# FIELD MANUAL FOR
# NATURAL FARMING




National Mission on Natural Farming (NMNF)
ICAR-Indian Institute of Farming Systems Research, Modipuram
Indian Council of Agricultural Research (ICAR)

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भाकृअनुप
ICAR




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# Preface

Natural farming is more than a cultivation practice—it is a way of working in harmony with nature to restore soil vitality, enhance crop resilience, and ensure safe, nutritious food for all. Rooted in traditional wisdom and strengthened by scientific validation, natural farming reduces dependence on synthetic inputs and fosters a self-sustaining farm ecosystem.

This field manual has been prepared to serve as a practical guide for farmers, extension workers, and agricultural practitioners who wish to adopt and promote natural farming methods. It brings together step-by-step instructions, time-tested formulations, crop-specific recommendations, and integrated pest and nutrient management practices suitable for diverse agro-climatic zones. The manual emphasizes four core principles: Soil health regeneration through organic amendments and microbial enrichment; Biodiversity enhancement via mixed cropping, trap crops, and beneficial plant associations; Minimal external inputs by harnessing locally available resources; and Farmer empowerment through knowledge sharing, cost reduction, and increased farm profitability.

By following the methods outlined here, practitioners can gradually shift towards a farming system that nurtures the land, conserves natural resources, and improves the livelihoods of rural communities. The instructions are designed to be simple, field-tested, and adaptable, ensuring that even smallholder farmers with limited resources can be benefited. The field manual covers the systematic study on natural farming, potential domains, package of practices as well as brief on NMNF guidelines and QR codes of videos related to natural farming.

We hope this manual not only provides technical clarity but also inspires a deeper commitment to protecting our natural heritage. As the challenges of climate change, soil degradation, and rising input costs continue to impact agriculture, the natural farming offers a pathway towards resilience and sustainability.

**Authors**

# Acknowledgement

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We also thank Dr. A. Velmurugan, Assistant Director General (SWM) and Dr. Rakesh Kumar, Assistant Director General (AAFCC)- Acting, ICAR, for his technical inputs and facilitation of collaborative efforts to enhance the scope and impact of natural farming practices. Our sincere appreciation goes to the Department of Agriculture & Farmers' Welfare (DA&FW), Government of India, for sponsoring the NMNF–Model Farms and Research projects to the NRM Division of ICAR, which has enabled the development and field validation of scientific protocols for natural farming.

We gratefully acknowledge the contributions of researchers, field staff, and participating farmers for their invaluable efforts in implementing, documenting, and refining the practices presented in this Field Manual. Their dedication and hard work form the backbone of this initiative, aimed at promoting sustainable and eco-friendly agricultural systems for the benefit of present and future generations.

**Authors**

# 01 BACKGROUND

The National Mission on Natural Farming (NMNF), launched as a standalone Centrally Sponsored Scheme under the Department of Agriculture & Farmers Welfare (DA&FW), Ministry of Agriculture & Farmers Welfare, represents a significant shift towards sustainable, climate-resilient, and safe food production systems in India. With a total outlay of ₹2,481 crore (₹1,584 crore as Government of India share and ₹897 crore as State share), NMNF aims to promote nature-based farming practices that reduce dependency on externally purchased inputs, encourage on-farm bio-input production, restore soil health, and strengthen ecological balance.

Natural Farming (NF) is not a new concept to Indian agriculture; it builds upon centuries-old indigenous knowledge, revalidated and enhanced through modern scientific research. The approach emphasizes the use of on-farm prepared bio-formulations such as Beejamrit, Jeevamrit, Ghanajeevamrit, Neemastra, Brahmastra, Agniastra, and Dashparni ark, enabling farmers to achieve chemical-free, nutritionally rich, and ecologically sustainable crop production.

**Purpose of the Field Manual**

This Field Manual is designed to serve as a practical guide for the establishment, management, and monitoring of Natural Farming Model Farms under NMNF. It consolidates, standardized input preparation protocols, field-tested packages of practices (PoPs) for various cropping systems and observations, ensuring that these farms act as centres of research data collection, demonstration, capacity building, and farmer-to-farmer knowledge dissemination. Model Farms are pivotal in:

- Showcasing location-specific NF practices adapted to local agro-climatic conditions.
- Demonstrating integrated crop-livestock systems with emphasis on indigenous cattle breeds.
- Serving as training hubs for Community Resource Persons (CRPs), farmers, and extension personnel.

**Scientific Foundation and ICAR's Role**

The Indian Council of Agricultural Research (ICAR), through its Natural Resource Management (NRM), Agricultural Extension, and Agricultural Education divisions, has been spearheading NF research, education and extension from 2020 under various programmes including the All-India Network Programme on Natural Farming. Multi-location experiments in 20 locations across 16 States have enabled the characterization of NF inputs, development of PoPs for major cropping systems, and formulation of generic NF protocols for adoption across the country. The outcomes include:

- Development and publication of a Technical Manual on Natural Farming in collaboration with the Integrated Nutrient Management (INM) Division, DA&FW.
- Standardization of bio-input characteristics to support the establishment of 10,000 bio-input centres under NMNF.

- Formulation of guidelines for institutional and farmer field model farms.
- Launch of a dedicated NMNF Research Portal for Competitive Research Grants (CRGs) and model farm tracking.
- Relevance of the Manual
- This Field Manual is a ready reference for:
- Researchers – to align field trials with standardized NF protocols.
- Extension Workers & KVK Staff – to demonstrate, train, and monitor NF practices effectively.
- Farmers – to adopt low-cost, sustainable methods ensuring profitability and environmental stewardship.
- Policy Implementers – to monitor outcomes and scale up NF adoption in targeted zones.
- Guidelines for extension agents

The Manual aligns with NITI Aayog's vision of expanding natural farming to 20% of India's cultivated area by 2030, contributing to national priorities of soil rejuvenation, water conservation, biodiversity enhancement, and climate change mitigation. By bridging traditional wisdom with scientific rigor, these Model Farms will catalyse a nationwide transformation towards chemical-free agriculture.




Conceptual Framework for assessing Natural Farming (adapted from Rao, 2020)

# 02 SALIENT RESEARCH FINDINGS

Natural Farming (NF) has emerged as a sustainable agroecological approach in India, addressing the ill effects of input-intensive agriculture. It minimizes use of synthetic agrochemicals by leveraging on-farm resources (cow dung/urine, plant extracts, compost) and traditional knowledge. As a result, NF systems are low-cost, free farmers from expensive purchased inputs, and can maintain *comparable productivity* (especially in low-input crops) while increasing farm income and preserving soil and environmental health. The practice has gained traction across diverse regions, predominantly among small and marginal farmers who typically cultivate <2 ha and integrate livestock (indigenous cattle for dung/urine) into their farms. Core NF practices – Jeevamrit, Ghanajeevamrit, Beejamrit (biofertilizers), mulching, intercropping, and botanical extracts for pest control – are adapted to local conditions. Field surveys in 16 states indicate that while many NF farmers achieve yields close to research station levels, others show yield gaps, especially in rainfed and hill areas. Bridging these gaps and enhancing profitability is critical to sustain and expand NF adoption.

- Multi-location research trials (2020–2022) demonstrate that NF can produce yields on par with or exceeding conventional and organic farming benchmarks in most regions. In several cropping system comparisons, NF yields matched those under organic and integrated management, and often surpassed local farmer practice yields. NF performance is context-dependent, varying by crop and location. In some instances (notably initial conversion years or marginal environments), NF yields have lagged behind due to transitional factors.
- A consistent finding is that NF significantly reduces cultivation costs by replacing costly chemical fertilizers and pesticides with home-made inputs. Across trials, NF farmers avoided expenditures on synthetic inputs, cutting input costs by ~18–50% in various locations. This frugality did not come at the expense of output – with yields largely maintained particularly with legume based cropping systems and low input use areas. NF often achieved equal or higher net returns than conventional and even organic farming. For instance, in Tamil Nadu cropping system trials, NF delivered greater net incomes than the standard farmer practice in groundnut–sorghum and cotton–sorghum systems. The combination of lower costs and competitive yields translates to better profit margins and benefit–cost ratios for NF adopters. Importantly, the lower cost of production makes NF a more economically accessible model for resource-poor and smallholder farmers.
- While initial adoption of NF may entail an adjustment period (with minor yield or profit declines in the first season at some sites), results indicate that profitability improves as soil health builds up. Careful management during transition (e.g. using supplemental organic manures, timely weeding) can mitigate short-term lags. Overall, evidence from the network trials confirms NF as a viable farming system economically, capable of sustaining farmer livelihoods once practices are optimized for various regions.
- NF management led to measurable improvements in soil health indicators. Over 2–3 years, NF plots showed rising soil organic carbon (SOC) levels – for example, SOC increased

from ~0.90% to 1.15% in Himalayan trials (a ~28% gain). NF soils had significantly higher microbial counts and diversity indices than chemical-fed soils. Richer microbial communities (e.g. more beneficial bacteria, fungi, and actinomycetes) and more balanced microbial evenness under NF was observed, indicating a healthier soil ecosystem developing over time. This boost in soil biota and organic matter under NF improves nutrient cycling and soil structure, laying the foundation for sustained fertility and yield stability.

- Natural farming practices also provide broader ecosystem services. On-farm biodiversity is increased through intercropping, crop rotations, and maintaining livestock, which in turn helps naturally suppress pests and diseases. By conserving biodiversity (above and below ground) and enhancing ecosystem functions (like carbon sequestration and water efficiency), NF aligns farming with natural ecological processes, contributing to long-term sustainability.
- Farmer-led Indigenous Technical Knowledge (ITK) has been actively documented and validated as part of the NF initiative. These time-tested practices – ranging from organic soil amendments to herbal pest remedies – are inherently low-cost and eco-friendly, relying on locally available materials. The publication highlights numerous successful ITKs, demonstrating their efficacy in the field. Many traditional formulations achieved 50–80% reduction in pest infestations and 18–25% increases in crop yields compared to controls. For example, a fermented ginger-garlic-green chili extract ("3G") provided up to 74% reduction in sucking pests on cotton and significantly boosted yields of cotton, okra, and maize under NF management.
- A scientific analysis of NF's bio-inputs (like Beejamrit, Jeevamrit, Ghanajeevamrit) reveals why they are effective. These home-made formulations contain extraordinarily high microbial populations and bioactive compounds. For instance, fresh Beejamrit (a cow dung–and urine–based inoculant for seeds) hosts an abundant and diverse microbial consortium – total viable bacteria on the order of 10^10 CFU/mL, beneficial actinomycetes ~10^8 and fungi ~10^5, including functional groups such as free-living nitrogen fixers (~10^9) and phosphate-solubilizing bacteria (~10^8). Such rich microbiota serve as a biological engine, inoculating the soil/seed with organisms that fix nitrogen, solubilize nutrients, and protect against pathogens. Analytical chemistry of these fermented inputs also detected numerous natural metabolites (phenolics, flavonoids, alkaloids, etc.) with antimicrobial or growth-promoting properties. This dual nature – dense in beneficial microbes and biochemical compounds – underlies the efficacy of NF inputs in improving seed germination, nutrient availability, and pest/disease resistance. In practice, the use of such bio-inputs (applied fresh for highest microbial activity) jump-starts soil biological processes each season, contributing to sustained soil fertility and plant health in NF systems.
- To scale up natural farming across India, the publication outlines a multi-pronged strategy encompassing research, capacity building, and market support.

Natural Farming offers a promising pathway toward sustainable and climate-resilient agriculture in India. The evidence from the publication shows that NF can maintain crop yields and farm incomes particularly in low-input areas and legume based cropping systems while delivering significant co-benefits – healthier soils, reduced input costs, and enhanced ecosystem services. These outcomes are particularly relevant for smallholders and resource-constrained farmers, for whom NF provides a low-input, regenerative alternative to the high-external-input model. At

the same time, realizing NF's full potential at scale will require addressing the noted challenges: bridging yield gaps through research and extension, supporting farmers during the transition phase, and building reliable markets for NF produce. The findings suggest that with enabling policies, knowledge support, and market incentives, natural farming can be scaled up as a viable national strategy to cover up to one fourth of the cultivated area as advocated by NITI Aayog.



