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Ministry of Rural Development
Government of India

The Moringa Toolkit

मोरिंगा का वादा,लखपति का इरादा

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The Moringa Toolkit

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Contents

List of Abbreviations

APEDA	Agricultural and Processed Food Products Export Development Authority
BMZ	German Federal Ministry for Economic Cooperation and Development
BPKP	Bhartiya Prakritik Krishi Paddhati programme
BRC	Bio Input Resource Centre
CAGR	Compound annual growth rate
CAGR	Compounded Annual Growth Rate
CECOEDECON	Centre for Community Economics and Development Consultants Society
CLF	Cluster Level Federation
CRP	Community Resource Person
CSR	Corporate Social Responsibility
CSR	Corporate Social Responsibility
DAC&FW	Department of Agriculture, Cooperation & Farmers Welfare
DAY-NRLM	Deendayal Antyodaya Yojana - National Rural Livelihoods Mission
DPC	District Programme Coordinator
DPR	Detailed Project Report
EDII	Entrepreneurship Development Institute of India
ERADA	Enhancing Rural resilience through Appropriate Development Actions
FI	Financial Institutions
FY	Financial Year
GDS	Grameen Development Services
GIS	Geographic Information System
GIZ	Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH
GKRA	Garib Kalyan Rojgar Abhiyan
GOI	Government of India
GP	Gram Panchayat
GSDP	Green and Sustainable Development
HH	Household
IFOAM	International Federation of Organic Agriculture Movements
IGC	Indo-German Consultations
IGSSS	Indo-Global Social Service Society
INR	Indian Rupees

KVK	Krishi Vigyan Kendra
LEISA	Low External Input Sustainable Agriculture
MGNREGA	Mahatma Gandhi National Rural Employment Guarantee Act
MGNREGS	Mahatma Gandhi National Rural Employment Guarantee Scheme
MoA & FW	Ministry of Agriculture & Farmers Welfare|
MoRD	Ministry of Rural Development
MP	Madhya Pradesh
MSME	Micro Small and Medium Enterprises
NADEP	Narayan Deorao Pandharipande
NCNF	National Coalition for Natural Farming
NGO	Non- Governmental Organisation
NRLM	National Rural Livelihood Mission
NRM	Natural Resource Management
NSOP	National Standards of Organic Production
NPOP	National Programme for Organic Production
PG	Producer Group
PGS	Participatory Guarantee System
PGSOC	Participatory Guarantee System Organic Council
PHED	Public Health Engineering Department
PMKSY	Pradhan Mantri Krishi Sinchai Yojana
PPE	Personal Protective Equipment
PRADAN	Professional Assistance for Development Action
RD	Rural Development
RDD	Rural Development Department
SDG	Sustainable Development Goals
SHG	Self-Help Group
SRLM	State Rural Livelihood Mission

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Foreword

Shri Shailesh Kumar Singh
Secretary
Ministry of Rural Development
Government of India

India, the largest producer of Moringa, has long recognised the potential of this 'miracle' tree in enhancing health and well-being. Traditionally cultivated across the country, Moringa, known by various names such as drumstick tree, horseradish tree, and 'sahjan,' has transitioned from a homestead tree to a super-food acclaimed for its remarkable health benefits.

In the pursuit of a healthier and more sustainable world, the cultivation and utilisation of Moringa (Drumstick) stands as a beacon of hope. India, the largest producer of Moringa, has long recognised the potential of this 'miracle' tree in enhancing health and well-being. Traditionally cultivated across the country, Moringa, known by various names such as drumstick tree, horseradish tree, and 'sahjan,' has transitioned from a homestead tree to a super-food acclaimed for its remarkable health benefits. The commendable initiatives of States like Andhra Pradesh, Madhya Pradesh, Tamil Nadu, and Karnataka, coupled with government support, have facilitated large-scale production and marketing of Moringa. However, the journey does not end here. There exists a critical need to expand production coverage nationwide and establish Moringa-based enterprises as sustainable livelihood options, particularly for marginalised communities and women. Despite a growing global demand, the scarcity of high-quality fresh and dry Moringa raw materials persists, creating an imperative to bridge this gap.

The Government of India, recognising the potential of Moringa, has taken strides in promoting its production, processing, and marketing through various national-level schemes like the Deendayal Antyodaya Yojna-National Rural Livelihoods Mission (DAY-NRLM) and the Mahatma Gandhi National Rural Employment Guarantee Scheme (Mahatma Gandhi NREGS). In tandem, the Indo-German development cooperation project 'Enhancing Rural Resilience through Appropriate Development Actions (ERADA)' has integrated Moringa plantations into a holistic livelihood model. Private enterprises, NGOs, and corporate social responsibility initiatives have also joined hands to champion this cause.

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In this backdrop, the "Moringa Toolkit", developed by GIZ India emerges as a valuable resource. Shaped by the insights of government officials, Self-Help Groups (SHG) members, farmers, agripreneurs, and agriculture experts, this toolkit serves as a practical guide for technical staff and community resource persons of DAY-NRLM engaged in promoting Moringa-based livelihoods. It's comprehensive content includes step-by-step process guidelines, practice-oriented advice, and solutions to common challenges.

This toolkit isn't merely a compendium of information; it is a bridge connecting knowledge to action. It extends beyond cultivation to encompass processing and marketing, essential components for farmers seeking to enter the Moringa value chain. Knowledge checks at the end of each section empower users to gauge their learning progress and make informed decisions. Assembled with insights from consultations, this toolkit is a collaborative effort, generously sharing knowledge about this super-food.

I take this opportunity to congratulate the team of DAY-NRLM, GIZ, Ecociate Consultants in designing this holistic knowledge product. It is our sincere hope that this resource proves invaluable information to the women SHG members and farmers interested in cultivating Moringa, contributing to the sustainable growth of this remarkable crop.

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Message

Shri Charanjit Singh
Additional Secretary, Rural Livelihoods
DAY-National Rural Livelihoods Mission
Ministry of Rural Development
Government of India

In the landscape of agricultural potential, the emergence of Moringa as a strategic economic and environmental resource is a testament to the innovation and sustainable development. Moringa, commonly known as drumstick tree, horseradish tree, or 'Sahjan,' is fast gaining recognition for its versatility and the myriad opportunities it holds, particularly in uplifting the livelihoods of communities across India.

As we delve into the narratives of Moringa, it becomes evident that its role transcends mere cultivation; it symbolises a promising avenue for economic growth and environmental well-being. The "Moringa Toolkit", meticulously crafted by the Indo-German development cooperation project 'Enhancing Rural Resilience through Appropriate Development Actions' (ERADA) reflects a comprehensive effort to guide and empower those navigating the landscape of Moringa-based livelihoods and production practices.

