Ecological farming methods (Akkadi Saalu)

This playbook has been designed for CSOs and trainers who want to work with farmers who want to use these methods

Primary user: CSOs, master trainers in semi-arid regions of India
Secondary users: Farmers practising rainfed farming

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This playbook was created using **Soil Vasu's** resources

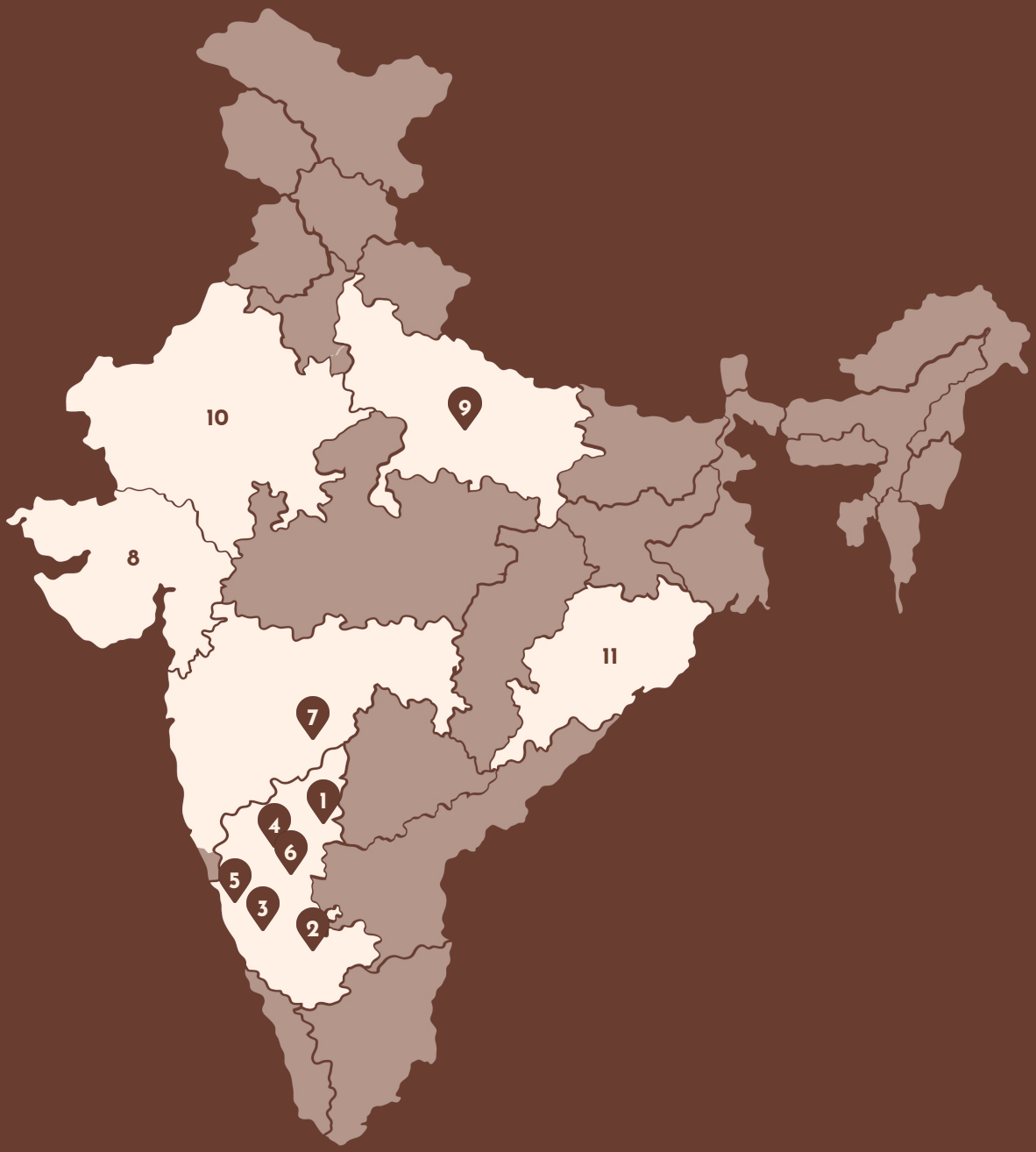
What need/pain point is this playbook addressing?

Many small farmers in rainfed areas face the challenge of degraded and unproductive land. This playbook can help farmers to practice regenerative agriculture that is economically viable and ecologically sustainable.