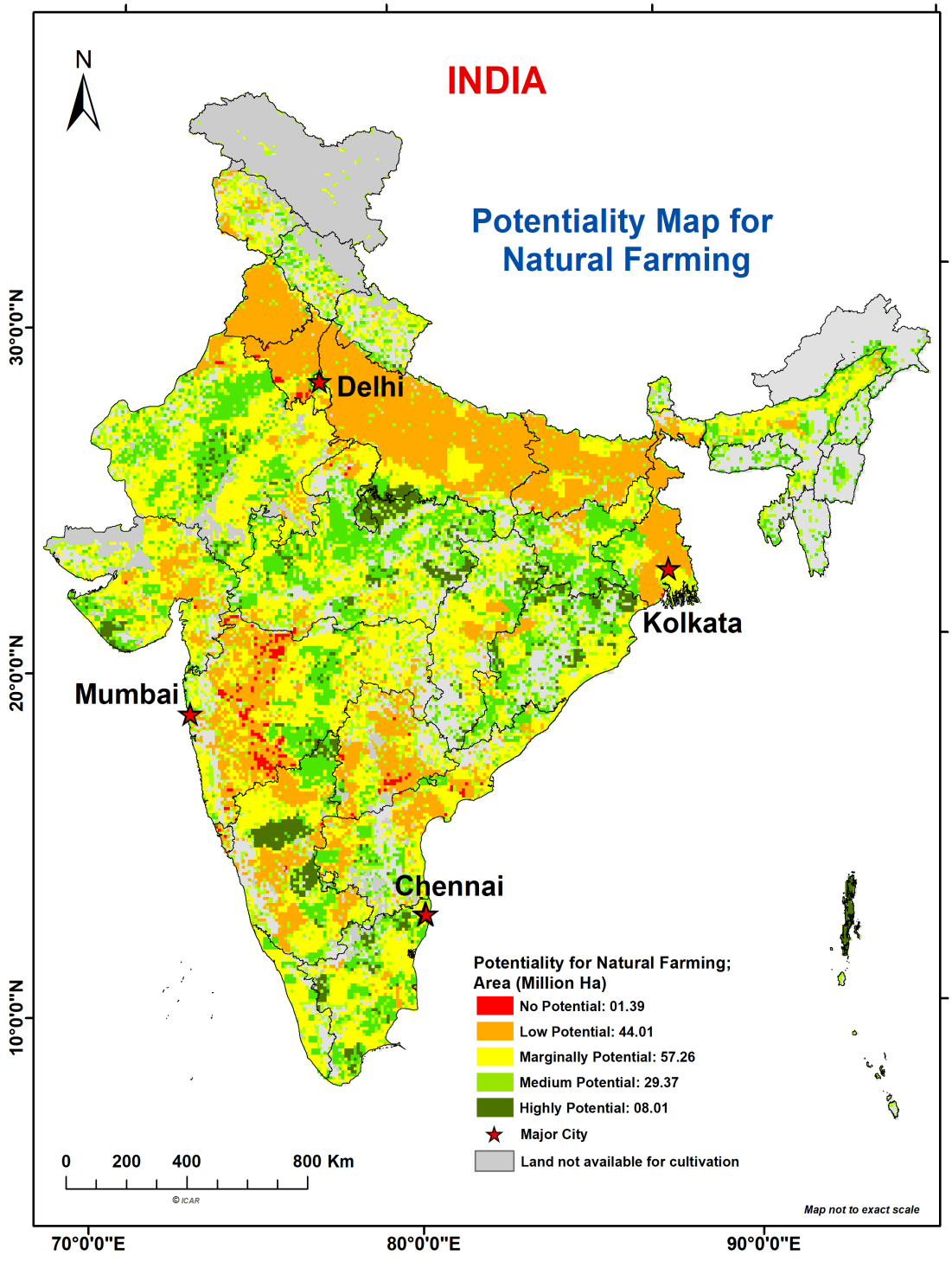
# 03 POTENTIAL DOMAINS FOR NATURAL FARMING

The mapping of potentiality for Natural Farming (NF) across agro-climatic and agro-ecological regions of India reveals a significant opportunity for expansion, with a combined highly potential area of 8.07 million hectares and medium potential area of 29.37 million hectares. This represents approximately 5.7% and 20.1% of the net sown area, respectively. The data highlights a wide geographic spread, covering diverse regions such as the Western Dry Region, Southern Plateau & Hills, Central Plateau & Hills, and Eastern Plateau & Hills.

State-wise analysis shows that Madhya Pradesh, Rajasthan, Odisha, Karnataka, Himachal Pradesh, Tamil Nadu have some of the largest contiguous areas suitable for NF, with a variety of existing cropping systems such as soybean-wheat, rice-fallow, pulses-fallow, groundnut-wheat, and cotton-based rotations. These systems present a strong base for conversion to natural farming due to their adaptability to low-input sustainable practices. The mapping also emphasizes the prevalence of rice-based systems in eastern and northeastern states, which hold potential for NF adoption due to their high cropping intensity with legumes and diverse seasonal combinations.

Importantly, the data underscores that NF adoption potential is not limited to rainfed regions but extends to irrigated areas where diversification and reduction of chemical inputs are priorities. The inclusion of crop-livestock integration in several districts further strengthens the viability of NF models, particularly in regions like Chhattisgarh, Jharkhand, and parts of Maharashtra.

The regional variation in potentiality suggests that NF promotion strategies need to be tailored to local agro-ecological conditions, market linkages, and farmer capacity. For example, hot arid and semi-arid eco-regions such as parts of Gujarat, Rajasthan, and Karnataka will require water-efficient NF models, while humid, sub-humid zones like the Western Ghats will benefit from biodiversity-based approaches.


INDIA
Potentiality Map for Natural Farming
N
Delhi
Kolkata
Mumbai
Chennai
30°0'0"N
20°0'0"N
10°0'0"N
70°0'0"E
80°0'0"E
90°0'0"E
Potentiality for Natural Farming; Area (Million Ha)
No Potential: 01.39
Low Potential: 44.01
Marginally Potential: 57.26
Medium Potential: 29.37
Highly Potential: 08.01
Major City
Land not available for cultivation
0 200 400 800 Km
© ICAR
Map not to exact scale

**Key Facts**

- Total highly potential area: 8.07 million hectares (5.7% of net sown area).
- Total medium potential area: 29.37 million hectares (20.10% of net sown area).
- Top regions in highly potential category include: Southern Plateau & Hills (2.08 Mha), Central Plateau & Hills (1.99 Mha), Eastern Plateau & Hills (1.74 Mha).
- States with largest highly potential area: Madhya Pradesh, Rajasthan, Odisha, Karnataka, Tamil Nadu.
- Dominant existing cropping systems in potential zones: Rice-fallow, Soybean-wheat, Groundnut-wheat/fallow, Cotton-fallow, Pulses-based rotations.
- Several districts show strong livestock integration, providing opportunities for on-farm input production like jeevamrit and compost.
- Eastern and northeastern states have high NF potential in rice-based and mixed cropping systems.
- Way Forward

**Research and Validation:** Develop and promote NF models aligned with local cropping patterns, climate, and resource availability. For instance, water-efficient NF practices for arid/semi-arid zones and integrated pest-nutrient management for humid areas. Undertake long term trials in identified high and medium potential districts to assess yield stability, economic returns, and environmental benefits of NF.

**Capacity Building:** Strengthen farmer training through Krishi Vigyan Kendras (KVKs), Farmer Field Schools (FFS), and participatory learning models focusing on NF protocols, indigenous seed use, and soil health management.

**Market Linkages:** Establish dedicated NF produce markets and certification systems to ensure premium pricing and consumer trust, particularly for rice, pulses, and oilseeds from high-potential districts.

**Policy Support:** Incentivize NF adoption through input subsidies reorientation, NF-specific crop insurance, and inclusion in state agriculture roadmaps.

**Water and Soil Management:** Integrate NF with water budgeting, soil moisture conservation, and organic matter enhancement to increase resilience in climate-vulnerable areas.

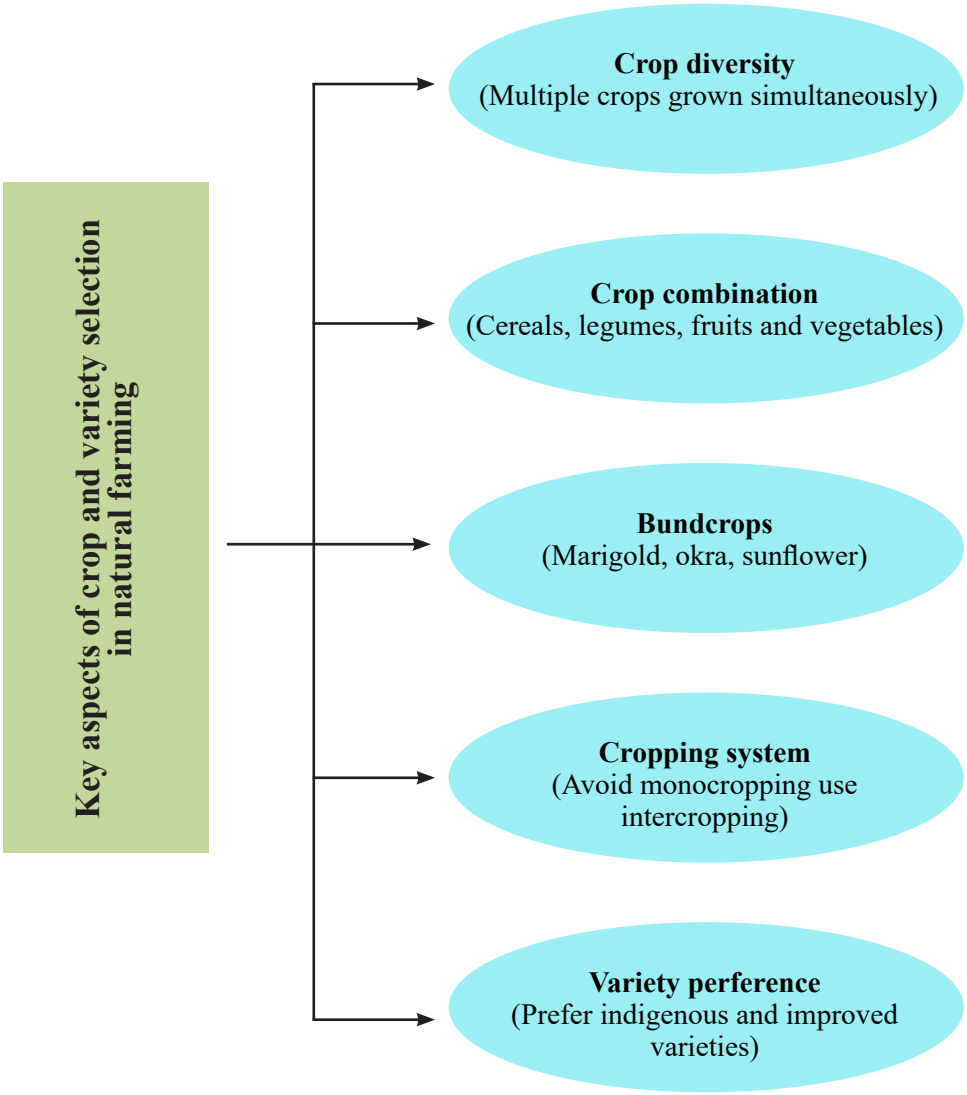
**Convergence of Schemes:** Align NF promotion under NMNF with ongoing government schemes like PMKSY, RKVY, PKVY, and watershed programmes for holistic resource management in the potential areas.