The market dynamics surrounding Moringa underscore its economic significance, India, being the primary cultivator of Moringa. Its transformation from a traditional homestead plant to an acknowledged super-food highlights the dedication to unlocking its remarkable health and wellness advantages. Traditionally planted in homesteads, this rapidly growing, drought-resistant tree is nurtured for its youthful seed pods, leaves utilised in traditional medicine, and its contribution to water purification. Handicrafts, tools, toys, and utensils crafted from Moringa represent only a fraction of the possibilities yet to be tapped fully.

It is indeed gratifying to acknowledge the contribution of Deendayal Antyodaya Yojna-National Rural Livelihoods Mission (DAY-NRLM) in catalysing the integration of Moringa into livelihood opportunities. This initiative aligns seamlessly with our vision and efforts for actively promoting Moringa cultivation, processing, and marketing as a livelihood opportunity.

The Moringa Toolkit, meticulously crafted by the Indo-German development cooperation project 'Enhancing Rural Resilience through Appropriate Development Actions' (ERADA) reflects a comprehensive effort to guide and empower those navigating the landscape of Moringa-based livelihoods and production practices.

DAY-NRLM has played a pivotal role in advancing these initiatives, particularly for marginalised communities and women farmers among the Self-Help Groups (SHG). This crop has the potential to strengthen sustainable incomes of our women SHG members across the country.

This toolkit is more than a guide; it is a reservoir of knowledge, offering step-by-step guidelines, practice-oriented advice, and solutions for the challenges that may be encountered in the cultivation, processing, and marketing of Moringa. It's relevance extends beyond technical staff to encompass community resource persons, entrepreneurs, professionals, and policymakers, providing insights that can shape informed decisions and policies.

I commend all the authors involved in bringing forth this toolkit and express gratitude to the DAY-NRLM team of MoRD, GIZ India and Ecociate Consultants for their dedication to advancing Moringa-based livelihoods. This toolkit, presented at an opportune time, stands as a beacon of knowledge dissemination, and a catalyst for the sustainable growth of Moringa enterprises. As we introduce the "Moringa Toolkit", let it act as a spark for an eco-friendly transformation at the community level, ensuring that each farmer possesses the expertise and resources to not only grow Moringa as a crop but also as a means of empowerment, resilience, and the foundation for sustainable livelihoods.

Message

Ms Swati Sharma
Joint Secretary, Rural Livelihoods
DAY-National Rural Livelihood Mission
Ministry of Rural Development
Government of India

Deendayal Antyodaya Yojana- National Rural Livelihoods Mission (DAY-NRLM), Ministry of Rural Development (MoRD) has mobilised over 100 million rural poor households through women Self Help Groups (SHGs) across India. Multiple programmes and sub-schemes have been launched for strengthening the livelihoods of women members through value chain, farming clusters, producer enterprises, and a large community cadre has been created to support these efforts. The Ministry is now embarking on a special initiative targeting million plus livelihoods in select sub-sectors. One such sub-sector is Moringa.

Moringa *(Moringa oleifera Lam./ drumstick)* belonging to the family *'Moringaceae'* is a fast-growing multipurpose medicinal tree extensively grown in tropics and subtropics of India. Moringa is widely used as vegetable and grown commercially for its edible pods and leaves. *Moringa oleifera* is an important food commodity which has had enormous attention as the 'Natural Nutrition of the Tropics'. Almost all the parts of this plant: root, bark, gum, leaf, fruit (pods), flowers, seed and seed oil have been used for various ailments in the indigenous medicine of South Asia.

Moringa products market is anticipated to achieve a CAGR of 9.20% and touch USD 9.4 Billion by 2027. The worldwide market for Moringa products is projected to develop speedily due to the health benefits of the tree's products. Moringa being used in countries like India and Africa in feeding programs to combat malnutrition as the leaves hold lots of vitamins and minerals when dried. As an antioxidant, it appears to help protect cells from damage leading to its use in capsules and pills as a supplement. Moringa oil is also regarded as the new coconut oil as many products using Moringa oil are now finding their way into cosmetic products such as shampoos, lip oils, blushes, hair oils, and moisturisers.

Moringa products market is anticipated to achieve a Compound Annual Growth Rate (CAGR) of 9.20% and touch USD 9.4 Billion by 2027. The worldwide market for Moringa products is projected to develop speedily due to the health benefits of the tree's products.

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Capacity Building of Krishi Sakhis (translates in English agriculture community resource person) is key for promotion of Moringa. The "Moringa Toolkit", developed by GIZ India will immensely help Krishi Sakhis in promoting Moringa Value Chain activities. I am happy to know that the compendium was developed after several rounds of consultation with various stakeholders working on moringa value chain. I hope this toolkit serves as a practical guide for SRLM staff and Community Resource Persons of DAY-NRLM engaged in promoting farm livelihoods.

I appreciate the efforts of farm livelihoods team at DAY-NRLM, GIZ India, and Ecociate Consultants in designing this wonderful manual. I hope this manual will be helpful to Community Resource Persons in promoting Moringa with Self Help Group members to make them lakpati Mahilas (translated in English as one million women).

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Government of India

Message

Shri Amit Kataria
Joint Secretary, Mahatma Gandhi NREGS
Ministry of Rural Development
Government of India

This toolkit is a result of the Indo-German project 'Enhancing Rural Resilience through Appropriate Development Actions', which aims to strengthen livelihoods of vulnerable households through assets created under Mahatma Gandhi NREGS, in convergence with other government programmes.

The Mahatma Gandhi National Rural Employment Guarantee Scheme (NREGS) is a flagship programme of the Ministry of Rural Development, Government of India aimed at providing public employment to every rural Indian household demanding for unskilled labour, up to 100 days in a year. Moringa is a superfood gaining momentum in global markets. Moringa plantation and maintenance is a permissible work under Mahatma Gandhi NREGS.

The Indo-German Development cooperation project 'Enhancing Rural Resilience through appropriate Development Actions' (ERADA) builds upon the success of the Garib Kalyan Rozgar Abhiyan (GKRA), which effectively alleviated the repercussions of the COVID-19 pandemic on the livelihoods of rural populations. Notably, Mahatma Gandhi NREGS played a pivotal role in the GKRA initiative, providing crucial support to returning migrants in rural areas amid the pandemic. A key facet of ERADA's strategy involves integrating the utilisation of Mahatma Gandhi NREGS assets for livelihood development. By focusing on convergence with other government programmes, ERADA anticipates a more robust framework for empowering vulnerable communities. The concentrated effort on vulnerable communities and the development of the moringa plantations in Madhya Pradesh and Rajasthan reflects ERADA's commitment to extending the reach of Mahatma Gandhi NREGS in these specific regions.

