- forestry



A function driven, multi-layered practice where trees are deliberately integrated into farmlands. Various species are selected for specific roles such as soil improvement, biomass generation, microclimate regulation thus transforming a fragile single-crop farm into a resilient multi-tier ecosystem and income. The research documents two methods of agroforestry.

Model 1

One-Acre Orchard Establishment with Intercropping

Reported in Karnataka

This method responds to income volatility by inserting a perennial income stream like horticulture fruit trees onto one acre of each participating farm, alongside fast-growing intercrops grown between the young trees in the early years to bridge the income gap before the orchard bears fruit. The combination of one seasonal (mango) and one continuous producer (lemon) reduces the risk of total income interruption.

A second, entirely separate layer of 8-10 forest tree species goes in along the field's boundary bunds. These boundary trees are not there for fruit income: they supply fuel, fodder, timber and biomass for compost, while also functioning as windbreaks and bund-stabilising vegetation.

In this variation, a farmer can also lease the standing crop to a contractor for a multi-year lump sum where the contractor handles harvest, transport, ripening and sale.

Model 2

Miyawaki Dense Plantation + Bund Plantation

Reported in Madhya Pradesh

In this multi-layered planting practice, two distinct planting systems are adopted on the same farm. One is Miyawaki-style dense forest patches (~3 plants/m²) established as concentrated blocks combined with linear bund plantation along field boundaries, with species in both chosen by role (soil improvement, biomass generation, bio-input material, fruit income, microclimate regulation) rather than by availability alone. Soil organic matter, in one case, increased from 0.4% to over 1.8% over eight years of combined bund agroforestry, mulching and crop rotation.

The difference between the two variations is that in method 1, boundary trees are treated as a secondary layer within an orchard-first model, while in method 2, bund plantation is treated as a standalone entity.

Overall Steps

- 
- Site assessment
 - Define purpose and species function
 - Soil preparation
 - Pit preparation and planting
 - Species selection
 - Support during establishment
 - Intercropping during establishment
 - Ongoing management
 - Harvest and market

Applicable Tools & Technologies

1. Contour trench-and-bund earthworks and farm ponds
2. Staking materials
3. Drip irrigation

Case Study **Shivappa Kognur**

*Location: Pattan Village,
Kalaburagi, Karnataka
Landholding: 8 acres*

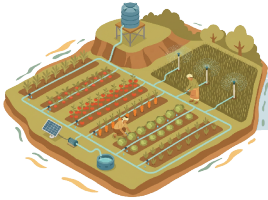
Shivappa has established a one-acre agroforestry orchard under the MYRADA programme on his 8 acres of leased land, using intercropping during the initial years to generate income while the fruit trees mature. Alongside farming, he earns approximately INR 1.2 lakh annually from dairy, which provided an important supplementary source of income during the orchard's establishment phase.

He emphasizes on the need for institutional support and tenure sensitive programme design to encourage long term investments since orchards require 4-5 years to become economically productive for tenant farmers.





1



Micro-Irrigation

2



Rainwater Harvesting

3



Mushroom Cultivation

10



Crop Rotation & Intercropping

9



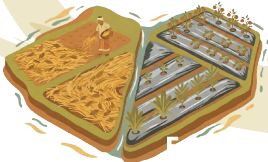
Family Nutrition Garden

8



Orchard Rejuvenation

11



Mulching

12



Cover Crops & Green Manuring

13



Bio-Input Adoption



4



Integrated Pest Management

5



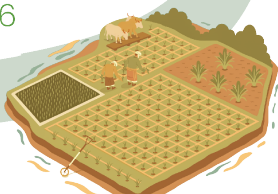
Seed Saving & Sovereignty

7



Integrated Farming System

6



System of Rice-Millet Intensification

14



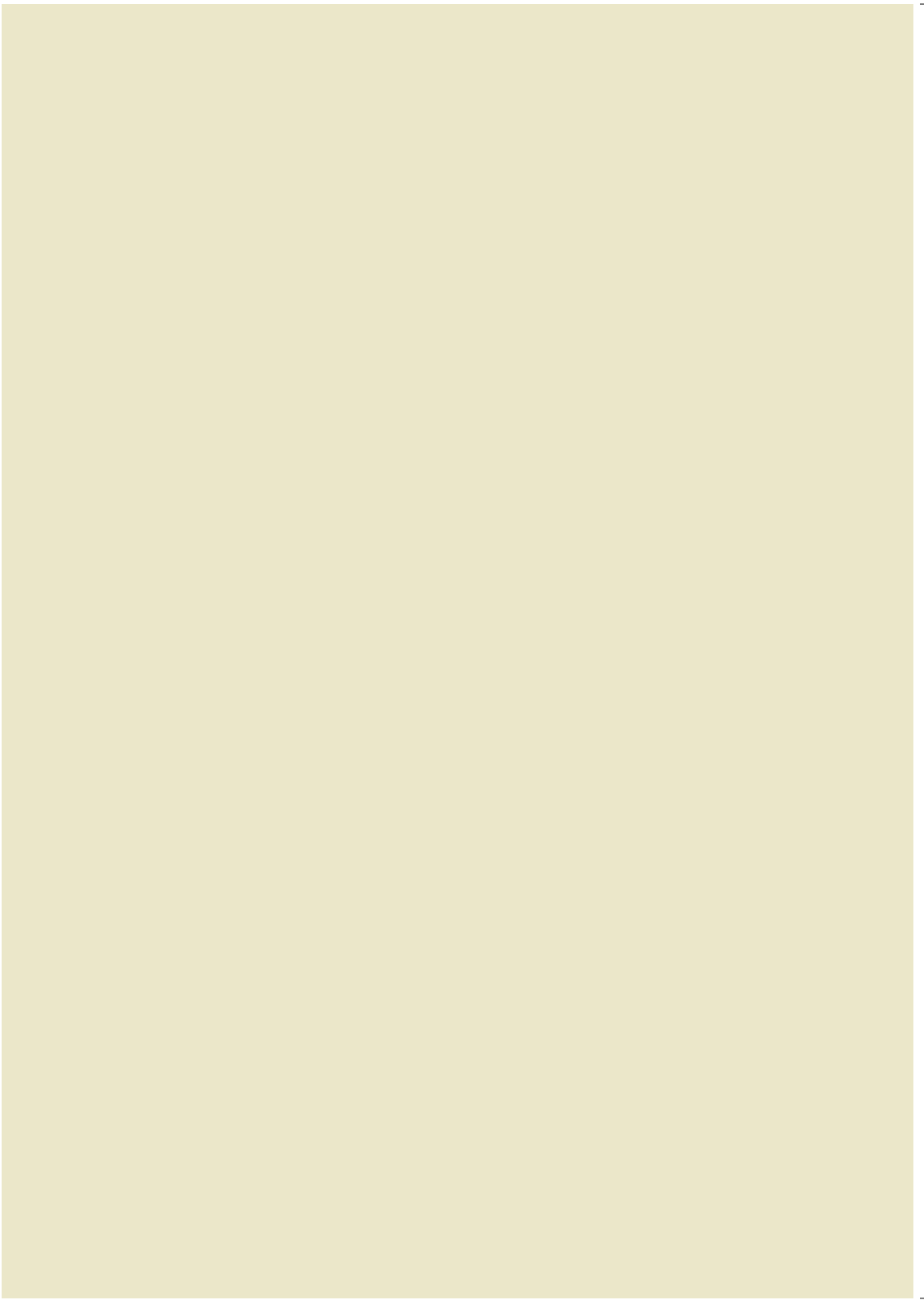
Vermicomposting

15



Agroforestry







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