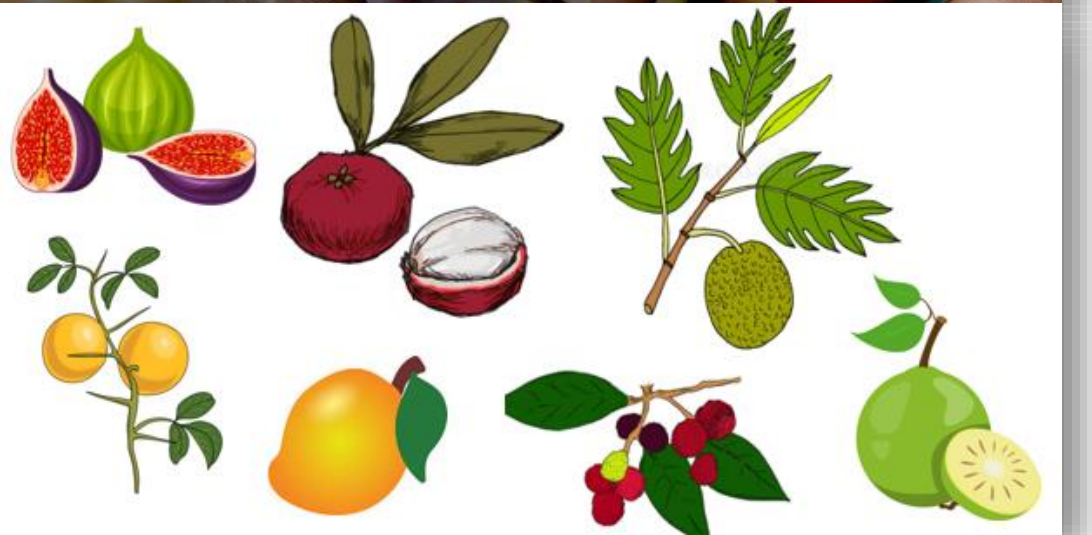

Agroecology for Nutrition and Resilience: Scaling Natural Farming for Sustainable Fruit Production

Sudhir Verma

19-11-2025

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Nauni, Solan (Himachal Pradesh) India

Introduction to project:

Title: Agroecology for Nutrition and Resilience: Scaling Natural Farming for Sustainable Fruit Production

Lead organization: Dr. YS Parmar University of Horticulture & Forestry, Nauni, Solan (HP)

Team Leader - Prof Rajeshwar Singh Chandel, Vice Chancellor

Coordinator - Dr Inder Dev, Director Extension

Principal Investigator - Dr Sudhir Verma, Pr. Scientist (*Soil Science*)

Co-PIs - Dr Pramod Kumar, Sr. Scientist (*Fruit Science*); Dr S C Verma, Prof & Head (*Entomology*); Dr NK Bharat, Prof (*Pl Path*) & Head (SST); Dr Kuldeep Thakur, Pr. Scientist (*Vegetable Science*); Dr Ashu Chandel, Prof (*Stat*) & Head (Basic Sci); Dr Rakesh Sharma, Assoc. Prof & Head (*Post-Harvest Tech*); Dr Rohit Bishist, Assoc. Prof (*Animal Science*) & Head (*Silviculture & Agroforestry*); Dr Subhash Sharma, Assoc. Prof & Head (*Social Science*); Dr Kiran Thakur, Scientist (*Fruit Science*) & Dr Nidhish Gautam, Scientist (*Vegetable Science*)

(Collaborate with KVKs & ATMA)

Target area: 10 villages in Solan and Sirmour districts representing Sub-Humid Mid Hills Zone in HP

Rationale

- Net cultivated area: 5.47 lakh ha contributing 13.62 % to GDP
- Rural population: 90 %
- Small & marginal landholders: 87%
- Direct employment in Agri./Horti.: 70% workforce.