**Monitoring, Evaluation, Learning and Impact Assessment:** Develop a geospatial and digital NF monitoring system to track adoption, productivity changes, and ecosystem services improvement.

# 04 PRACTICES AND INPUT PREPARATION FOR NATURAL FARMING

## SELECTION OF CROPS AND VARIETIES

- Natural farming promotes crop diversity, having multiple crops grown simultaneously.
- A combination of cereals, legumes, fruits, and vegetables, along with trap/indicator crops such as marigold, okra, sunflower, etc., on bunds is the preferred choice.
- Avoid monocropping.
- Use recommended intercropping methods suitable for your region.
- Generally, prefer indigenous/traditional varieties; but also use improved varieties within natural farming practices.




Key Aspects for Sustainable Crop Planning
Crop Diversity
Cropping System
SUSTAINABLE FARMING PRACTICES
Crop Combination
(Cereals, legumes, fruits, and vegetables)
Variety Preference
Prefer indigenous and improved varieties
Bund Crops
(Marigold, pigeonpea, okra, sunflower and pulses)

## ii TILLAGE AND SOWING

- Adopt reduced/no tillage, especially in summer (no till).
- Use shallow tillage (10–15 cm) during *kharif* and *rabi*.
- Avoid deep tillage; use manual or shallow mechanical seed drills.

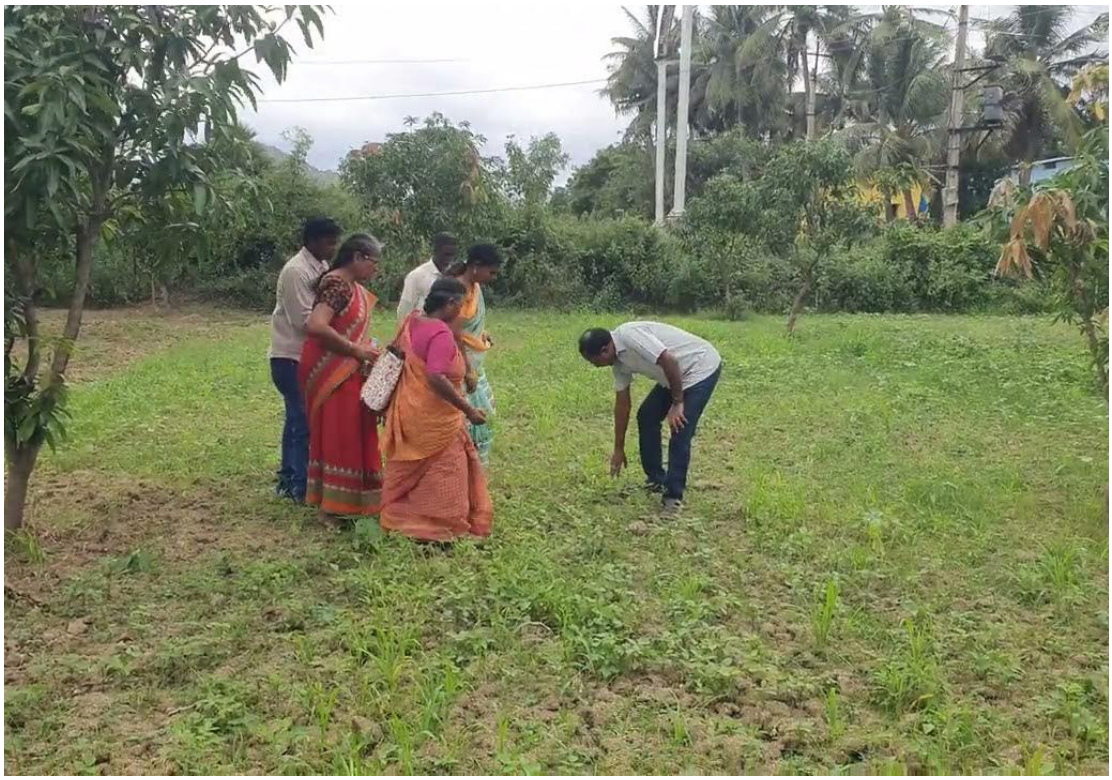



Manual tillage and sowing operations in agriculture

## iii SUMMER/FALLOW CROPPING

**a. Pre-Monsoon Dry Seeding (PMDS) (rainfed areas): PMDS enables farmers to cultivate crops during non-farming seasons or when there is no crop cover.**

- This method can be practiced before the monsoon, during summer, after *Kharif*, and before *Rabi* planting.
- It involves raising 8 to 15 diverse crops, which fosters better seed germination through Beejamrit seed coating and improves survival during dry periods.
- Mulching helps capture early morning dew, allowing it to percolate into the soil while minimizing evaporation.
- PMDS is best practiced from March to May/June, leading into *Kharif*, Pre-*Rabi* Dry Sowing (PRDS), and *Rabi* crops.
- Crops from PMDS and PRDS serve as green manure after 35 days, providing cash income, food, and fodder for livestock.





Promoting sustainable farming through PMDS

**b. Multivariate cropping (irrigated areas):**

- Fields are generally left fallow.
- During summer, green manure crops are planted.
- Common crops include Sesbania aculeata, Sesbania rostrata, and sun hemp.
- Deep tillage is performed prior to planting.
    - In natural farming, practice green manuring with crops like *Sesbania aculeata, Sesbania rostrata,* sun hemp, or moong, or engage in multivariate cropping during the fallow period in irrigated areas.
    - Utilize no-till or reduced-till methods to keep the soil covered and promote microbial activity through root exudates.
    - Incorporate biomass with varying carbon to nitrogen (C: N) ratios to ensure a longer decomposition period and extended nutrient release.
    - Grow crops of different durations and types, including cereals, pulses, oilseeds, fiber crops, and green manures, together in a mixed planting system (multivariate cropping).
    - Mix and broadcast a minimum of nine different crop seeds during the summer or fallow period.
    - Use about 25% of the seed rate of a sole crop for each crop in the mix.
    - Before sowing or planting the main crop, incorporate the biomass from the multivariate cropping into the soil after harvesting any economic produce.
    - Benefits of multivariate cropping include the reduction of soil-borne pathogens through annidation and allelopathy.





Growing green manure crops and incorporating before planting the main crop

## iv POLY/INTER CROPPING

- Seasonal Guidance
  - *Kharif* & *Rabi* → Practice polyculture/intercropping for soil health and yield enhancement and nutrient diversity
- Recommended Intercropping
  - Proven Methods → Follow recommended row ratios
  - Legumes preferred → e.g., pigeonpea, cowpea etc
- Trap & Indicator Crops
  - Trap Crops : marigold, okra, sorghum etc
  - Indicator Crops : Sunflower (Plant along bunds & borders)




Multivariate cropping

**Special Note for Rice Fields**

- No intercropping/mulching in fully inundated paddy due to anaerobic conditions.

• Rice Cultivation under Natural Farming
- Intercrop with Dhaincha
- Grow trap crops & legumes on bunds
- Mulch with Azolla

• Azolla + Rice System
- Grow Azolla alongside rice
- Continuous Azolla harvest → extra income for farmers

• Green Manuring with *Sesbania*
- *Sesbania aculeata / Sesbania rostrata*
- Incorporate into soil after 30–35 days using cono weeders

• Direct Seeding
- Machines available for simultaneous sowing of rice + green manure

• Benefits of Green Manure Intercropping
- Weed suppression
- Nitrogen fixation
- Improves soil organic matter





NF Model Farms at Rahuri

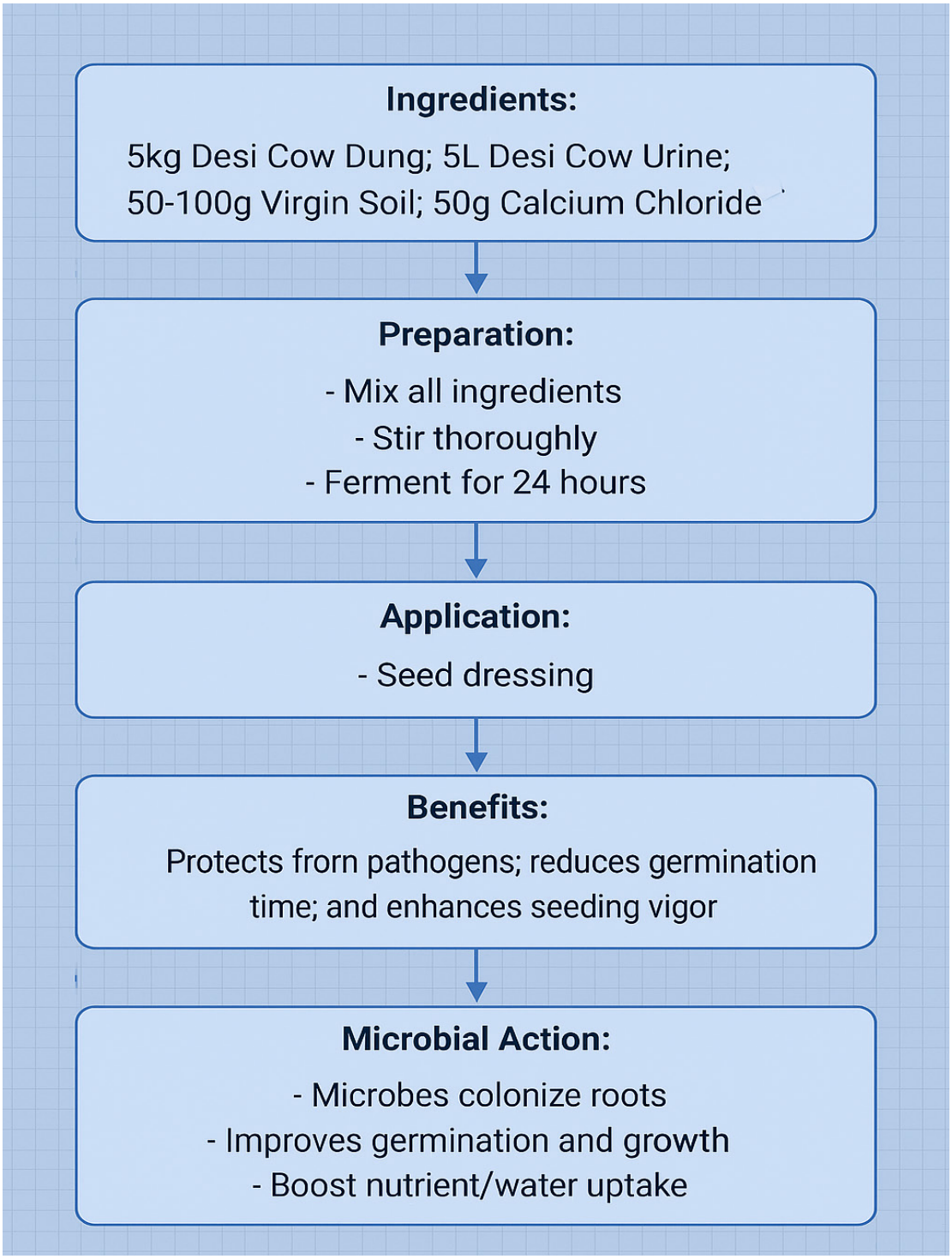
## V NATURAL FORMULATIONS

**a. Beejamrit** (Beejamrutha or Bheejamrutham)

- It is a microbial paste made using 5 kg of fresh dung from desi cows, 5 liters of desi cow urine, 50-100 g of virgin soil (preferably from forests, banyan trees, or termite mounds), 50 g of calcium chloride, and 20 liters of water.
- The mixture is thoroughly stirred and fermented for 24 hours.
- It is used for seed dressing or dipping seedling roots.
- Seed dressing involves coating seeds with beejamrut before sowing and drying them in the shade.
- Beejamrut has been shown to protect seeds and young seedling roots from soil-borne and seed-borne pathogens, reduce germination time, and enhance seedling vigor, leading to better growth.
- The application of beneficial microbes to seeds effectively places microbial inocula in the soil, positioning them to colonize seedling roots and protect them against soil-borne diseases and pests.
- Microbes improve seed germination, shoot and root length, seedling vigor, and crop performance.
- Beejamrut promotes root dry weight and root proliferation, enhancing nitrogen, nutrient, and water uptake by crop plants.