What are the benefits to stakeholders?

- For farmers - reduction in input costs and net gains.
- Beneficial for the ecology of the soil and farm.

Success Stories



1. Nanjungoad, Bellary, Magadi-ICRA
2. Chitradurga
3. Challakere
4. Parts of Mysuru
5. Chamrajnagar- Purnarchith
6. Kolar-Gram Vikas
7. MH- Kaneeri Math
8. Gujarat
9. Lucknow, UP
10. Rajasthan
11. Odisha

Step 1: Prepare field for sowing

1. Deep plowing

After the first rain during summer (March/April), plow the land deeply.

- This removes pests in pupae stage, disease-carrying insects, nematodes and weeds (these weeds could be used to make compost and/or liquid manure).
- Plowing also loosens the soil, which leads to rainwater being better absorbed and retained for longer by the soil (increase in soil moisture).
- To maximize soil and water conservation within the farm plot, plow across the slope and build bunds on plots with a higher degree of slope.

2. Apply Farm Yard Manure (FYM)

FYM is made from agricultural waste. Collect animal dung in a pit daily and add some water; you can also add neem leaves. Over 6 mo. to 1 year, the dung collected in this pit becomes FYM –mixing this in this fertilizes the soil.

- Mix FYM with trichoderma - this helps to prevent black arm disease, bacterial blight and fusarium wilt, all of which affect seeds.
- At Least 3-5 quintals of improved FYM mixed with 20 kgs of vermicompost has to be applied to the farm, with cattle urine and neem cake - before sowing begins.

If you do not have access to FYM, use vermicompost or compost created on the farm using kitchen waste and materials that are available locally.

3. Construct farm pond

Construct a farm pond in the lower portion of the farmland to ensure rainwater conservation. Video tutorial in Kannada

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Step 2: Seed Selection and treatment

1. Selecting and sourcing seeds

Use pest and disease resistant variety seeds - service directory as using these seeds reduces input costs. Using these seeds instead of hybrid seeds also means that the farmer can save these seeds for the next cropping cycle.

The main crop should be planted with a minimum of 8 other crops. Choose companion plants with deeper roots so they can supply nutrients to shallow root zones.

Companion planting has multiple benefits:

1. Reduced input costs - the need for pesticides and fertilizers is significantly reduced – 10-15k saved, leads to a net increase in income
2. Cash crop yield + food crop income
3. Use crop residue as mulch and broad leaved companion crops to shade the soil underneath – this leads to better soil for the next crop
4. Nutrition and fodder security for farmers
5. Reduced risk of pests and diseases since the diversity in cropping keeps both from spreading to the whole farm. Certain pest-attractant companion plants keep pests away from the cash crop.

For example, here's a list of companion crops that can be used for cultivation of cotton using ecological farming methods:

(CSOs and trainers can make these for the prevalent cash crops in the region and guide farmers to procure seeds accordingly).

Seed Selection and treatment

Crop	Output and uses
Cotton	Cotton fiber Cotton stalks for fuel Cotton seeds as fodder and for edible oil extraction Cotton cake for agricultural purpose Dried stalks treated with jaggery + salt - as fodder in emergency Powdered cotton seeds for poultry Seeds for mushroom culture
Castor	Seeds for hair oil and oil bath for babies Castor cake as manure Leaves to cover from sunlight Sticks for fuel purpose
Pearl Millet	Grains for staple food and medicine Straw is very good fodder for cattle, especially calves
Cowpea	As vegetable Dried to make other dishes when there is lack of vegetables during summer Leaves and creepers as fodder for cattle.
Redgram	Used as green vegetable Sticks for domestic fuel and thatching material Husk/seed coat used as fodder Dried seeds as dal
Sorghum	Staple food Sticks for fodder
Horse Gram	As food and fodder
Onion/Garlic	As vegetable and spice Growing onion/garlic for every 8 rows of cotton controls cotton pests Outer layer of garlic skin (dry) to manage storage pests
Marigold	Flowers (to sell) which also acts as a repellent for pests

Crop	Output and uses
Green Gram	As vegetable and as dal, sticks for fodder
Chillies	As spice in food

2. Treating Seeds

1. With cow urine (2 %) and trichoderma (10 %) solution to control fungal diseases:

   For eg. Drench 1 kg of cotton seed in a solution of 200 ml cow urine + 10 liters of water + 10 gms of trichoderma for 20 minutes. Once the seeds are dried in shade, they are ready to be sown.