- >20% food commodity samples carry residues.
- Chemical input usage has increased. Apple: upto 12 pesticide sprays; cauliflower, capsicum and tomato: 6- 8 sprays; pomegranate upto alarming 16 sprays.
- >80% farmers reported eye irritation, fatigue; >60% skin allergy, headache and vomiting after pesticide applications.
- 90% found a decline in natural enemies and honey bees.
- The per capita income of the state increased from ₹1.34 Lakh in 2015-16 to ₹1.90 Lakh in 2019-20, and ₹2.22 Lakh in 2022-23.
- However, as per the NFHS-2021, proportion of children (<5 years) having acute malnutrition (weight-for-height) has increased from 13.7% in 2015-16 to 17.4% in 2019-20;
- Proportion of stunted (height-for-age) children (>5 years) has gone up from 26.3% in 2015-16 to 30.8% in 2019-20.

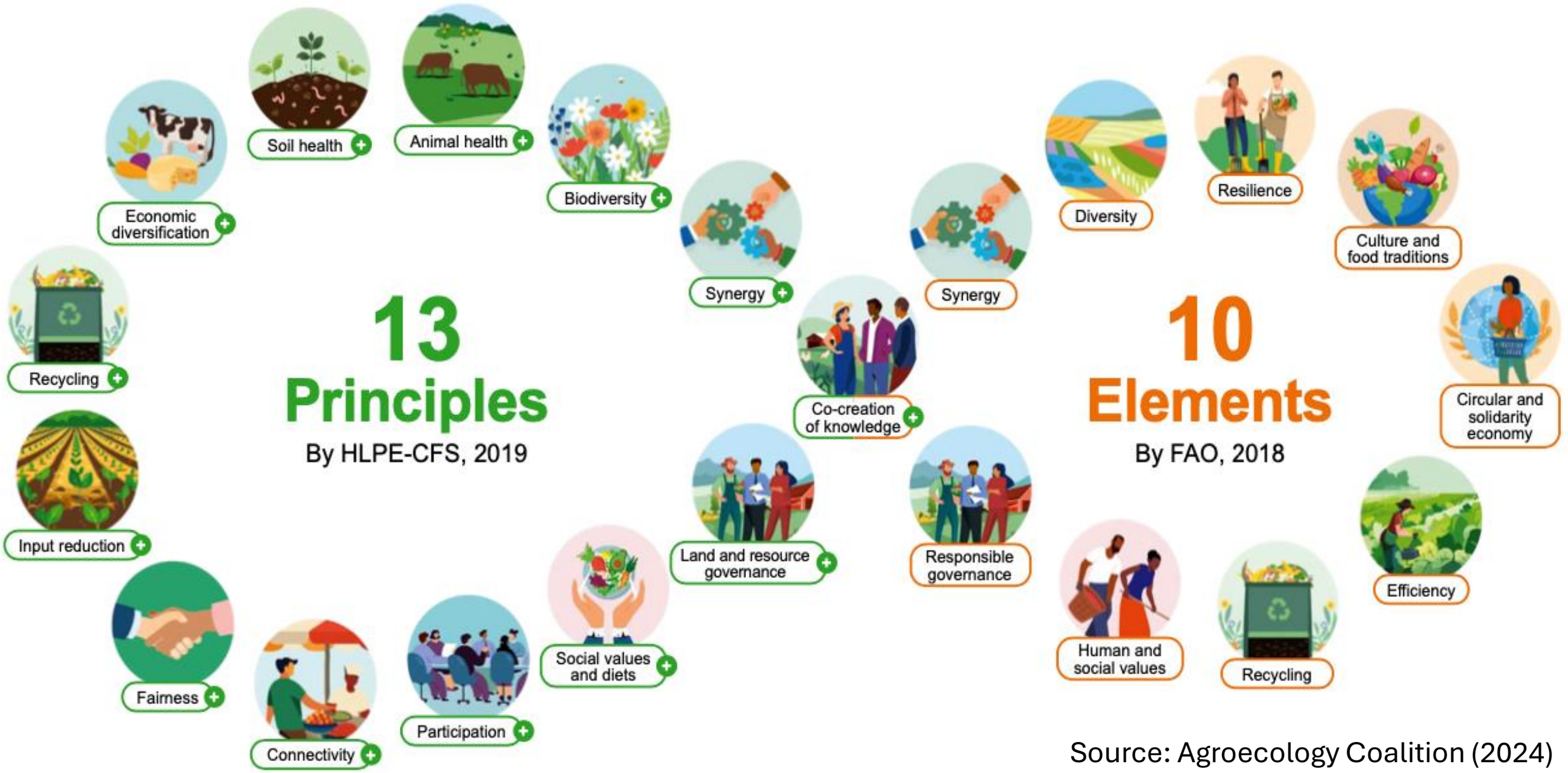