NF Model Farm in NEH & cover cropping


Ingredients:
5kg Desi Cow Dung; 5L Desi Cow Urine;
50-100g Virgin Soil; 50g Calcium Chloride
Preparation:
- Mix all ingredients
- Stir thoroughly
- Ferment for 24 hours
Application:
- Seed dressing
Benefits:
Protects frorn pathogens; reduces germination time; and enhances seeding vigor
Microbial Action:
- Microbes colonize roots
- Improves germination and growth
- Boost nutrient/water uptake




b. **Ghanjeevamrit**:

- It is solid in form and is prepared using ingredients such as desi cow dung (150 kg), jaggery (1 kg), pulse flour (2 kg), virgin fertile soil for microbial culture (50-100g) and native/desi cow's urine as required.
- Make a pile of fresh cow dung partially dried up to 3-4 days up to a height of 1.5 feet. Size of the pile might be as per convenience (say (12 X 3 feet).
- Make holes with a wooden log at a distance of about 1 feet and fill up these holes with already prepared jeevamrit.
- Turn the dung pile up and down after one week.
- Then again make the holes and fill up these holes with jeevamrut and turn up the pile again after one week. This way the process is repeated 2-3 times.
- The Ghanjeevamrit will be ready in 30-35 days.
- Then, after pounding it into small-sized particles, it can be broadcasted uniformly in the field or stored in shade after covering with gunny bags.
- Generally, it is recommended to use 800 to 1000 kg per acre as a basal dose. However, this can be applied as top dressing.






Ghanjeevamrit prepartion



Ghanjeevamrit preparation

c. **Jeevamrit** (Jivamrita or jeevamruta or Jeevamrutha or Jeevamrutham):

- It is a fermented microbial culture made from on-farm ingredients: 10 kg of fresh dung from desi cows, 10 liters of aged desi cow urine, 1.5 kg of cane jaggery (sugar) or sweet fruit pulp, and 1.5 kg of pulse flour mixed in a barrel with 180 liters of water.
- A handful (50-100 g) of virgin soil from banyan tree areas, forests, or termite mounds is added as a local microflora inoculant.
- The mixture is stirred daily and fermented for 48 hours in the shade.
- During fermentation, aerobic and anaerobic bacteria in cow dung and urine multiply as they decompose the organic ingredients.
- Cane jaggery enhances fermentation, and pulse flour provides protein energy.
- Jeevamrit is ready after 3-4 days in summer and 6-7 days in winter and is applied to soil twice a month at a rate of 200 to 600 liters per acre, depending upon crops and soil conditions, either through irrigation water or as a foliar spray.
- Application of Jeevamrit or Ghanjeevamrit through drip or sprinkler irrigation is preferred.
- Jeevamrut acts as a catalyst, promoting soil microorganism activity, including earthworms, and making nutrients available to crops. Indigenous cow dung and urine produce the best Jeevamrut due to higher beneficial microbial populations.




Jeevamrit Preparation

**Ingredients:**

10kg desi cow dung + 10 litres of aged desi cow urine + 1.5 kgjaggery or sweet fruit plup + 1.5 kg pluse flour + 180 litres of water + 50-100 grams of virgin soil

↓

**Preparation:**

-mix ingredients in the barrel
-Stir daily

-Ferment 48 hours (shade)

-ready in 3-4 days (summer), 6-7 days (winter)

↓

**Application:**

-Use 200-600 litres per acre

-Apply biweekly

-Use with irrigation or foliar spray

-Preferred: drip/sprinkler

Preparation and application of Jeevamrit



## vi MULCHING (ACCHADANA)

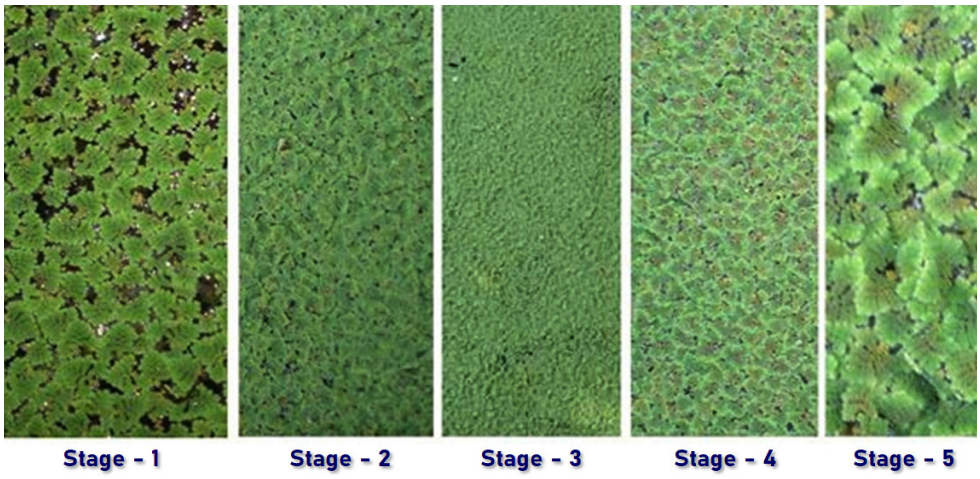
**Types: Soil mulching, straw mulching, and live mulching.**

- Soil mulching (tillage of the soil as normal, but to a reduced depth of 10-15 cm),
- Straw mulching (spread dried crop residues or straw from the previous crop), and
- Live mulching (raising diverse legume intercrops with cereals for supplying phosphorus, potassium, and sulphur to monocotyledons, such as rice, wheat, ragi, etc.).

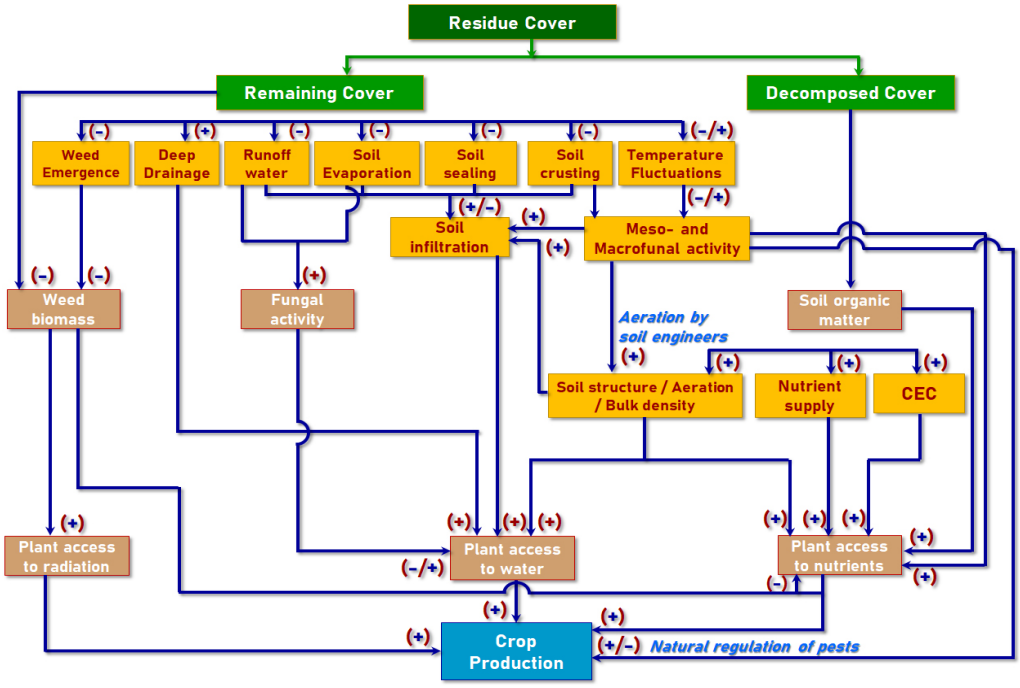



**Straw Mulching**

- Crop residue mulching should be applied immediately after sowing the crops to reduce the germination of weeds in the field.
- Depending upon the crop residues, generally 5 to 7 tonnes are required to cover one ha area for all the crops except rice, in which Azolla should be used as mulching material under natural farming.
- Mulching should be done in all seasons.
- Some of the leguminous cover crops which can be introduced in natural farming are spreading type viz., cowpea, horsegram and calapagonium.
- Application of Jeevamrut through drip/micro irrigation has an accelerating effect on multi/relay crops, and polythene mulching may also be recommended depending upon the soil condition and requirement.

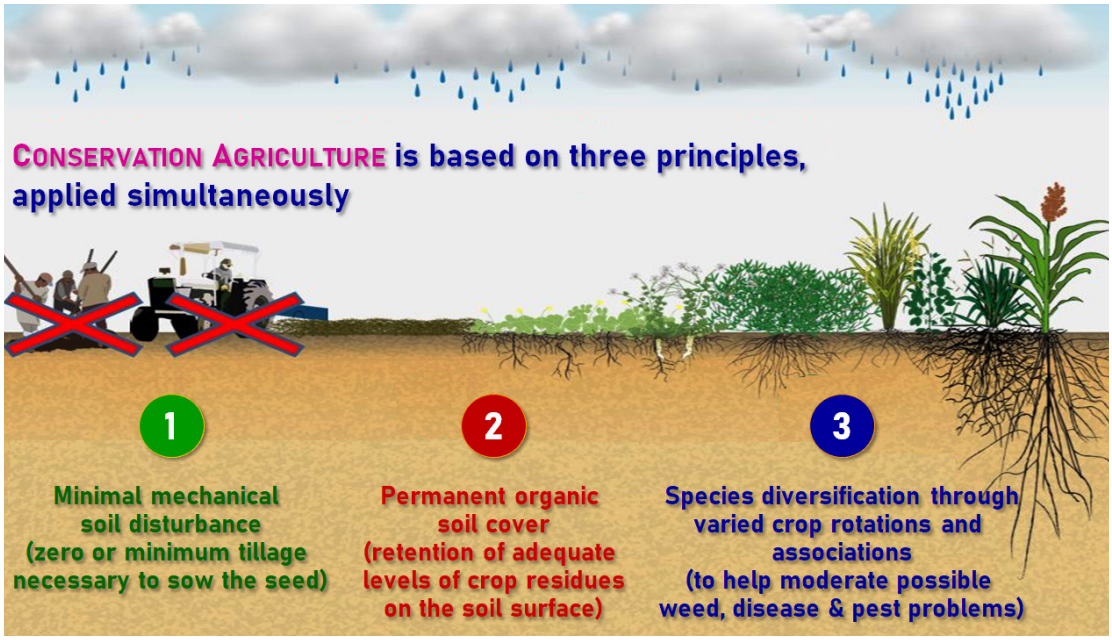



Various stages in the formation of a dense Azolla mat




Agro-ecological functions of surface crop residues, positive (+) and negative (−) effects (adapted from Ranaivoson et al., 2017)

Yet farmers have been practicing several variations of the constitutive ZBNF elements long before the term was coined. Further, the three components of ZBNF to a greater extent represent the three principles of modern conservation agriculture (Ranaivoson et al., 2017).