I am delighted to introduce the 'Moringa Toolkit', a knowledge product that provides a detailed guide for Mahatma Gandhi NREGS Technical Staff and Community Resource Persons of other government programmes to support small-holders and women farmers initiate moringa cultivation. This toolkit is a result of the Indo-German project 'Enhancing Rural Resilience through Appropriate Development Actions', which aims to strengthen livelihoods of vulnerable

households through assets created under Mahatma Gandhi NREGS, in convergence with other government programmes.

Moringa is a superfood gaining momentum in global markets, and moringa plantation and its maintenance are a permissible work under Mahatma Gandhi NREGS. The 'Moringa Toolkit' provides step-by-step guidance, practice-oriented advice, frequently encountered challenges and their solutions, approaches, tools, templates, and resources for the same. This toolkit will help in initiating moringa cultivation, especially for the vulnerable households of Para 5, Schedule 1 of Mahatma Gandhi NREGA. Furthermore, the integration of other Mahatma Gandhi NREGS assets such as nurseries, vermicompost units and water harvesting structures can augment the incomes of vulnerable households, while also contributing to their sustainable and integrated livelihood generation, and household level nutrition.

The 'Moringa Toolkit' is a valuable resource that will contribute to the sustainable development of rural communities. I would like to commend the team for their efforts in developing this toolkit and hope that it will be used widely by Mahatma Gandhi NREGS Technical Staff and Community Resource Persons of other government programmes.

Preface

Shri Rajeev Ahal
Director, Natural Resource Management
and Agroecology; Head of Project ERADA
GIZ India

The Moringa Toolkit mainly contributes to one of the key priorities that is, the lighthouse cooperation on "Agroecology and Sustainable Management of Natural Resources" to benefit the rural population and small-scale farmers in India in terms of income, food security, climate resilience, improved soil, biodiversity, among other goals. One cannot overstate the potential benefits that the Moringa Toolkit brings to the forefront.

The Moringa Toolkit marks a significant milestone in our decade-long collaboration with the Ministry of Rural Development (MoRD) and stands as a testament to the collective dedication and hard work invested by all involved. It is with immense pride and pleasure that I extend my heartfelt thanks to the guidance and leadership of MoRD for enabling this toolkit. I congratulate the entire team of the ERADA Project and all colleagues who made this publication happen.

As a service provider in the field of international cooperation for sustainable development and international education work, GIZ is the German Government's implementing agency for technical cooperation and is present in more than 100 countries.

For over 60 years, GIZ has been working jointly with partners in India for sustainable economic, ecological, and social development. The Government of India has launched numerous important initiatives to address the country's economic, environmental, and social challenges, and GIZ is contributing to some of the most significant ones. The partnership with MoRD is 11 years old, and we continue to work together mainly on environmental benefits, natural resource management, water security, climate adaptation, digitalisation, social protection and livelihoods. Our harmonious journey with MoRD is characterised by shared goals, mutual respect, and a commitment to addressing challenges in rural development. The ERADA project, commissioned on behalf of the German Development Cooperation for Economic Development, a shining example of this collaboration, has consistently demonstrated a tireless pursuit of sustainable solutions aimed at enhancing the livelihoods of communities in need.

The ERADA project has made remarkable progress and an unwavering commitment to its primary goal: enhancing the sustainable incomes of vulnerable households in rural areas.

The project aims to empower these households to achieve a decent standard of living, thereby providing them with the means to stay in their rural communities rather than migrating to urban areas due to economic distress. The launch of the Moringa Toolkit showcases a consolidation of deep literature review, stakeholder insights and experiences from the project implementation.

The Moringa Toolkit, crafted through thorough research and practical insights, ensures that this remarkable plant brings substantial benefits to the communities engaged in its cultivation. The development of the 'Moringa Toolkit' stems from the project's interventions and experiences, recognising the necessity for a practical guide and quick-reference resource, particularly for the technical staff involved in the Mahatma Gandhi NREGS and the staff and community resource persons of the DAY-NRLM. This comprehensive toolkit provides detailed, step-by-step guidelines, practical advice, solutions to commonly faced challenges, market opportunities, approaches, tools, templates, self-learning resources, and knowledge checks for people to check their knowledge after training. Its primary purpose is to support smallholder and women farmers interested in cultivating moringa, offering them valuable assistance in navigating the intricacies of moringa-based livelihoods in rural areas.

Furthermore, the Moringa Toolkit aligns seamlessly with global Sustainable Development Goal (SDG) 1, 3, 10, 12 and 13. By facilitating the adoption of Moringa cultivation, the toolkit contributes to income generation, improved nutrition, agroecological benefits and overall community well-being. It also thus contributes to the Indo-German Green and Sustainable Development Partnership (GSDP) launched during the 6th Indo-German Inter-Governmental Consultations (IGC) jointly chaired by Prime Minister Mr. Narendra Modi and Chancellor Mr. Olaf Scholz in Berlin, Germany. The Moringa Toolkit mainly contributes to one of the key priorities that is, the lighthouse cooperation on "Agroecology and Sustainable Management of Natural Resources" to benefit the rural population and small-scale farmers in India in terms of income, food security, climate resilience, improved soil, biodiversity, among other goals. One cannot overstate the potential benefits that the Moringa Toolkit brings to the forefront.

As we celebrate the release of the Moringa Toolkit, let us also acknowledge the collaborative spirit that has fueled this achievement. This toolkit is developed in cooperation with Ecociate Consultants and with inputs from various Indo-German development cooperation projects, government, and other stakeholders to ensure the inclusion of evidence-based approaches. This partnership has proven to be a force multiplier, amplifying our impact and fostering positive change. Together, we have laid the groundwork for a more sustainable and resilient future, and the Moringa Toolkit stands as a symbol of our shared commitment to progress.

May this initiative inspire further endeavors. I hope the readers find this useful and the toolkit will pave the way for the nationwide uptake of moringa production!

About the Toolkit

Moringa has traditionally been widely cultivated across India, albeit more as a homestead tree rather than as a cash crop.