Key Issues

- Soil health degradation, bio-diversity loss, climatic variability, rising input costs & health issues.
- Hill-specific challenges like soil erosion, nutrient loss, and moisture stress.
- Lack of practical NF models for multi-layered fruit based systems.
- Low adoption of eco-friendly, cost-effective practices in holistic manner

Natural Farming

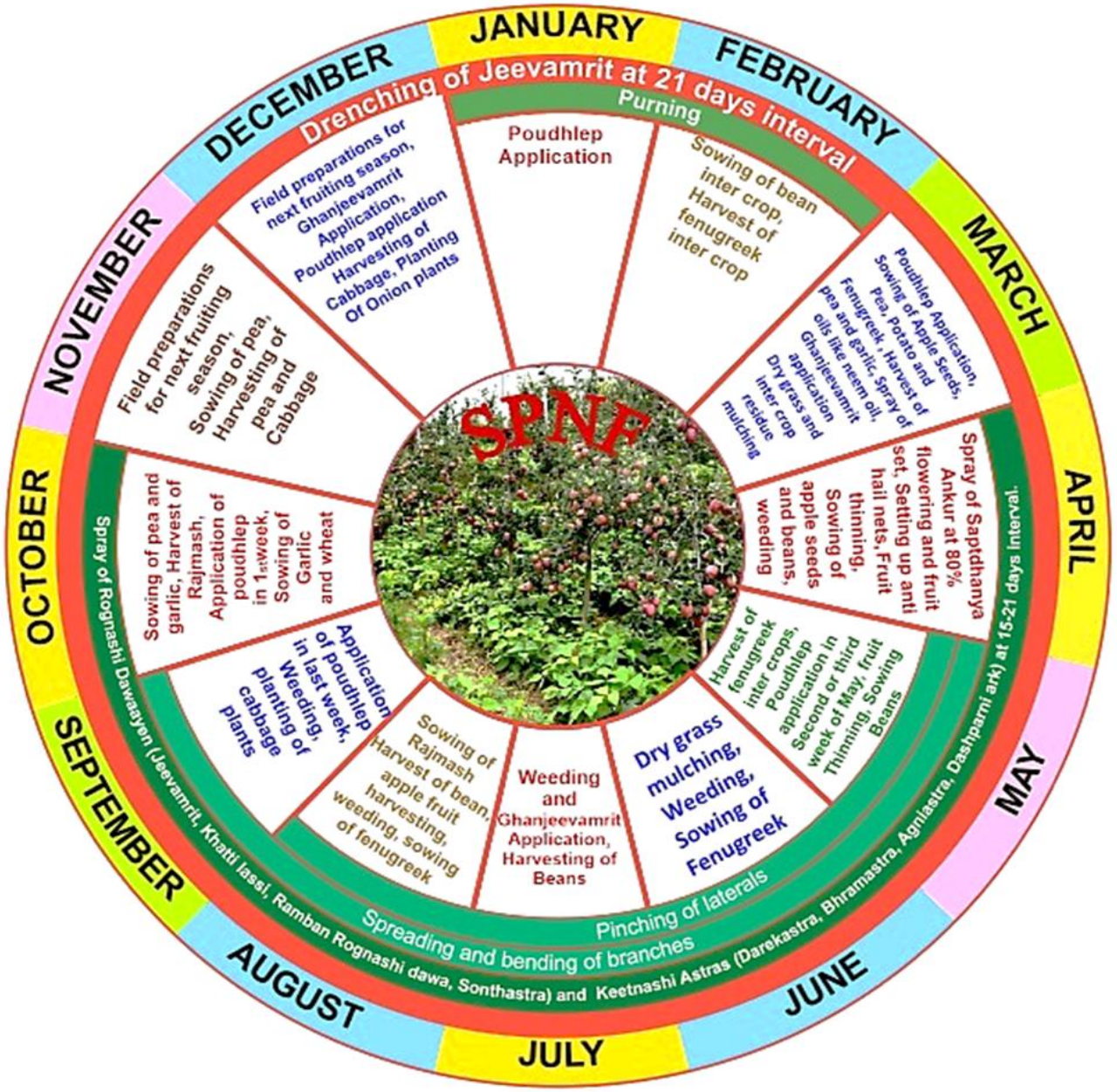
- Restores soil fertility & boosts SOC using local farm based inputs.
- Cuts chemical dependency & production costs, improving profitability
- Enhances fruit quality and climate resilience (better quality, reduced pest attack, drought tolerance).
- Promotes environmentally safe, climate-smart horticulture in fragile hill ecosystems.
- Aligns with state & national priorities, & CFI mission