2. With Panchagavya as general prevention for most diseases:

   Soak 1 kg of cotton seeds in 300 ml of Panchagavya + 10 litres of water for 20 minutes, then dry in shade.

Step 3: Sowing

Sow seeds in an Intercropped manner in roughly a ratio of 70-20-10 for cash crops, companion crops and pest control crops respectively.

Poster/visual:

- Sow seeds in time for first rain
- Space plants with 2 ft between two plants and 2.5 ft between two rows
- At the borders of the farm, plant at least 3 rows of border crops. Use millets since they also provide food security.
- For every 3 rows of cash crops, sow one row of pulses like greengram, blackgram, field bean, cowpea or oil seeds. This will help in pest control and as these crops have a short root system, the nutrients from the soil will not be overused.
- Likewise, for every 20 rows of cotton, sow one row of jowar/maize. These attract birds who act as natural pest control. If possible, install bird perches in at least in four places per acre.
- For every 8 rows of cotton, sow one row of onion or garlic These control sucking and chewing pests considerably.
- Along with this, sow trap crops like lady's finger, castor and, marigold surrounding the cotton farm.

Step 4: Pest Control Techniques

- Deep ploughing after the first rain. This gets rid of pests in pupae stage and nematodes in the lower layers of the soil).
- Clean out all residues of previous crop from the field before sowing seeds.
- Procure and use pest and disease resistant variety seeds.
- Treat seeds with Panchagavya or Trimurthy Tonic before sowing
- To manage certain diseases, add bio-fertilizers like trichoderma to the FYM when mixing in with the soil
- Avoid monocropping as this attracts pests; Intercropping also helps to manage weeds.
- Grow ladies finger, castor, marigold and any other locally appropriate trap crops. Regularly collect and destroy pests which attack these trap crops.
- Spray 3% of Neem seed kernel extract (NSKE) or 2% of Neem oil on leaves and fruits to repel sucking pests.

Step 5: Harvest and value addition

Ask for native knowledge and current methods and suggest new methods.

You can refer to this guide from ICAR for post-harvest processing of organic produce.
Post-harvest processing usually includes these stages:

- Storage
- Cleaning
- Value addition
- Gradation
- Branding

Step 6: Market Linkage

- Can link to agents with help from partner institutions
- Can create markets

Step 2: Seed selection and treatment

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Training of trainers

1. Data collection through partner CSO

1. Ask CSO/trainers responsible for the farmers of a given region to collect data and analyze it. This should include:

- Data on cash crops from all farmers involved in the training programme - which crop is being grown? On how much of the farmer's land?
- Ask farmers to maintain a farm diary to keep a record of farming activities -- as evidence to support organic/natural farming practices (and to answer questions from KVKs and agri depts to support claims about organic farming being beneficial for farmers).
- Analysis of socio-economic status of farmers and a cost-benefit analysis of cash crop: expenses for pre-sowing, sowing and after sowing activities (inputs, seeds, yield, labour, transportation, income from other crops, if any and food security)

These trainings can be conducted as a mix of discussions and interactive sessions,.

List and map stakeholders (esp government departments involved in the region)- think through how can these be leveraged for various parts of this farming method.

2.. Collectivise farmers into farmer groups

Create farmer groups and generate awareness around ecological farming methods and building soil health

- Initiate savings activities for farmers as entry point activity - opening an account in banks, maintaining records of members and meetings.
- Collectivise farmers for the purpose of buying/selling inputs and forming local networks.
- Identify and map farm lands to empower farmers: Village level mapping is already done by watershed programs. Here, farmers map their own lands -- each inch in mapped (weeds, places where water is leaving the land to put TCBs, etc) -- basically serves the purpose of the farmer knowing the best place in the farm for any structure and tree/crops.
- Train farmers in the village to make compost, FYM, vermicompost

- Encourage farming families to start home gardening – distribute vegetable seeds to get them started.

Some of the activities that can be done collectively by farmer groups are:

- For land preparation – desilting tanks, transporting to farm lands, constructing pits and bunds to conserve soil and rainwater.
- Making compost and other inputs in Bio-resource centres (BRCs) at the village scale.
- Meetings in every villages at least once in every 15 days. It gives trainer access to the community, builds trust, engaging with community elders.