Moringa pods

India is the largest producer of Moringa (commonly known as drumstick tree, horseradish tree, ben oil tree, *'Murungai', 'Sahjan'*), which has achieved the status of a superfood due to its impressive health and wellness benefits. Moringa has traditionally been widely cultivated across India, albeit more as a homestead tree rather than as a cash crop. States such as Andhra Pradesh, Tamil Nadu and Karnataka have conducted significant research and development for developing pest and disease-resistant cultivars with improved productivity. The governments of these states have also enabled large-scale production and marketing of Moringa produce and products. However, there is a need for increasing production coverage across the country and building Moringa-based enterprises as a livelihood activity for producer groups. Moreover, despite an increasing global demand, there is a shortage of good quality fresh and dry Moringa raw materials, and there is a need to fill this gap.

The government of India has been promoting the production, processing, and marketing of Moringa as a livelihood opportunity especially for marginalised communities and women, through two strategic national-level schemes namely DAY-NRLM and Mahatma Gandhi NREGS. In addition, private enterprises, NGOs, and corporate social responsibility initiatives have also been promoting this 'miracle' tree.

About ERADA

The Indo-German development cooperation project, Enhancing Rural Resilience through Appropriate Development Actions (ERADA) is commissioned by the German Federal Ministry for Economic Cooperation and Development (BMZ) in cooperation with the Ministry of Rural Development (MoRD), Government of India. The project is implemented by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, India and aims to strengthen the livelihoods of vulnerable households in

rural areas of Bihar, Madhya Pradesh, Jharkhand and Rajasthan with the focus on improving their sustainable incomes through diversified farm and off-farm activities. ERADA works on a living income enhancement approach, strengthening the participation of vulnerable households in Mahatma Gandhi NREGS programme, and diversifying their livelihood activities through DAY-NRLM and other rural development programmes. One of the key initiatives under the project has been promoting moringa plantations as part of an integrated livelihood model.

'Moringa Toolkit' is an outcome of the project's interventions and learnings that reflected the need to develop a practical guide and ready reference resource for mainly the Mahatma Gandhi NREGS technical staff and the DAY-NRLM's CRPs to support their efforts to promote moringa based livelihoods in rural areas. It contains detailed step-by-step process guidelines, practice-oriented advice, frequently encountered challenges and their solutions, approaches, tools, templates, and self-learning resources to support mainly small-holder and women farmers interested in growing moringa. Knowledge checks and decision-making tools at the end of each section have been designed to help users to measure their learning progress and take practical decisions regarding moringa cultivation, processing, and marketing. This toolkit is developed in cooperation with Ecociate Consultants and with inputs from various Indo-German projects, government, and other stakeholders to ensure the inclusion of evidence-based approaches and inputs for making the toolkit as comprehensive as possible. Any person / group interested in cultivating Moringa would be able to benefit from this handy resource.

Realising the importance of linking farmers to remunerative markets, we have included a process for market analysis developed by the ERADA project in Madhya Pradesh. Since the secondary and tertiary processing industry of Moringa are capital and technology intensive, we have only included primary processing of Moringa produce which has comparatively less complex infrastructure and technology requirements and so can be established easily at village, cluster, or district level.

Disclaimer:

We recognise that farmers in different regions of India have their own unique capacities to understand their experiences and evaluate their ecosystems according to their livelihood needs and preferences. Thus, a caveat about this toolkit is that it is not a blanket recipe, and due consideration should be given to farmers' knowledge, local conditions, and requirements.

Finally, in the making of this toolkit we have borrowed freely from published information available on the web and validated the same with the learning and information we gathered through consultations with progressive farmers, sustainable agriculture experts, agripreneurs and marketers of Moringa products. In recognition of their generous support for a greater good, this toolkit is being made available as a free resource. A detailed list of documents referred are attached at the end of the toolkit.

Moringa saplings ready for plantation

What is inside the toolkit?

It can be used by farmers and any stakeholders interested in Moringa cultivation and associated livelihood creation.

Moringa and some products

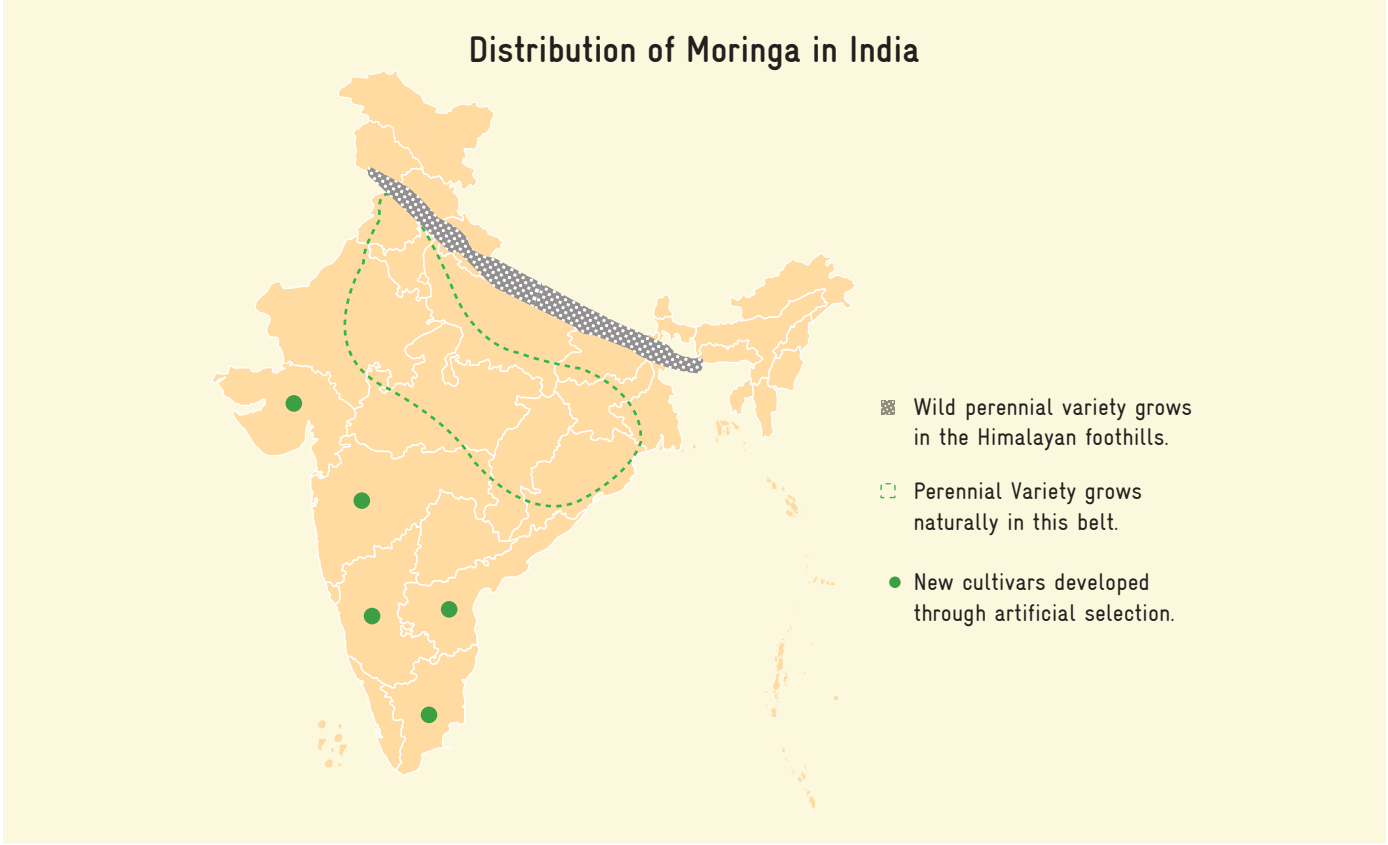
Let us now take a look at the learning outcomes that readers may expect to achieve from the different sections contained in this kit.