Agroecology – Way forward to sustainable agriculture



Source: Agroecology Coalition (2024)

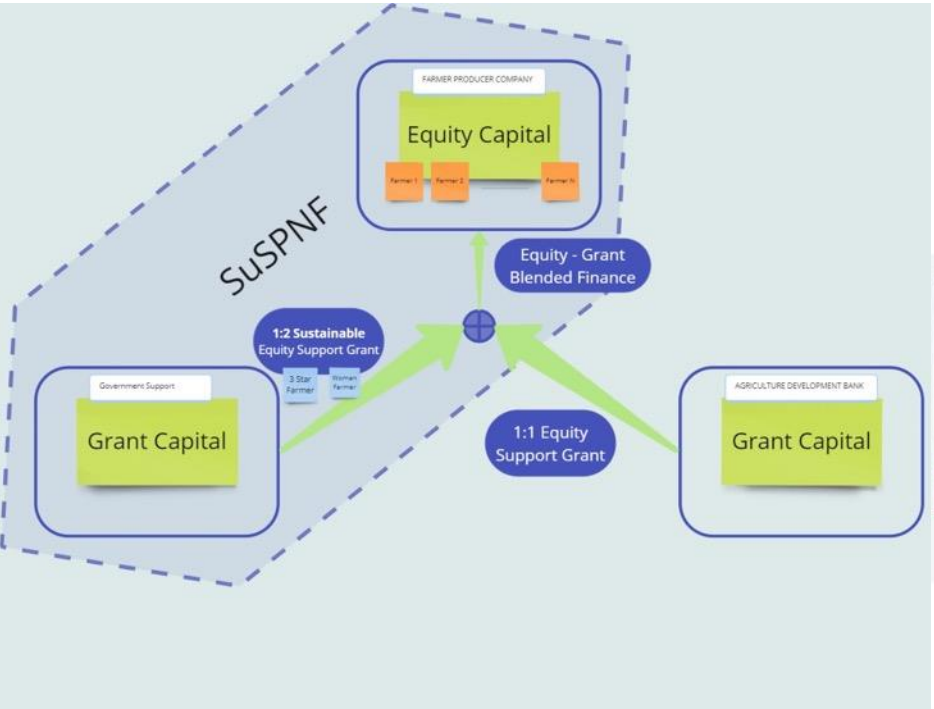
Natural Farming – Agroecological Approach