Principles of conservation agriculture (adapted from FAO, 2017)



Mulching and mechanical application of Jeevamrit

## vii WHAPASA (SOIL AERATION)

- It refers to the soil condition where a balanced concentration of water and air molecules exists in the crop root zone.
- Natural farming promotes this state of soil condition through the application of minimal irrigation, reduced tillage, and enhanced soil humus, achieved through residue mulching and the addition of concoctions.
- By maintaining Whapasa, the water use by crops can be reduced significantly.
- Whapasa soil condition in the crop root zone under field conditions is feasible through application of jeevamrit using precision technologies such as micro irrigation systems, such as drip and sprinkler irrigation, including sensors, controllers, etc., to deliver a measured quantity of water with jeevamrit precisely in the vicinity of roots to achieve optimal soil-water-plant relations.
- Alternate furrow irrigation and surge irrigation can also be adopted. Flood irrigation should be avoided.



Different types of minimal irrigation for Whapasa

## viii WEEDING

- Adopt mulching, intercropping, and polycropping to suppress weeds.
- Time and quantity of mulching play a very important role in reducing the weed infestation. Generally dense mulching with crop residues immediately after sowing is preferred to manage the weeds effectively in the early stages of the crop.
- Non-Chemical weed management approaches such as hand weeding, shallow hoeing with tools, reduced spacing of crops, stale seed bed, and other indigenous techniques can also be practiced as per need under natural farming.





Manual hand weeding and reduced spacing for weed management

# ix BOTANICAL CONCOCTIONS - INSECT MANAGEMENT

Natural Farming promotes the use of various kashaya (decoctions) from locally sourced ingredients like cow urine, neem leaves, green chilies, garlic, tobacco, sour buttermilk, etc., to act as natural fungicides and pesticides. Some of the prominent ones used are Agniastra, Bramhastra, Neemastra, and Dashparni ark. Prophylactic spray of these botanical concoctions every 15 days or in a month, depending upon the crops, is recommended under natural farming.

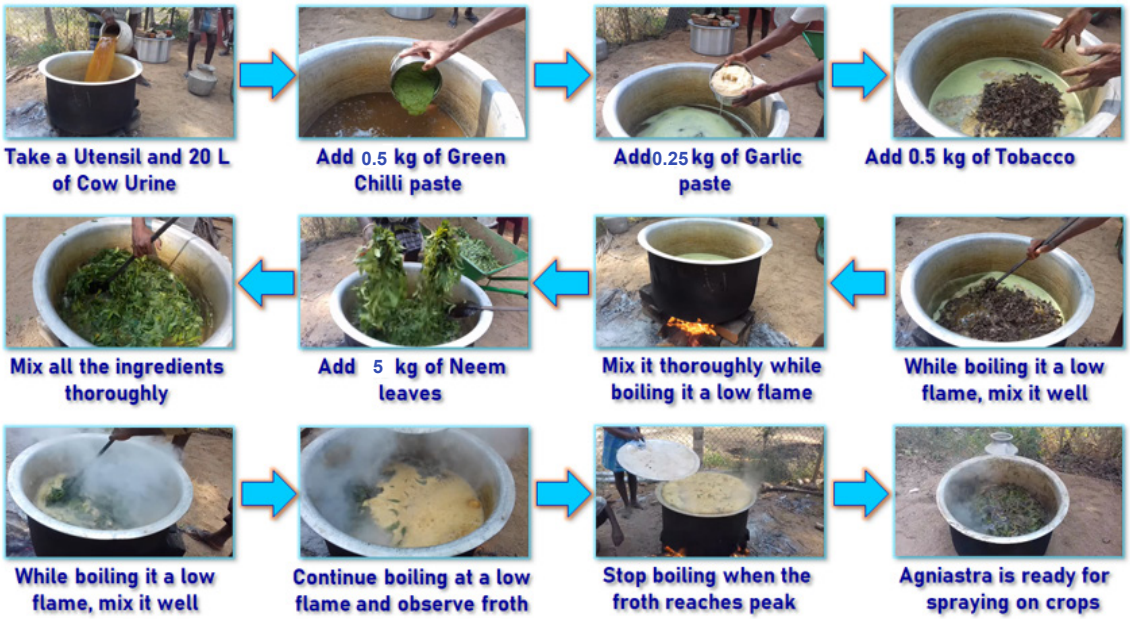
**a. Agniastra:**

- **Ingredients**: 20 L cow urine, 500 g tobacco, 0.5 kg green chili, 0.25 kg garlic, and 5 kg neem leaves
- **Preparation**:Boil → Cool → Ferment 48 hrs → Filter
- **Usage**: 6–8 L in 200 L water → Spray on 1 acre
- **Effect**: Controls leaf/stem/fruit/pod borers
- **Shelf Life:** Use within 3 months





Jeevamrit application through drip irrigation




Preparation of Agniastra (adapted from Rao, 2020)

**b. Bramhastra**

- Ingredients:10 L cow urine, 2 kg each of neem, karanj, custard apple, castor, and datura leaves
- Preparation: Boil → Froth → Filter → Ferment 48 hrs (shade), stir twice daily
- Usage: 6–8 L in 200 L water → 1 acre



NF Model Farm at Srivilliputhur




Preparation of Bramhastra (adapted from Rao, 2020)

- **Effect**: Controls sucking pests, fruit & pod borers
- **Shelf Life**: Use within 1 month

**c. Neemastra**

- Ingredients: 5 L cow urine, 1 kg cow dung, 5 kg neem leaf paste, 100 L water or 20 L Cow Urine, 2 kg cow dung, 10 kg neem leaf paste, 200 L water.
- Preparation: Ferment 48–96 hrs → Stir twice daily → Filter
- Usage: Full volume of 200 L for 2 acre
- Effect: Controls sucking pests, and leaf eating caterpillars




Preparation of Neemastra (adapted from Rao, 2020)

**d. Dashparni ark**

- Ingredients:
  - 200 L water, 20 L cow urine, 2 kg dung, 2 kg each of 10 medicinal leaves (Neem, Tulsi, Mango, etc.), turmeric, heeng, dry ginger, tobacco, chili, garlic
- Preparation:
  - Soak, mix, crush → Ferment for 30–40 days → Stir daily
- Usage:
  - 6–8 L in 200 L water → 1 acre
- Effect:
  - Controls borers, maggots, and caterpillars




Jeevamrit preparation in NF Model Farm in Karnataka





Dashparni ark preparation




Preparation process of Dashparni Ark for insect management



NF experiment under AINP-Natural Farming

## X BOTANICAL CONCOCTIONS - DISEASE MANAGEMENT

**a. Sonthastra: Natural Antifungal Spray**

Ingredients

- 200 g dry ginger
- 5 litres of desi cow's milk
- 200 litres of water

Step-by-Step preparation

Step 1: Ginger Decoction

- Grind ginger into powder
- Mix in 2 litres of water → Boil → Reduce to 1 litre
- Let it cool

Step 2: Milk Preparation

- Boil 5 litres of desi cow milk once
- Cool it
- Remove the cream (can be used at home)

Step 3: Mixing

- Filter both: ginger decoction & milk
- Mix both into 200 litres of water

Application

- Spray the final solution on 1 acre of crop
- Benefits: Controls fungal infections effectively

**b. Khatti Lassi (Sour Butter Milk): Natural Antifungal & Antiviral Solution (For 1 Acre)**

**Ingredients**

- 100 litres of water
- 5 liters of khatti lassi (3–5 days old sour buttermilk)
- 1 small piece of copper
- 50 grams of turmeric powder

Step-by-Step Preparation

- Soak copper in khatti lassi for 3–5 days
- Mix 5 liters khatti lassi + 100 liters water
- Add 50 g turmeric powder and stir well

Application

- Spray the mixture uniformly on 1 acre of crops.

Benefits

- Controls fungal diseases
- Works as a natural virus killer
- Cost-effective & chemical-free plant protection

**c. Cow Urine Application: Natural Disease Control**

**1. Pre-Sowing Use**

- Apply 30–40 litres of cow urine
- Mix with irrigation water
- Controls:
- Soil-borne diseases
- Seed-borne diseases
- Seedling & wilt infections

**2. Canopy Disease Control (Field Crops)**

- Use 10–20% dilution (1–2 L cow urine in 10 L water)
- Spray on crop canopy
- Controls fungal and bacterial infections in foliage

**3. Orchard Planting (Fruit Crops)**

- At planting:
- Apply 10% cow urine solution in pits
- Mix pits with soil + cow dung/ghanjeevamrit
- Post-planting:
- Spray 10–20% diluted cow urine as per need and at regular interval

**Benefits**

**Natural protection against:**

- Soil-borne pathogens
- Canopy diseases
- Wilt and bacterial infections
- Boosts immunity of plants
- Eco-friendly & cost-effective

**d.Saptdhanyankur Ark**

**Ingredients**

- 100 g each of sesame (oilseed) + Moong + Urd + Cowpea +Moth +Gram + Wheat

Step-by-Step Preparation

Step 1: Soaking

- Day 1: Soak sesame overnight
- Day 2: Mix all seeds and soak overnight

Step 2: Sprouting

- Day 3: Drain water (keep it aside); tie seeds in coarse cotton cloth; and hang them inside the house to sprout

Step 3: Mixing the Ark

- Grind sprouted seeds into a paste (chutney)
- Mix in:
  - 200 litres of water
  - 10 litres of cow urine
  - Soaked seed water
  - Stir thoroughly with a wooden stick

Step 4: Fermentation & Filtration

- Cover with a gunny bag
- Leave for 2 hours
- Filter the solution with a cloth

Application

- Use within 48 hours
- Spray during:
  - Milk stage of grains
  - Infancy of fruits
  - Bud stage in flower crops

Benefits:

- Enhances grain shine & weight
- Reduces flower & fruit drop

In addition to the above, depending upon the requirement, mechanical traps, pheromone traps, yellow sticky traps, bio-control agents such as *Trichoderma, Pseudomonas, Trichogramma, Bacillus etc*., can also be used in the natural farming to manage insect and diseases in crops.

## xi HARVESTING

- Manual or mechanical harvesting, depending on crop and tools available.
- Adapt post-harvest practices to maintain grain quality and soil health.



Harvesting in NF Model Farm in Uttarakhand




NF experiment at Bhopal

# 05 PACKAGE OF PRACTICES FOR SELECTED CROPING SYSTEMS

**Details of cropping systems and practices under Natural farming**

**1. Cropping System: Soybean + Maize-Wheat + Mustard**

Recommended states: Chhattisgarh and Madhya Pradesh

**Pre-Kharif Season (Fallow period/summer)**

| Time/week/date | Crops/seed to be mixed | Quantity (kg/ha) | Tillage operation | Method of sowing | Date/time/week of incorporation |
|---|---|---|---|---|---|
| Last week of April | Maize | 4 kg | 1 harrow, One rotavator, one tiller for mixing seeds | Broadcasting | 2 weeks before sowing of next crop |
| | Greengram | 4 kg | | | |
| | Cowpea | 6 kg | | | |
| | Clusterbean | 4 kg | | | |
| | Sesame | 1.25 kg | | | |
| | Sunhemp | 5 kg | | | |
| | Marigold | 0.5 kg | | | |
| | Okra | 4 kg | | | |
| | Rice bean | 4 kg | | | |

9 crops for MVC, 25% of sole crop seed rate to be taken for MVC

**Kharif season: Soybean + Maize (4:2)**

| | | |
|---|---|---|
| Land preparation | | 2-3 Harrowing, 1 planking |
| Seed treatment | | Seed treatment with Beejamrit |
| Sowing method | | Drilled/line sowing |
| Row ratio | | 4:2 (Replacement series) |
| Mulching material | | Unchopped Paddy straw / Wheat straw |
| Mulching quantity (t/ha) | | 6 t/ha |
| Mulching time (days after sowing) | | Immediately after sowing of crop (ground cover) |
| Weed management | | Need based weeding using chemical free methods |
| Basal | Source (Quantity on dry basis) | Ghanajeevamrit @ 1000 kg/ha |
| | Time of application | At the time of field preparation |
| Top dressing / foliar application | Source (Quantity) | Jeevamrit @ 1500 lit/ha |
| | Time of application | Twice in a month |

| | |
|---|---|
| Time | Twice in a month |
| Source (Quantity) | Alternate Application of Neemastra and Brahamastra |
| Trap crop in borders | Okra |