- **Introduction** aims to inform the reader regarding the nutritional, economic and environmental benefits that may be obtained from cultivating, selling and consuming the produce of Moringa tree. It also aims to help readers from states such as Rajasthan, where Moringa is not commonly grown, to identify the Moringa tree.

- **Cultivating Moringa** based on LEISA (Low External Input Sustainable Agriculture) and organic agriculture practices has been broken down into the following 10 sections:
  - **Climatic Conditions:** Although Moringa is a hardy tree and can survive even under stressful conditions, this section provides readers information about the optimal conditions necessary to cultivate Moringa, especially the critical growth stages.
  - **Site Selection:** In taking up Moringa cultivation as an enterprise, selecting an appropriate site is essential to successful production. In this section, the dos and don'ts have been discussed.
  - **Variety Selection:** Many varieties of Moringa are grown across India. However, certain cultivars developed through artificial selection are more suitable for large scale cultivation since they are less vulnerable to disease and pest attack and have higher yield. These cultivars, and their expected yield, have been discussed in this section.
  - **Soil / Land Preparation** deals with methods and measures that may be adopted to prepare the soil before sowing.
  - **Methods of propagation** provides details about the different methods of growing Moringa and the most suitable method with respect to different varieties.

- **Nursery Management** narrates a success story and a model for building a nursery as a profitable enterprise.
- **Cropping Systems** takes a look at the question of intercropping in a Moringa plantation.
- **Intercultural Operations** provides details about the best practices for the different operations involved in cultivating Moringa as a cash crop.
- **Pest and Disease Management** addresses critical issues pertaining to prevention, control and treatment of common diseases and pests to which Moringa is a susceptible.
- **Harvesting** delves into the question of how to harvest the leaf and pod of Moringa to maintain its quality and shelf life and minimise losses.

- **Value Added Products** discusses questions related to national and global processing and packaging standards for Moringa products. Details of Participatory Guarantee Scheme (PGS) have also been included for farmer groups following organic package of practices.
- **Marketing** deals with the process of linking producer groups with various market players, and discusses the quality parameters and standards which must be met for domestic and global markets.
- **Supporting Ecosystems** provides information about the different stakeholders playing an active role in promoting Moringa in India.
- **Programme Monitoring** shares a model for building a collaborative platform for large scale promotion of Moringa based livelihoods in India. This section also takes a look at the critical success factors necessary for managing a successful programme for promoting Moringa as a business enterprise.
- **Resources** provides contact details and website links of key stakeholders engaged in promoting Moringa in India.



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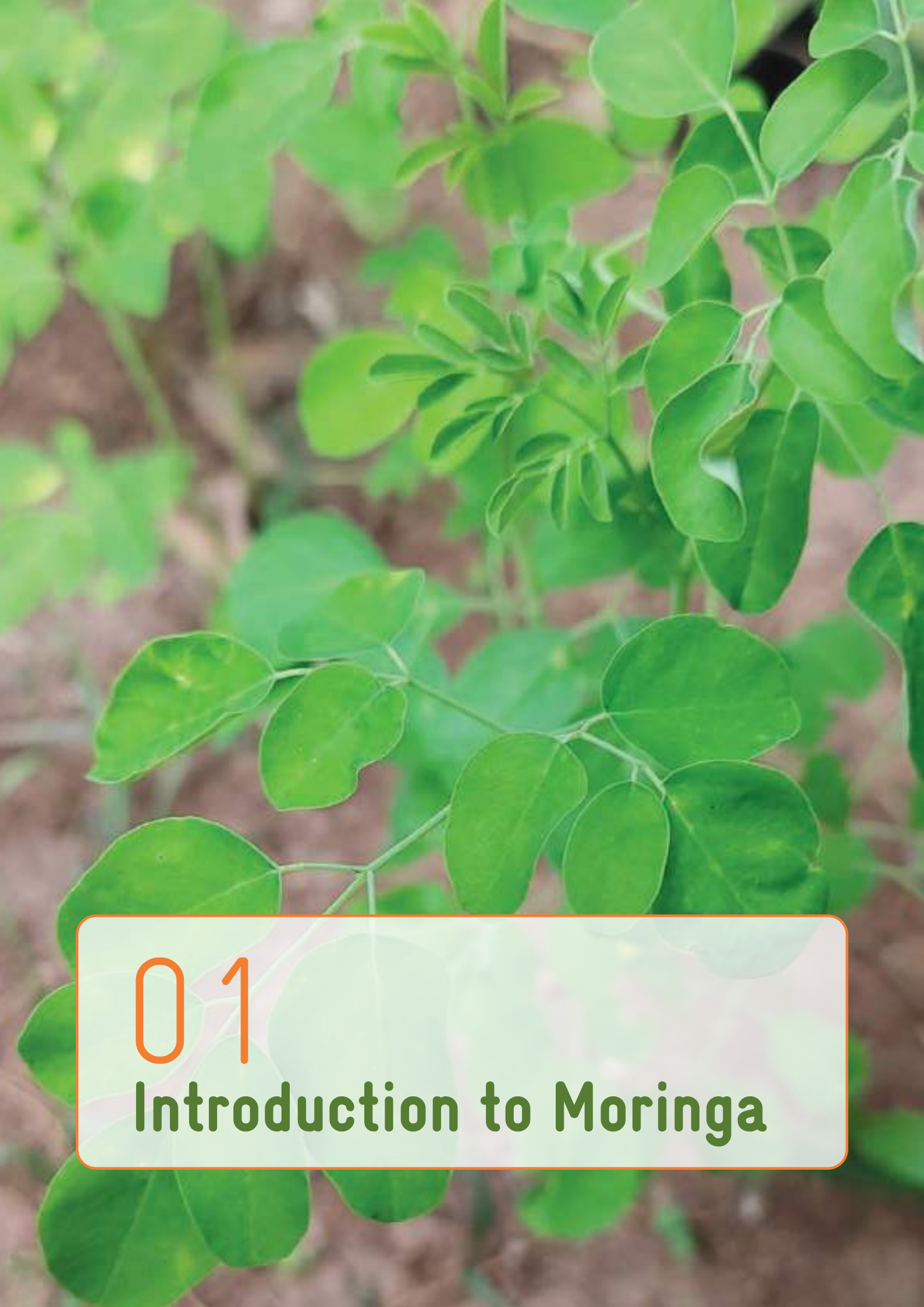