- **NF practices for apple farming systems** standardized (~7 crops cultivated throughout the year- **Crop intensification approach)**
- **Vegetable based NF systems standardized** (Tomato + French bean+ Brinjal; Cucumber+ French bean+ Okra, Capsicum + French bean + Brinjal, Tomato + French bean+ Capsicum, Cabbage + Methi + Coriander, Pea+ Spinach+ Fenugreek)

Sustainable Food System Platform Model - An Innovation

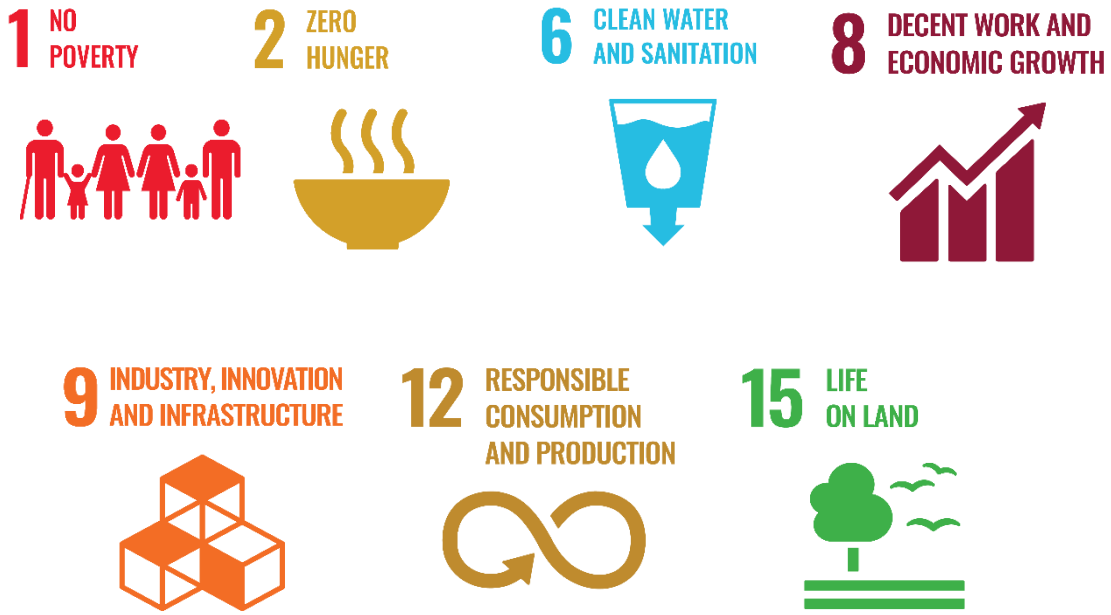
- Developed Framework of Sustainable Food System Platform for NF (SuSPNF)
- UHF declared as POPI- NABARD
- Incubation of Startup Business to create Captive and Mobile Outlets in university/cities linked to SuSPNF/CETARA
- Capacity Building, Monitoring and Legal Compliances of FPCs
- Initial phase – 4 Natural Farming FPCs - Solan Naturals, Chaupal Naturals, Karsog Naturals & Pachhad Naturals



Sustainable Development

+vely mapping SDGs through NF

	Globally	PK3Y
Total SDG Goals	17	7
Total SDG Targets	169	15
Total SDG Indicators	232	18



External Evaluation- By MANAGE & AMS, Lucknow

- Decline in pest & disease attack (75% farmers)
- Reduced soil erosion (88% farmers)
- Better water retention (87% farmers)
- Increased pollinator population (93% farmers)
- Increased land productivity (75% farmers)

Project Objectives

- Establish demonstrations on multi-layer fruit-based natural farming systems and demonstrate bio-inputs, mulching, and ecological pest management
- Improve soil health and biodiversity in orchard ecosystems
- Build farmer capacity through training, exposure visits, and community field schools, improve access to safe, chemical-free fruits, skill in value addition and improve farmer incomes
- Create scalable village-level clusters that serve as demonstration hubs for neighbouring regions