**Rabi season: Wheat + Mustard (8:2)**

| | | |
|---|---|---|
| Land preparation | | 2 harrowing, 1 planking, broad bed preparation |
| Seed treatment | | Seed treatment with Beejamrit |
| Sowing method | | Drilling/Line sowing |
| Row ratio | | 8:2 (Replacement series) |
| Mulching material | | Unchopped Paddy straw / Wheat straw |
| Mulching quantity (t/ha) | | 6 t/ha |
| Mulching time (days after sowing) | | Immediately after sowing of crop (Ground cover) |
| Weed management | | Need based weeding using chemical free methods |
| Basal | Source (Quantity on dry basis) | Ghanajeevamrit @ 1000 kg/ha |
| | Time of application | At the time of field preparation |
| Top dressing / foliar application | Source (Quantity) | Jeevamrit @ 1500 lit/ha |
| | Time of application | Twice in a month |
| Time | | Twice in a month |
| Source (Quantity) | | Alternate application of Neemastra and Brahamastra |
| Trap crops in borders | | Marigold |

**2. Cropping System : Groundnut + Sesame (6:2) - Fennel + Cabbage (2:1)**

Recommended states: Gujarat and Rajasthan

**Pre-Kharif Season (Fallow period/summer)**

| Time/week/date | Crops/seed to be mixed | Quantity (kg/ha) | Tillage operation | Method of sowing | Date/time/week of incorporation |
|---|---|---|---|---|---|
| Last week of April | Maize | 4 kg | 1 harrow, One rotavator, one tiller for mixing seeds | Broadcasting | 2 weeks before sowing of next crop |
| | Greengram | 4 kg | | | |
| | Cowpea | 6 kg | | | |
| | Clusterbean | 4 kg | | | |
| | Sesame | 1.25 kg | | | |
| | Sunhemp | 5 kg | | | |
| | Marigold | 0.5 kg | | | |
| | Okra | 4 kg | | | |
| | Rice bean | 4 kg | | | |

9 crops for MVC, 25% of sole crop seed rate to be taken for MVC

**Kharif season: Groundnut + Sesame**

| | | |
|---|---|---|
| Land preparation | | Direct sowing (Sowing with minimum soil disturbance) |
| Seed treatment | | Seed treatment with Beejamrit |
| Sowing method | | Ridge and furrow |
| Row ratio | | 6:2 (Replacement series) |
| Mulching material | | Fennel straw (unchopped) |
| Mulching quantity (t/ha) | | 5 t/ha |
| Mulching time (days after sowing) | | Immediately after sowing of crop (ground cover) |
| Weed management | | Need based chemical free method of removing weeds |
| Basal | Source (Quantity) | Ghanajeevamrit @ 1000 kg/ha |
| | Time of application | At the time of field preparation |
| Top dressing / foliar application | Source (Quantity) | Jeevamrit @ 1500 lit/ha |
| | Time of application | Jeevamrit @ 1500 lit/ha/Twice a month (with irrigation or spray on soil) |
| Time | | Twice in a month |
| Source (Quantity) | | Alternate application of Neemastra and Dashparni |
| Trap crop in borders | | Marigold and tulsi |

| Pest | Management | |
|---|---|---|
| | Groundnut | Sesame |
| Collor rot | Seed treatment with Trichoderma 6-8 g/kg seed<br>Seed treatment with | - |
| Tikka disease | Foliar spray of neem oil @ 2 ml/L water | - |
| Powdery mildew | | Spray of 2 % garlic paste |
| Phyllody disease | | Spary of 10 % Dashparni |
| Insect-pest | | |
| White grub, Termite and leaf miner | Application of Neem cake 5 q/ ha at sowing, Pheromone trap @ 25/ha for mass trapping of adults, Metarhizium@5g/L water, *Beauveria bessiana* @5g/L water<br>Spray of 10 % Dashparni | - |
| Hawk moth, aphid, semilooper | | Azadirachtin 1500 ppm @ 5 ml/L water, Metarhizium@5g/L water, Bt @ 2ml/ L water and spray of 10 % Dashparni |

**Rabi season: Fennel + Cabbage**

| | | |
|---|---|---|
| Land preparation | | Direct sowing (Sowing with minimum soil disturbance) |
| Seed treatment | | Seed treatment with Beejamrit |
| Sowing method | | Ridge and furrow |
| Row ratio | | 2:1 (Additive series) |
| Mulching material | | Groundnut straw (Unchopped) |
| Mulching quantity (t/ha) | | 5 t/ha |
| Mulching time (days after sowing) | | Immediately after sowing of crop (Ground cover) |
| Weed management | | Need based chemical free methods |
| Basal | Source (Quantity) | Ghanajeevamrit @ 1000 kg/ha |
| | Time of application | At the time of field preparation |

| | | |
|---|---|---|
| Top dressing / foliar application | Source (Quantity) | Jeevamrit @ 1500 lit/ha |
| | Time of application | Jeevamrit @ 1500 lit/ha/Twice a month (with irrigation or spray on soil as per rainfall availability) |
| Time | | Twice in a month |
| Source (Quantity) | | Application of Neemastra/ Dashparni etc. (Alternate) |
| Trap crops in borders | | Marigold and tulsi |

| Pest | Management through organic sources | |
|---|---|---|
| | Fennel | Cabbage |
| Powdery mildew | Spray of 2 % garlic paste | Spray of 2 % garlic paste |
| Insect-pest | | |
| White grub, Termite and leaf miner | - | Pheromone trap @ 25/ha for mass trapping of adults, *Beauveria bessiana* @5g/L water, spray of 10 % Dashparni |
| Aphid | Azadiractin 1500 ppm @ 5 ml/ litre and spray of 10 % dashparni | - |
| DBM, aphid, tobacco caterpillar and semilooper | - | Pheromone trap @ 25/ha, Azadirachtin 1500 ppm @ 5 ml/ L water, SlNPV 250 LE/ha, Metarhizium@5g/L water, Bt @ 2ml/litre and Spray of 10 % dashparni |

### 3. Rice + Dhaincha - Maize + Cowpea

Recommended States: Maharashtra, Jharkhand

**Pre-Kharif Season (Fallow period/summer)**

| Time/week/date | Crops/seed to be mixed | Quantity (kg/ha) | Tillage operation | Method of sowing | Date/time/week of incorporation |
|---|---|---|---|---|---|
| Last week of April | Maize | 4 kg | 1 harrow, one rotavator, one tiller for mixing seeds | Broadcasting | 2 weeks before sowing of next crop |
| | Greengram | 4 kg | | | |
| | Cowpea | 6 kg | | | |
| | Clusterbean | 4 kg | | | |
| | Sesame | 1.25 kg | | | |
| | Sunhemp | 5 kg | | | |
| | Marigold | 0.5 kg | | | |
| | Okra | 4 kg | | | |
| | Rice bean | 4 kg | | | |

9 crops for MVC, 25% of sole crop seed rate to be taken for MVC

**Kharif season: Rice + Dhaincha**

| Practices | | Complete Natural Farming |
|---|---|---|
| Land preparation | | 1 Harrowing, 1 planking |
| Seed treatment | | Seed treatment with Beejamrit |
| Sowing method | | Flat bed method Rice + Dhaincha (3:1 ratio) |
| Row ratio | | 3:1<br>(Replacement series) |
| Mulching material | | Paddy straw |
| Mulching quantity (t/ha) | | 6 t/ha |
| Mulching time (days after sowing) | | Immediately after sowing of crop (**ground cover**) |
| Weed management | | No weeding |
| Basal | Source (Quantity) | Ghanajeevamrit @ 1000 kg/ha |
| | Time of application | At the time of field preparation |
| Top dressing / foliar application | Source (Quantity) | Jeevamrit @ 1500 lit/ha |
| | Time of application | Twice in a month |
| Time | | Twice in a month |
| Source (Quantity) | | Application of Neemastra/ Dashparni etc. (Alternate) |
| Other | | Bird perches in field<br>Pheromone trap |

* Glyricidia Green leaf manuring (GGLM) for Karjat Centre
** Vermicompost for Ranchi Centre

**Rabi season: Maize + Cowpea (Grain)**

| Practices | | Complete Natural Farming (T2) |
|---|---|---|
| Land preparation | | 1 harrowing, 1 Planking, flat bed preparation |
| Seed treatment | | Seed treatment with Beejamrit |
| Sowing method | | Flat bed |
| Row ratio | | Maize + Cowpea (Additive series) |
| Mulching material | | Paddy straw (Unchopped) |
| Mulching quantity (t/ha) | | 6 t/ha |
| Mulching time (days after sowing) | | Immediately after sowing of crop (Ground cover) |
| Weed management | | No weeding |
| Basal | Source (Quantity) | Ghanajeevamrit @ 1000 kg/ha |
| | Time of application | At the time sowing |
| Top dressing / foliar application | Source (Quantity) | Jeevamrit @ 1500 lit/ha |
| | Time of application | Twice in a month |
| Time | | Twice in a month |
| Source (Quantity) | | Application of Neemastra/ Dashparni etc. (Alternate) |
| Trap crops in borders | | Marigold |

**4. Cassava + Vegetable cowpea (bush/non trailing type)-Green gram**

State: Kerala

**Pre-kharif (Fallow period/summer)**

| Time/week/date | Crops/seed to be mixed | Quantity (kg/ha) | Tillage operation | Method of sowing | Date/time/week of incorporation |
|---|---|---|---|---|---|
| Last week of April | Pearlmillet | 1.25 kg | 1-2 harrow, One rotavator, one tiller for mixing seeds | Broadcasting | 2 weeks before sowing of next crop |
| | Sorghum | 5 kg | | | |
| | Cowpea | 6.25 kg | | | |
| | Clusterbean | 4.0 kg | | | |
| | Sesame | 1.25 kg | | | |
| | Sesbania | 10 kg | | | |
| | Sunhemp | 10 kg | | | |
| | Greengram | 4 kg | | | |
| | Marigold | 0.5 kg | | | |

9 crops for MVC, 25% of sole crop seed rate to be taken for MVC

**Kharif season: Cassava + Vegetable cowpea**

| Practices | | Complete Natural Farming (T2) |
|---|---|---|
| Land preparation | | 2-3 harrowing, 1 planking |
| Seed treatment | | Seed treatment with Beejamrit |
| Sowing method | | Ridge and furrow |
| Row ratio | | 1:1 (Additive series) |
| Mulching material | | Dry leaves |
| Mulching quantity (t/ha) | | 6 t/ha |
| Mulching time (days after sowing) | | Immediately after sowing of crop (**ground cover**) |
| Weed management | | No weeding |
| Basal | Source (Quantity) | FYM@ 250 kg/ha + Ghanajeevamrit @ 1000 kg/ha |
| | Time of application | At the time of field preparation |
| Top dressing / foliar application | Source (Quantity) | Jeevamrit @ 1500 lit/ha |
| | Time of application | Twice in a month |
| Time | | Twice in a month |
| Source (Quantity) | | Alternate application of Neemastra and Dashparni |
| Trap crop in borders | | Okra |