01
Introduction to Moringa

What is Moringa?

The scientific name of drumstick tree, horseradish tree, ben oil tee, *'murungai'* or *'saijan'* as it is commonly known in India, is *Moringa oleifera Lam*. This tree is indigenous to the Indian subcontinent. It is a tall (10-12 metres) and slender (trunk diameter 45 cm) fast growing softwood tree with medicinal properties. It bears small tear-drop shaped dark green leaves, white fragrant flowers and dark green long pods with globular seeds that are whitish when tender. All parts of the plant are edible and packed with nutrition. However, only the pod, leaf and flower are most commonly consumed. When cultivated as a crop or in agroforestry, it is pruned to 1-2 metres to increase its productivity and ensure that pods and leaves remain within arm's reach.

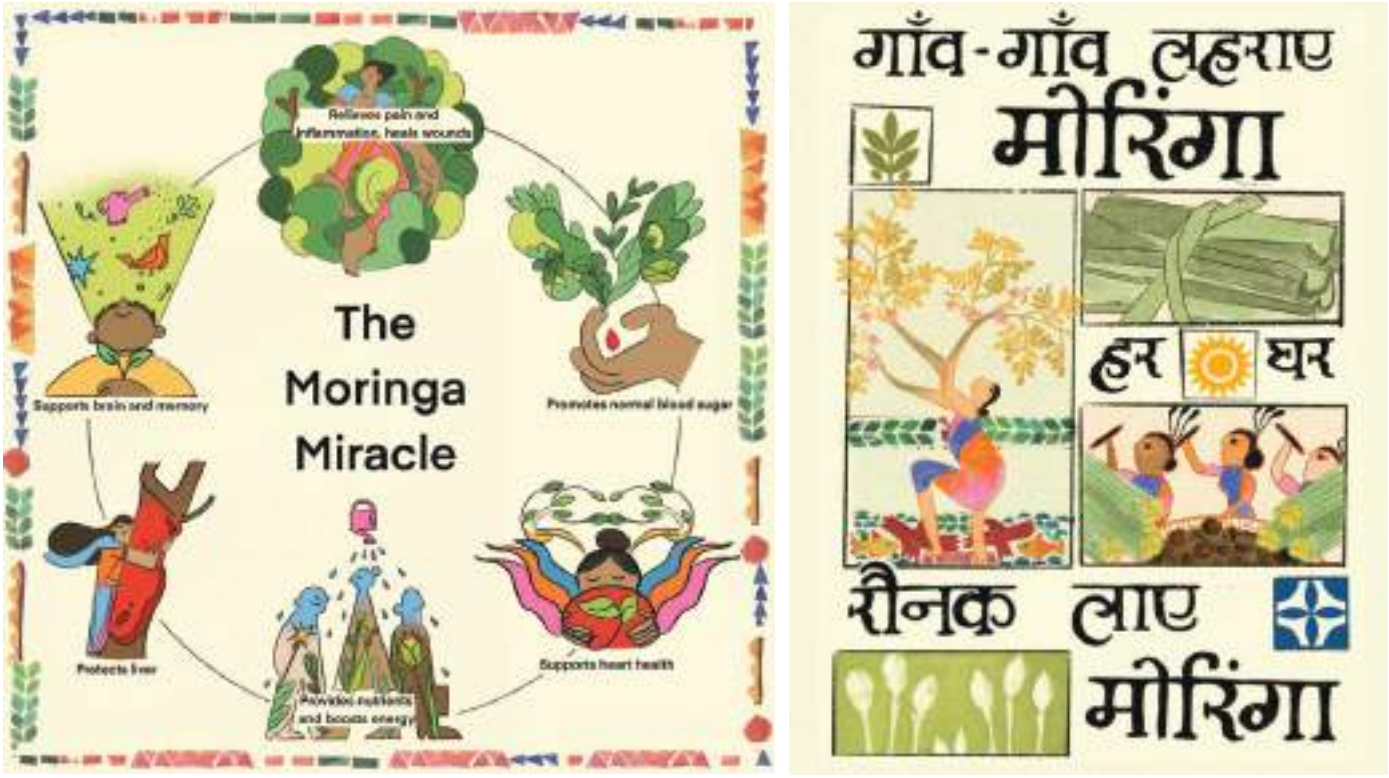

Figure 1: Benefits of Moringa: The Moringa Miracle

The next page is a tearable poster sticker to use for awareness creation and trainings in the field with technical staff, community resource persons, SHG members and moringa farmers. More such posters are available on the next pages with a scissor sign on the left side.