Methodology and implementation approach

- Farmer-centric participatory mode for cluster-based orchard development
- Establish holistic multilayer natural farming model involving multiple fruit crops (apple, peach, plum, apricot, pomegranate, kiwi, guava, strawberry, etc) for nutritional resilience by providing consistent and dependable dietary access to rural communities especially low-income families (100 No.).
- On-farm preparation of bio-inputs, mulching with orchard residues, intercropping with legumes will be demonstrated.
- Demonstration of bio-sprays and soil drenching with cow dung and urine based formulations will be done to prevent pest and disease incidence.
- Training on various aspects of orchard management including orchard floor management, canopy management, natural rejuvenation techniques, top-working, waapsha etc will be imparted.
- Capacity building through Farmer Field Schools, demonstration orchards, and training programs to provide safe and nutritious produce and integrate value chains.
- Planned activities include capacity building on bio-input preparation and orchard management, soil health restoration, value addition, and market-oriented interventions.
- The approach emphasizes low-cost, eco-friendly practices such as mulching, applications of natural farming formulations, and biodiversity enhancement.

Year-round fruit availability

Crop	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Apple	▢	▢	▢	▢	▢	▢	■	■	▢	▢	▢	▢
Peach	▢	▢	▢	▢	▢	■	■	▢	▢	▢	▢	▢
Apricot	▢	▢	▢	▢	■	■	▢	▢	▢	▢	▢	▢
Plum	▢	▢	▢	▢	▢	■	■	▢	▢	▢	▢	▢
Kiwi	▢	▢	▢	▢	▢	▢	▢	▢	▢	■	▢	▢
Pomegranate	▢	▢	▢	▢	▢	▢	▢	▢	■	■	▢	▢
Guava	■	■	▢	▢	▢	▢	■	■	▢	▢	▢	■
Strawberry	▢	▢	■	■	▢	▢	▢	▢	▢	▢	▢	▢

Methodology and implementation approach

Year 1: Foundation and Capacity Building

- Focus on establishing the groundwork through a baseline survey, stakeholder consultations, & community mobilization.
- Awareness campaigns and farmer trainings on natural farming principles, soil rejuvenation, and orchard management.
- Establishment of demonstration orchards in selected sites to serve as practical learning centres.
- Soil testing and production of natural farming inputs.