3. Conduct a Participatory Rural Appraisal (PRA) and model farm demos

Complete PRA to get stakeholder buy in and gauge if farmers themselves think their soil is damaged.

- Strengthen farmer groups through exercises where farmers test their soil to understand it's condition and characteristics. Trainers can help farmers decide cropping pattern based on the results of this test. From farmer field schools in this manner.
- Conduct demonstrations for Improving soil quality in a model farm to show farmers how ecological soil management techniques can improve soil quality. For this purpose, request a piece of 1/2 to 1 acre land from the village community. Provide them with seeds and inputs, and ask farmers to volunteer the labour - they can distribute the necessary hours between themselves. This becomes a fortnightly demonstration where farmers can see changes in soil quality over time.
- Conduct zonal level meetings where many villages from a cluster participate and can see the improvement in soil quality in demo plots in a smaller subset of villages. Since Gram Panchayats are involved in these meetings, this is an opportunity to get them onboard with these techniques since GPs have a much wider reach and better access to farmers than any trainer or small CSO.
- Organize street plays, puppet shows, etc that depict the importance of ecological farming methods locally by involving interested youth from the village.

Usually, repeated demos are needed to convey this message effectively. So continue to put forth this messaging for a 6 month period - both formally and informally in interactions with the village community.

4. Organise a seed mela to showcase successful harvests

After a whole season of training for ecological farming methods in a village where at least some farmers have adopted these methods, organise a Seed Mela. This mela should showcase a diversity of seeds from the harvest of crops grown using these methods from a completed crop cycle. Educate people through this mela about native resources such as the diversity of cattle, other livestock, tree crops, etc. The larger objective of the mela is to generate pride in community.

Trainers can work with the community association of farmers – give them the responsibility of procuring seeds for the season and of generating awareness so many farmers save seeds in the next season.

The trainer needs to start planning for this in the 1st month itself, as the cropping data comes in. They can use this data to suggest native alternatives and start training on seed treatments using ecological farming methods.

The trainer also needs to conduct troubleshooting meetings every 2 weeks to address any challenges farmers might be facing in using these methods. The following page shows an example of a calendar of activities for a trainer.

Manner of Implementation: January to December 2023

Activities	2023										2024		
	Mar	April	May	June	July	August	Sept	Oct	Nov	Dec	Jan	Feb	Mar
Pre-sowing Activities													
Training to the team on roles and responsibilities and discussion on activity chart													
Designing Survey Formats on Families and Soils													
Survey of families and soils involved in the activity													
Orientation to farming families on why DIVERSITY BASED ECOLOGICAL FARMING SYSTEMS													
Formation of crop specific groups													
Identification & management of Demo plots (crop-based)													
Designing monitoring cards and crops timeline to document activities throughout the year													
Training on Designing & Mapping of a farm land													
Families designs their farm lands													
Training & demonstration on making of contour bunds and soil inputs related to land-based activities - Contour bunds using A frame - Farm ponds - Farm Trenches - Making of Hot Compost - Improved FYM - Weed Tea - Greenleaf manure													
Families makes contour bunds / farm ponds													
Weekly meetings with team & farming community													
Training on making of various types of Liquid Manures													
Family members prepare liquid manures													
Sourcing and distributing quality sowing seeds for the main and companion crops													
Training on Seed Selection – Seed germination Test – Seed Treatment													
Training on importance of Mixed Cropping – Space between rows and plants – border crops – trap crops – nutritional crops etc													
Broadcasting Green manure seeds after the first rain and ploughing													
Making of small pits for planting tree saplings													
Sowing and after sowing activities													
Sowing varieties of seeds to address mixed cropping systems													
Demonstrative training on making of liquid manures to address nutritional security for growing plants – managing pests and diseases (application of these liquid manures once in every 20 DAS)													
Demonstrative training on Weed Management													
Managing moisture in the farmland													
Demonstrative training on managing pests and diseases													
Training on Harvesting and storage methods													
Other allied activities													
Networking with Government line departments (Agriculture – Horticulture – Forestry etc) to source various schemes													
Initiating Family Gardening activity in each home													

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What caveats/disclaimers do we need to keep in mind?

Do you have any other remarks /suggestions?

References (Links to pdfs or videos)

https://abcd.com
https://efghijklmnop.com
https://qrstuvw.com
https://xyz.com

What prerequisites does implementing this playbook need?

What is is applicable for?

What internal and external resources (human and financial) were needed to make this happen?

Are there companies that provide services available?