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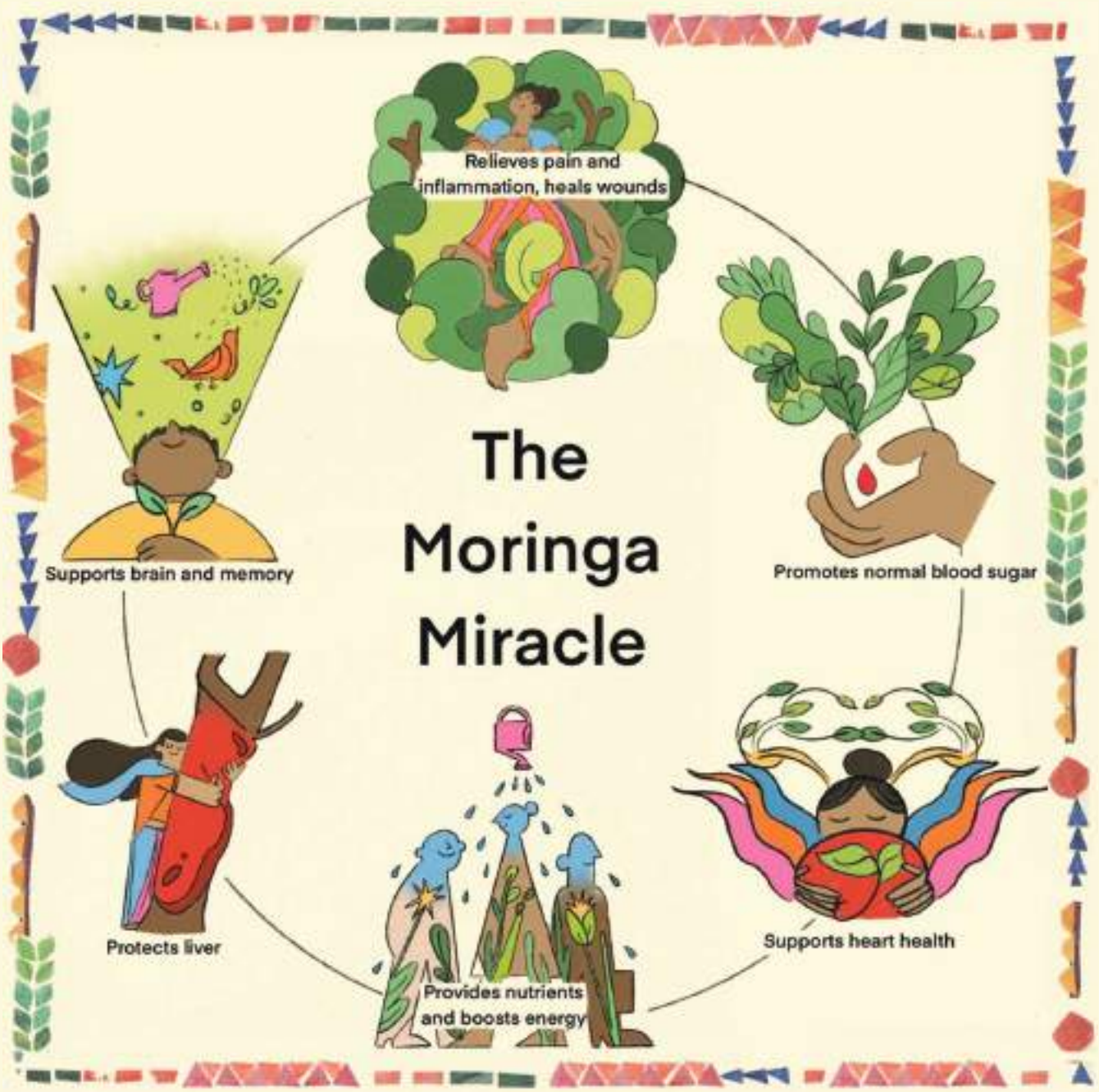
The Moringa Miracle



Tear it from here

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गाँव-गाँव लहराए मोरिंगा

हर  घर

रौनक लाए 

मोरिंगा

Tear it from here

When integrated as a part of the daily diet, Moringa can prevent nutritional deficiencies. In a study conducted by the Krishi Vigyan Kendra, Khandwa in Madhya Pradesh, Moringa leaf powder mixed in various dishes, when administered in controlled amounts, was found to be effective in fighting malnutrition among infants.

Some industrial uses: In addition to its use as food, in cosmetics, and as cattle feed, Moringa has the following industrial uses:

- Oil extracted from the seed retains its fragrance and does not become rancid easily. Therefore, it is used in the perfume industry. It is also used in the manufacture of paints and lubricants.
- Oil cake is used as a green manure. It is also used in water purification, and sedimentation of fibres in juice and beer industries.
- Timber is soft and can be used for light constructions. It is however, most suitable for producing fibre for ropes and mats, as well as pulp for paper industry.
- Bark is used for making dye.

How to identify the Moringa tree

Know Your Tree (I)

Leaf Type: Compound Tripinnate (many small leaves along the midriff, each leaflet has 4 to 6 pairs of leaves).
Shape: Tear drop
Colour: Dark green

Petals: 5, Unequal & Long
Colour: White to cream
Pollen: Bright yellow
Flavour: Mild, sweet

Tree Height: 10 to 12 metres
Crown: Open, Drooping, Umbrella shaped
Wood: Soft

Seed Shape: Round (1 – 1.5 cm in diam.) with 3 papery wings about 2.5 com long
Colour: Brown, Quality: Oily, Flavour: Bitter

Pod: Long (20 to 45 cm), 3-sided like a 'drumstick' with 15-20 seeds.
Colour: Outer cover - Green (young), Brown (Mature). Inside pulp - off white, young seed - greyish white.
Flavour: Sweet and fibrous

Know Your Tree (ii)

Root type: Large tap root, Lateral system of roots not extensively developed.
Flavour: Pungent (like horseradish).
Use: Has anti-oxidant property. Used in ethnomedicine to treat asthma, diabetes.

Bark Colour: Whitish grey surrounded by thick cork. Young shoots have purplish or greenish-white hairy bark.
Use: Has antibacterial and antifungal properties. Research is ongoing to establish its ability to kill cancer cells.

Gum: White in colour. Becomes reddish brown to brownish black on exposure to air.
Use: To prevent the risk of virus related diseases, it is used in ethnomedicine.

Since the root, bark and gum have very strong medicinal properties, they are not recommended for consumption as part of the daily diet and should be consumed only under medical supervision.

Moringa leaves and powder

Notes

I am interested in learning more about how to cultivate Moringa for the following three reasons:

Will Moringa grow well in my area?

The following characteristics of Moringa tree make it suitable for cultivation in all agroclimatic zones of India:

- It is a hardy tree.
- It is well adapted to tropical, sub- tropical and even arid regions.
- It can grow even on poor soils / wasteland, provided the soil is not clayey or water logged.
- It is drought resistant.
- It is an extremely fast-growing tree and takes five to six months to attain maturity.
- It needs special care and maintenance for the first two and a half to three months. Once the tree reaches maturity (after first fruiting), it does not require much time and resources, except for attention to prevention and control of diseases and pest attack and occasional irrigation to keep the soil moist.
- It has a life span varying from 4-40 years depending on the variety /cultivar.

Tear it from here

Full Sun

21° - 35°C

Drained sandy soil

Keep moist - Irrigation + Mulching

Survives on degraded soil

pH between 6.3 to 7

Good irrigation

1. Required when rainfall is <800 mm

2. Assured irrigation during growth period till plant reaches maturity

3. No water logging

Will Moringa grow well in my area?