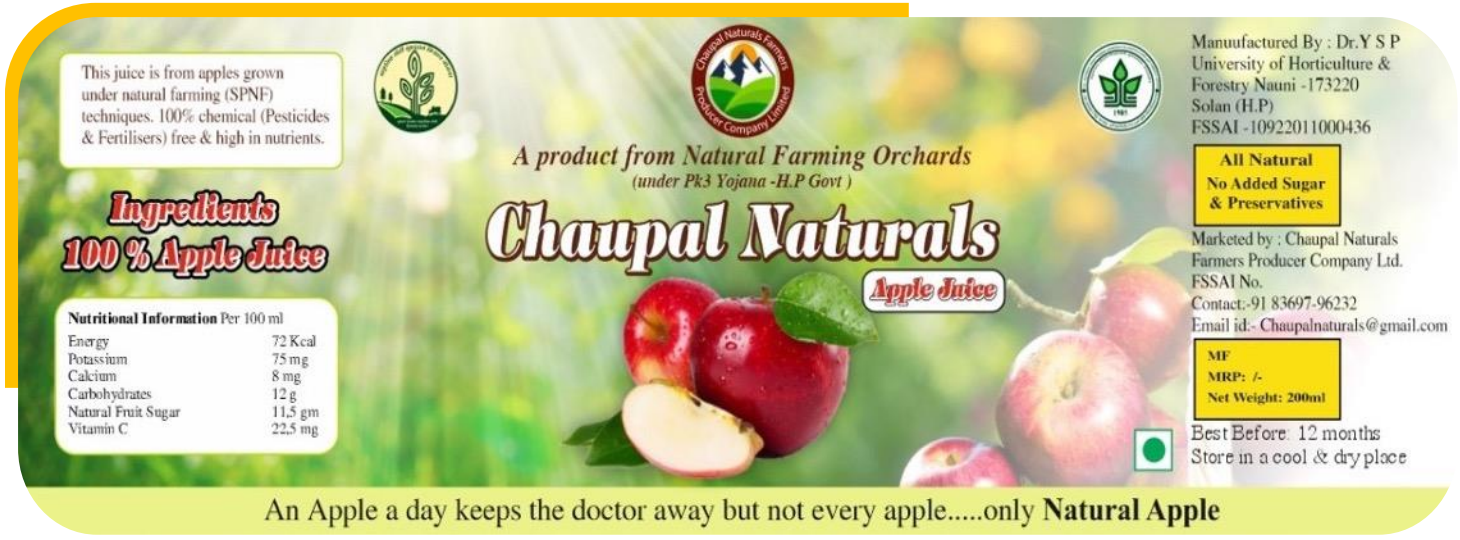
Year 2: Expansion and Strengthening

- Consolidate field-level interventions by expanding the number of participating farmers and strengthening farmer groups for collective input procurement and marketing.
- Continued capacity building will focus on advanced orchard management, pest control, and CETARA certification processes for natural produce.
- Efforts will also be directed towards developing market linkages with buyers and cooperatives.
- Monitoring and evaluation mechanisms will be institutionalized to assess adoption progress and yield improvements.

Year 3: Consolidation, Value Addition, and Sustainability

- Focus on value addition, small-scale processing, and establishing sustainable market channels.
- Farmer groups will be supported in obtaining CETARA certification.
- Documentation of best practices will be carried out to facilitate upscaling in similar agro-ecologies.

Technology Upscaling and Transfer



Project outcomes

Expected outcomes are

- improved soil health & biodiversity,
- higher resource use efficiency,
- climate change mitigation,
- reduced input costs,
- round the year fruit production,
- enhanced fruit quality, and
- improved household nutrition security.

Through its pathway to change, the project envisions

- strengthened farmer groups with improved livelihoods,
- replicable model of climate-resilient, nutrition-secure horticulture.

Model outlets for Natural Farming Produce –

Branding, certification, traceability, transparency & profitability

Budget summary, risk and mitigation strategy

The project will require a combination of financial, human, institutional, and material resources to promote natural farming-based horticulture with focused investment in farmer training and establishment of demonstration orchards.

Major Head	Details	Amount (₹)			
		Year 1	Year 2	Year 3	Total
Manpower	Young Professional & Field Investigator	6,00,000	6,00,000	6,00,000	18,00,000
Operations	Baseline survey, workshops, Farmer mobilization & training, soil testing, NF input preparation and related infrastructure, planting material, group formation, value addition, model demonstrations, etc; Literature, publications; stationary, reports, other unforeseen expenses	9,00,000	8,00,000	7,00,000	24,00,000
Travel	TA-DA, POL/Transportation, taxi	1,00,000	1,00,000	1,00,000	3,00,000
Total		**16,00,000**	**15,00,000**	**14,00,000**	**45,00,000**

Risk Category	Risk Level	Mitigation Strategy
Slow soil transition	Medium	Phased adoption, soil monitoring, NF formulations
Water scarcity	High	Mulching, water harvesting
Pest/disease surge	Medium	NF concoction sprays
Farmer adoption	High	Champion farmers, field demonstrations
Temporary yield loss	Medium	Intercrops, market linkages
Market fluctuations	High	Value addition, market linkages
Implementation delays	Medium	Multi-vendor procurement, Regular monitoring
Climate variability	High	Diversification, mulching

Collaborations with

KVKs and ATMA

Convergence

Activities in other schemes of UHF, MNREGA

Alliance
Bioversity & CIAT

CGIAR

Thanks