**Rabi season: Green gram**

| Practices | | Complete Natural Farming (T2) |
|---|---|---|
| Land preparation | | 2 harrowing, 1 planking, broad bed preparation |
| Seed treatment | | Seed treatment with Beejamrit |
| Sowing method | | Ridges and furrow |
| Row ratio | | Pure crop |
| Mulching material | | Dry leaves |
| Mulching quantity (t/ha) | | 6 t/ha |
| Mulching time (days after sowing) | | Immediately after sowing of crop (Ground cover) |
| Weed management | | No weeding |
| Basal | Source (Quantity) | FYM@ 250 kg/ha + Ghanajeevamrit @ 1000 kg/ha |
| | Time of application | At the time of field preparation |
| Top dressing / foliar application | Source (Quantity) | Jeevamrit @ 1500 lit/ha |
| | Time of application | Twice in a month |
| Time | | Twice in a month |
| Source (Quantity) | | Application of Neemastra/ Dashparni etc. (Alternate) |
| Trap crops in borders | | Marigold |

**5. Maize+cowpea – wheat + chickpea**

State: Uttarakhand, Uttar Pradesh and Punjab

**Pre-kharif (Fallow period/summer)**

| Time/week/date | Crops/seed to be mixed | Quantity (kg/ha) | Tillage operation | Method of sowing | Date/time/week of incorporation |
|---|---|---|---|---|---|
| Last week of April | Pearlmillet | 1.25 kg | 1-2 harrow, One rotavator, one tiller for mixing seeds | Broadcasting | 2 weeks before sowing of next crop |
| | Sorghum | 5 kg | | | |
| | Cowpea | 6.25 kg | | | |
| | Clusterbean | 4.0 kg | | | |
| | Sesame | 1.25 kg | | | |
| | Sesbania | 10 kg | | | |
| | Sunhemp | 10 kg | | | |
| | Greengram | 4 kg | | | |
| | Marigold | 0.5 kg | | | |

9 crops for MVC, 25% of sole crop seed rate to be taken for MVC

**Kharif season: Maize + Cowpea**

| Practices | | Complete Natural Farming (T2) |
|---|---|---|
| Land preparation | | 2-3 harrowing, 1 planking |
| Seed treatment | | Seed treatment with Beejamrit |
| Sowing method | | Ridge and furrow |
| Row ratio | | 1:1 (Additive series) |
| Mulching material | | Paddy straw (unchopped) |
| Mulching quantity (t/ha) | | 6 t/ha |
| Mulching time (days after sowing) | | Immediately after sowing of crop (**ground cover**) |
| Weed management | | No weeding |
| Basal | Source (Quantity) | FYM@ 250 kg/ha + Ghanajeevamrit @ 1000 kg/ha |
| | Time of application | At the time of field preparation |
| Top dressing / foliar application | Source (Quantity) | Jeevamrit @ 1500 lit/ha |
| | Time of application | Twice in a month |
| Time | | Twice in a month |
| Source (Quantity) | | Alternate pplication of Neemastra and Dashparni |
| Trap crop in borders | | Okra |

**Rabi season: Wheat + Chickpea**

| Practices | | Complete Natural Farming (T2) |
|---|---|---|
| Land preparation | | 2 harrowing, 1 planking, broad bed preparation |
| Seed treatment | | Seed treatment with Beejamrit |
| Sowing method | | BBF (105 cm bed) |
| Row ratio | | Two row of chickpea in between two rows of wheat on bed |
| Mulching material | | Paddy straw (Unchopped) |
| Mulching quantity (t/ha) | | 6 t/ha |
| Mulching time (days after sowing) | | Immediately after sowing of crop (Ground cover) |
| Weed management | | No weeding |
| Basal | Source (Quantity) | FYM@ 250 kg/ha + Ghanajeevamrit @ 1000 kg/ha |
| | Time of application | At the time of field preparation |
| Top dressing / foliar application | Source (Quantity) | Jeevamrit @ 1500 lit/ha |
| | Time of application | Twice in a month |
| Time | | Twice in a month |
| Source (Quantity) | | Application of Neemastra/ Dashparni etc. (Alternate) |
| Trap crops in borders | | Marigold |

**6. Soybean (Main crop) + Maize (Inter crop) - Garden pea (Main crop) + Green coriander (Inter crop)**

States: Uttarakhand, Himachal Pradesh, Sikkim

**Pre-kharif (Fallow period/summer)**

| Time/week/date | Crops/seed to be mixed | Quantity (kg/ha) | Tillage operation | Method of sowing | Date/time/week of incorporation |
|---|---|---|---|---|---|
| Last week of April | Pearlmillet | 1.25 kg | 1-2 harrow, One rotavator, one tiller for mixing seeds | Broadcasting | 2 weeks before sowing of next crop |
| | Sorghum | 5 kg | | | |
| | Cowpea | 6.25 kg | | | |
| | Clusterbean | 4.0 kg | | | |
| | Sesame | 1.25 kg | | | |
| | Sesbania | 10 kg | | | |
| | Sunhemp | 10 kg | | | |
| | Greengram | 4 kg | | | |
| | Marigold | 0.5 kg | | | |

9 crops for MVC, 25% of sole crop seed rate to be taken for MVC

| Details | *Kharif* | Rabi/Summer |
|---|---|---|
| Cropping system | Soybean ( Main crop) + Maize (Inter crop) | Garden pea (Main crop) + Green coriander (Inter crop) |
| Farming situation (Irrigated/ rainfed) | Irrigated | Irrigated |
| Row ratio (intercropping) | Main crop to Inter crop 2:1 | Main crop to Inter crop 2:1 |
| Spacing (main and inter crop) | Main crop 45 cm<br>Inter crop 90 cm | Main crop 60 cm<br>Inter crop 120 cm |
| Method of sowing/planting (Flat bed, BB, ridges & furrows etc) | Flat bed | Flat bed |
| NF Concoctions applied (name, quantity & time of application) | Beejamrit: Seeds were soaked before sowing<br>Ghanajeevamrit @1000 kg /ha at sowing<br>Jeevamrit @ 1500 litre/ ha / time twice a month<br>Dashparni ark spray @ 5% at 30 & 45 DAS | Beejamrit: Seeds were soaked before sowing<br>Ghanajeevamrit @1000 kg /ha at sowing<br>Jeevamrit @ 1500 litre/ ha/ time twice a month<br>Agniastra spray @ 2% at 30 & 45 DAS |
| Mulching material used and quantity (t/ha) | Wheat straw @ 5t/ha | Soybean straw @ 5t/ha |

**7. Cotton + greengram – Sorghum + chickpea**

Recommended States: Karnataka and Tamil Nadu

**Pre-kharif (Fallow period/summer)**

| Time/week/date | Crops/seed to be mixed | Quantity (kg/ha) | Tillage operation | Method of sowing | Date/time/week of incorporation |
|---|---|---|---|---|---|
| Last week of April | Pearlmillet | 1.25 kg | 1-2 har-row, One rotavator, one tiller for mixing seeds | Broadcasting | 2 weeks before sow-ing of next crop |
| | Sorghum | 5 kg | | | |
| | Cowpea | 6.25 kg | | | |
| | Clusterbean | 4.0 kg | | | |
| | Sesame | 1.25 kg | | | |
| | Sesbania | 10 kg | | | |
| | Sunhemp | 10 kg | | | |
| | Greengram | 4 kg | | | |
| | Marigold | 0.5 kg | | | |

9 crops for MVC, 25% of sole crop seed rate to be taken for MVC

| Details | *Kharif* | *Rabi/Summer* |
|---|---|---|
| Cropping system | Cotton + Green gram | Sorghum + Chick pea |
| Farming situation (Irrigated/ rainfed) | Irrigated | Irrigated |
| Soil type | Sandy clay loam | |
| Row ratio (intercropping) | 1:1 | 1:1 |
| Spacing (main and inter crop) | 75 x 45 cm | 45 x 15 cm |
| Method of sowing/planting (Flat bed, BB, ridges & furrows etc) | Ridges & furrows | Ridges & furrows |
| NF Concoctions applied (name, quantity & time of application) | Beejamrit – Seed treatment<br>Ghanajeevamrith @ 1000 kg/ha as basal<br>Jeevamrit @ 1500 l / ha through irrigation twice a month<br>Agniastra @ 3% at vegetative & Flowering stage for pest management | Beejamrit – Seed treatment<br>Ghanajeevamrith @ 1000 kg/ ha as basal<br>Jeevamrit @ 1500 l / ha through irrigation twice a month<br>Agniastra @ 3% at vegetative stage for pest management |
| Mulching material used and quantity (t/ha) | Millet straw – 5 t/ha | Cotton stalk – 5 t/ha |

**8. Turmeric + greengram - cowpea**

State: Meghalaya and Kerala

**Pre-kharif (Fallow period/summer)**

| Time/week/date | Crops/seed to be mixed | Quantity (kg/ha) | Tillage operation | Method of sowing | Date/time/week of incorporation |
|---|---|---|---|---|---|
| Last week of April | Pearlmillet | 1.25 kg | 1-2 harrow, One rotavator, one tiller for mixing seeds | Broadcasting | 2 weeks before sowing of next crop |
| | Sorghum | 5 kg | | | |
| | Cowpea | 6.25 kg | | | |
| | Clusterbean | 4.0 kg | | | |
| | Sesame | 1.25 kg | | | |
| | Sesbania | 10 kg | | | |
| | Sunhemp | 10 kg | | | |
| | Greengram | 4 kg | | | |
| | Marigold | 0.5 kg | | | |

9 crops for MVC, 25% of sole crop seed rate to be taken for MVC

| Locations (State) | Umiam (Meghalaya) | |
|---|---|---|
| Details | ***Kharif*** | ***Rabi/Summer*** |
| Cropping system | Turmeric + Cowpea (1:1) | Green gram |
| Farming situation (Irrigated/ rainfed) | Rainfed | Irrigated |
| Row ratio (intercropping) | 1:1 | |
| Spacing (main and inter crop) | 45 cm row to row | 45 cm row to row |
| Method of sowing/planting (Flat bed, BB, ridges & furrows etc) | Flat bed | Flat bed |
| NF Concoctions applied (name, quantity & time of application) | Beejamrit + Ghanajeevamrit @ 1000kg/ha + Jeevamrit @ 1500 lit/ha + weed biomass as mulch @ 5t/ha<br>(Neemastra & Agniastra for pest management) | Beejamrit + Ghanajeevamrit @1000 kg/ha + Jeevamrit @1500 lit/ha/irrigation twice in a month + weed biomass as mulch @ 5t/ha + Whapasa (irrigation in alternate furrows at noon) (Neemastra & Agniaster for pest management) |
| Mulching material used and quantity (t/ha) | Weed biomass as mulch @5 t/ha (fresh weight basis) | Weed biomass as mulch @ 5 t/ha (fresh weight basis) |

# 06 NMNF- MISSION GUIDELINES - BRIEF

**Natural Farming (NF) means growing crops without using chemical fertilizers or pesticides.**

**It relies on:**

- Local cow-based inputs (Beejamrut, Jeevamrut, Ghanjeevamrut, Neemastra, Dashparni ark etc)
- Multi-cropping
- Mulching
- Use of traditional seeds
- Integration of trees, livestock and soil biodiversity

**Natural Farming improves:**

- Soil health
- Water holding capacity
- Biodiversity (beneficial insects, birds, soil microbes)
- Climate resilience
- Farmers' income by reducing cost of cultivation

**Why India Needs Natural Farming?**

Indian agriculture became highly productive due to the Green Revolution, but now faces:

- Soil degradation
- High cost of chemical inputs
- Water scarcity
- Reduced biodiversity
- Declining soil organic carbon

Natural Farming provides a sustainable, low-cost, eco-friendly alternative suited to local agro-ecology, especially for small and marginal farmers.

**Purpose of NMNF**

The National Mission on Natural Farming (NMNF) is a Government of India programme to:

- Promote NF as a nationwide movement
- Strengthen scientific research and farmer knowledge
- Build large-scale clusters of NF farmers
- Create a national system for training, certification and marketing of natural produce
- Promote cow-integrated farming systems

**Total Outlay: ₹2481 crore**

**(GoI share ₹1584 crore + State share ₹897 crore)**

**Implementation of NMNF**

**The Mission aims to:**

1. Reduce dependence on chemical inputs
2. Improve soil organic carbon and fertility
3. Build evidence-based NF models
4. Train farmers through hands-on demonstration
5. Create a national brand for natural produce
6. Promote easy and farmer-friendly certification

**Where NMNF will be implemented**

**NMNF will work in 15,000 clusters (each ~50 ha) covering 7.5 lakh hectares.**

**Priority areas:**

- Ganga river corridor (5 km buffer)
- Tribal regions
- Districts with high or low fertilizer use
- Regions with strong SHG/SRLM networks

**What is a "Natural Farming Cluster"?**

**Each cluster includes:**

- 50 hectares contiguous area
- ~125 willing farmers
- 2 trained Krishi Sakhis (CRPs)
- Farmers can begin on small plots and then expand

**Training Ecosystem**

A strong training network will support farmers:

| Level | Institution | Role |
|---|---|---|
| National | CoNF (Centers of Natural Farming) | Train scientists, FMTs, officials |
| State | SAUs, KVKs, Local NF Institutions | Hands-on field training |
| Village | Farmer Master Trainers & CRPs | Continuous support and guidance |

**Total Training Institutions: 665**

- 530 KVKs
- 40 Agricultural Universities
- 200 Local NF Institutions

**Who will train farmers?**

- Scientists (ICAR/KVK/SAUs)
- Farmer Master Trainers (FMTs) – farmers with 3+ years NF experience

- Krishi Sakhis (CRPs) – local trained women/SHG members
- 30,000 Krishi Sakhis will be deployed across India.

**Support, Incentives, Certification & Monitoring**

**Support to Farmers**

Each trained and willing farmer receives:

- ₹4000 per acre per year for 2 years (max 1 acre per farmer)
- Support for:
  - Practicing NF
  - NF training to 6 more farmers
  - Livestock upkeep
  - Preparing NF inputs
  - Buying drums/mixing containers
  - Buying NF inputs from BRCs (if needed)

**Support to Krishi Sakhis and FMTs**

• Krishi Sakhi:

- ~₹1.2 lakh for 2 years
- For field meetings, data collection, training support

• FMTs:

- Monthly incentives for field demonstrations and cluster visits

**Bio-Input Resource Centres (BRCs)**

- 10,000 BRCs
- Provide locally made Jeevamrut, Beejamrut and other NF inputs
- Can be run by SHGs, FPOs, PACS, KVKs, NF farmers
- Each BRC receives ₹1 lakh support

**Certification & Branding**

- A simple Participatory Guarantee System (PGS)-like method
- Developed by NCONF
- A single national brand for chemical-free natural produce will be created

**Institutional Structure, Funding, Outcomes & What Farmers Gain**

**Who will run the mission?**

**National Level**

- **National Steering Committee (NSC)** – Policy decisions
- **National Executive Committee (NEC**) – Implementation oversight
- **Natural Farming Cell (DA&FW)** – Day-to-day management
- **ICAR** - Research

- **MANAGE** – Capacity building
- **NCONF** – Certification, training & portal

**State Level**

- **State Level Executive Committee (SLEC)** – Approves state plans
- **State Natural Farming Cell** – Coordination & supervision
- **District & Block Level Committees** – On-ground monitoring

**Expected Outcomes of NMNF**

The mission expects to achieve:

**Environmental Benefits**

- Improved soil structure & fertility
- Increased soil organic carbon
- Reduced chemical contamination
- Biodiversity restoration
- Higher water retention
- Climate resilience against droughts & floods

**Economic & Social Benefits**

- Lower cost of cultivation
- Safe & nutritious food for families
- Better farmer health due to lower exposure to chemicals
- Opportunities for CRPs, SHGs and FPOs
- Potential carbon credit income

**Expected Outputs**

- 15,000 NF Clusters
- 7.5 lakh ha under NF
- 18.75 lakh trained farmers
- 1 crore farmers practicing NF through cascading
- 30,000 Krishi Sakhis
- 10,000 BRCs
- 2000+ NF Model Farms
- National NF certification system
- National brand for natural produce

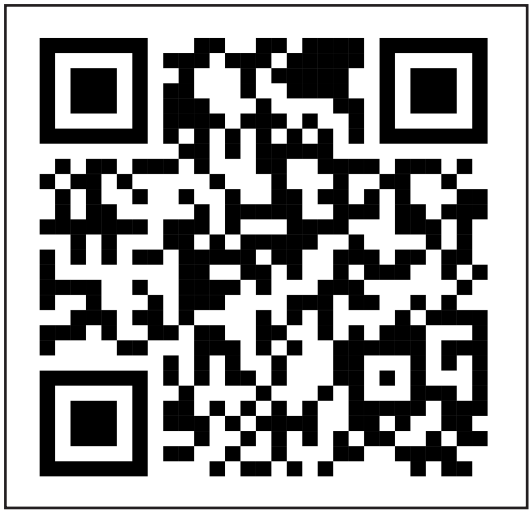
# 07 QR CODES OF VIDEOS RELATED TO NATURAL FARMING



Natural Farming (Tamil)



Natural Farming (Hindi)



Overview of Natural Farming



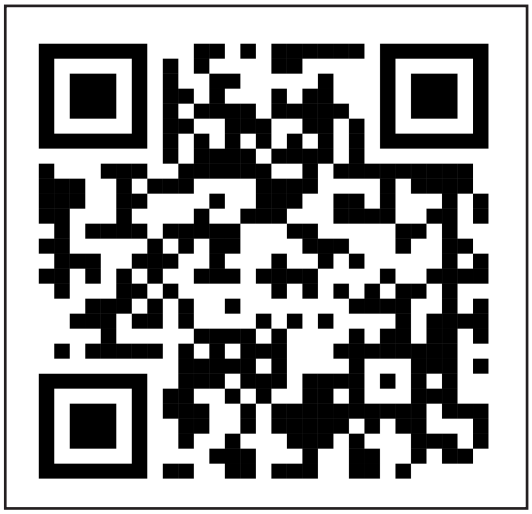
Bio-inoculants in Soil Fertility Management



**Multi variant cropping in Natural farming**



**Weed Management in Natural Farming**



**Pest Management in Natural Farming**



**Case studies on Natural Farming**



Natural Farming in Indian Condition



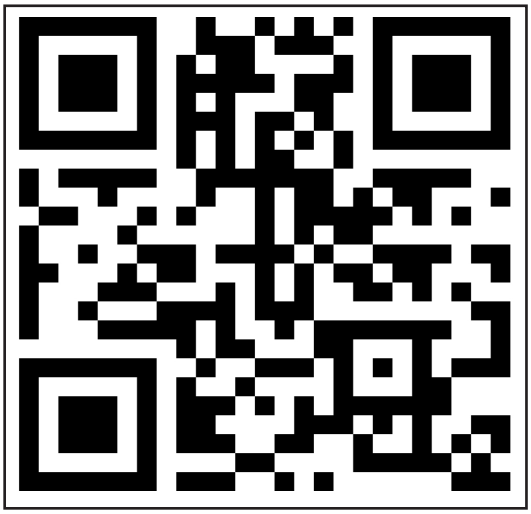
Preparation of Ghanjeevamrit



Preparation of Beejamrit



Preparation of Jeevamrit



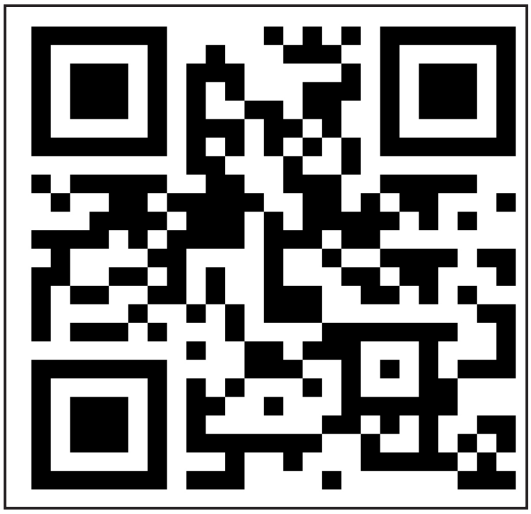
**Preparation of Neemastra**



**Preparation of Agniastra**



**Preparation of Brahmastra**



**Preparation of Sonthastra**

# REFERENCES


- FAO (2017). Conservation Agriculture. Food and Agriculture Organization of the United Nations Viale delle Terme di Caracalla, 00153 Rome, Italy. Available at https://openknowledge.fao.org/server/api/core/bitstreams/d571cf1a-7ff4-4565-8af9-eb25d198b41a/content https://naturalfarming.niti.gov.in/andhra-pradesh/
- Hari Om, Baljeet Singh Saharan, Vijay and V.P. Chahal. 2024. Natural Farming and Science, Twenty First Century Publications, Patiala, p. 191
- Meena, R.K., Hardev Ram, Anurag Saxena and Rakesh Kumar.2024. Natural Farming: Basics and Application, ICAR-National Dairy Research Institute, Karnal, India p.149.
- Ranaivoson, L., Naudin, K., Ripoche, A., Affholder, F., Rabeharisoa, L., & Corbeels, M. (2017). Agro-ecological functions of crop residues under conservation agriculture. A review. Agronomy for sustainable development, 37(4), 26.
- Ravisankar, N., V. Praveen Rao, J.K. Thakur, R. Krishnan, Meenu Rani, Himanshu Joshi, A.K. Prusty, M. Shamim, Meraj Alam Ansari, Raghuveer Singh, Raghavendra, KJ, T.P. Swarnam, Azad Singh Panwar, S. Bhaskar, Sunil Kumar and Rajbir Singh.2024. Science of Natural Farming: Proven Practices and their role in soil health and sustainability, Journal of the Indian Society of Soil Science, 72 (Special issue): 151-167.
- Ravisankar, N., A. Velmurugan, G. Obi Reddy, Mohd Ramiz, A.K. Prusty, M. Shamim, Raghavendra, K.J., Raghuveer Singh, T.P. Swarnam, Sunil Kumar and A.K. Nayak.2025. Potential Domains for Natural Farming in India (First Approximation towards Strategic Agroecological Transition), Natural Resource Management Division, Indian Council of Agricultural Research, New Delhi (i-20p.)
- Ravisankar,N., A.K. Prusty, Raghavendra, KJ, A. Velmurugan, Vipin Kumar, M. Shamim, Raghuveer Singh, J.K. Thakur, M. Suganthy, T.P. Swarnam, Gautam Chatterjee, Meraj Alam Ansari, Himanshu Chauhan, P.V.N. Sindhuja, A.S. Panwar, Sunil Kumar, S. Bhaskar and Rajbir Singh. 2025. Natural Farming Research: Status and Future Strategy, All India Network Programme on Natural Farming, ICAR-Indian Institute of Farming Systems Research, Modipuram, Meerut-250 110, India (i-95 pp).
- Sharma, SK, N. Ravisankar, N.K. Jain and S.K. Sarangi.2023. Natural Farming: Current status, research and case studies, Indian Journal of Agronomy 68 (XXII Biennial National Symposium Special issue):S1-S15.
- Shibasis Mukherjee, Suchana Sen, Md. Nasim Ali, Rupak Goswami, Argha Chakraborty, Krishnendu Ray, Rantim Bhattacharjee, Bhubaneswar Pradhan, N. Ravisankar, Gautam Chatterjee.2022. Microbiological properties of beejamrut, an ancient Indian traditional knowledge, uncover a dynamic plant beneicial microbial network, World Journal of Microbiology and Biotechnology, 38 (111): 1-12.
- Suganthy, M., P. Janaki, E. Parameswari, R.Krishnan, P.S. Kavitha, M. Ramasubramanian and M.K. Kalarani. 2023. Natural farming: Present status and future prospects, Tamil Nadu Agricultural University, Coimbatore, India p.487

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