PROPOGATE FROM

1. Stem

2. Direct seed sowing

3. Transplantation of sapling

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What is the most effective method for propagating Moringa?

- **Stem cutting:** The traditional perennial varieties of Moringa Chemmurungai, Jaffna, Valayapatti are stem propagated. In this case the stem cutting must be replanted immediately. Therefore, for promoting Moringa at a new location where it is not commonly grown, stem propagation is not recommended.
- **Direct Seeding:** Other cultivars such as PKM1, PKM2, ODC 3, MOMAX3 developed through artificial selection and possessing higher disease and pest resistance as compared to the traditional perennial varieties, are seed propagated. They perform best when grown through direct seeding in the agricultural field.

Agro-climatic Zones of India map

Agro-climatic Zone

1. Western Himalayan Region
2. Eastern Himalayan Region
3. Lower Gangetic Plains Region
4. Middle Gangetic Plains Region
5. Upper Gangetic Plains Region
6. Trans-Gangetic Plains Region
7. Eastern Plateau and Hills Region
8. Central Plateau and Hills Region
9. Western Plateau and Hills Region
10. Southern Plateau and Hills Region
11. East Coast Plains and Hills Region
12. West Coast Plains and Ghats Region
13. Gujarat Plains and Hills Region
14. Western Dry Region
15. Island Region

Source: Agro-climatic regions of India map by the erstwhile Planning Commission.

The research on Moringa is still emerging. This is based on existing evidence on productivity and practices in the field, and available literature.

- **Transplantation:** Our experiences with transplantation of sapling indicate, that the survival rate of the plant is lower when transplanted than when grown through direct seeding. However, farmers in Tamil Nadu have perfected an innovative method for nursery cultivation of plants through double air layering with excellent results.

Based on the above, we recommend direct seeding as the most effective method for commercial production of PKM1, PKM2 and ODC 3 cultivars of Moringa.

Most suitable agroclimatic zones for moringa cultivation	Preferred variety of moringa for commercial cultivation (these are varieties released by ICAR institution only)
Western Himalayan region	Not suitable since fruiting is diffecult in the climatic conditions. Wild varieties grow. PKM 2 can be tried for household consumption.
Eastern Himalayan region	PKM 1
Lower,middle, upper and trans-Gangetic plains region	PKM 1 and PKM 2
Central, western and southern plateau and hills region	PKM 1, PKM 2 and ODC 3
East coast plains and hills region	PKM 1 and ODC 3
West coast plains and ghat region	PKM 1, PKM 2
Gujarat plains and hills region	PKM 1, PKM 2 and ODC 3
Western dry region	PKM 1 and ODC 3
The Islands region	PKM 1, PKM 2

What resources do I need to grow Moringa?

Depending on the purpose, the number of Moringa trees and the site of planting may vary and accordingly the resources required would also vary.

Growing *Moringa*

Commercial plantation on agricultural land or wasteland as an enterprise. As a primary livelihood activity, about 500 trees on 1 acre is profitable

One or two trees near homestead or in agricultural field for home consumption and local sale of surplus produce as an addition to the household income.

As a living fence, planted close together. Practically, to avoid cutting back the sun on other agricultural fields, this may be undertaken on the side of the agricultural land which does not have other agricultural land adjacent to it.

In this toolkit we focus on the commercial production and processing of Moringa produce according to LEISA (Low External Input Sustainable Agriculture) and Natural Farming methods.

Healthy Moringa leaves

The calculation of Moringa pods and leaves powder production is based on consultations with KVK, Horticulture department and local entrepreneur engaged in Moringa based enterprise in Khandwa district.

Pod production: With PKM 1 variety

Assumptions:

The plant comes to flowering within 5-6 months of sowing and comes to harvest in 7-8 months. The peak harvest is during March-August. The plants grow to a height of 4-6 m in a year and produce 6-12 primary branches. The pinnate leaves are about 40 cm long with small leaves which are dark green on the upper side and pale green on the lower side. Usually, flowers are in clusters of 25-150 flowers per cluster. Only one pod develops in one cluster and maximum it goes up to 2-4 per cluster.

The pods are 75 cm long with a girth of 6.3 cm and weight of 80g with 70% flesh which is consumable. The average yield is 220 pods/Tree.

Total weight of pods in a tree is (80gX220) = **17,600g or 17.6 Kg Per Tree**

Deducting 30% average moisture loss = **2.88 Quintal (q) per tree**

Market average rate in Khandwa district = **INR 45/Kg**

Estimated cost per tree 17.60 X 45 = **INR 792.00/Year/Tree**

Assuming,

- 650 plants are grown per acre of land.
- 2m tree to tree and 4 m row to row distance

Total expected revenue in one acre of land = **INR 5,14,800.00**

The pods attain edible maturity 65 days after flowering.

Input cost for moringa plantation:

Labour charges in per acre of land in one year = **INR 60,000.00**

Bio crop inputs cost in per acre of land in one year = **INR 10,000.00**

Seeds, watering & other expenses = **INR 50,000.00**

Total input cost = **1,20,000.00**

Estimated income through pod production in acre of land = INR (5,14,800-1,20,000) = INR 3,94,800.00

Cost of moringa dry leaves powder production

Assumptions:

For moringa dry leaves production, planting is done at 1feet x 1feet density (44,000 plants per acre) using compost. The green leaves are harvested when plants reach a height of 50 - 60 cm or more (approximately every 40-50 days), cut at a distance of 15-20 cm above the ground.

After 60 to 70 days of planting & seedling with an average of 700 plant per acre = **100 Kg green leaves**

Total 44,000 plants per acre = **44000/700 = 62.85 quintal (q) of leaves**

Assuming, average weight after drying reduce 80% of their weight which equals to 12.57 q per acre.

Average rate of dry moringa leaves in market is **INR 70 per Kg**

Estimated expected cost from one acre of land: **12.57 q X INR 7000 = INR 87,990 per quintal**

Assuming, an average of three cycle in a year total revenue per acre of land of moringa cultivation for making powder is

3 X INR 87,990 = INR 2,63,970

Input cost for moringa plantation:

Labour charges and Bio input = **INR 95,000.00**

Transportation and collection = **INR 5,000**

Seeds and watering = **INR 30,000**

Other costs = **INR 20,000**

Total = **INR 1,50,000.00**

Estimated income through dry leaves production in acre of land = INR 1,13,970

Tear it from here

These calculations have not considered the capital investment of about ₹4 lakhs, required for setting up the processing facility, as it is assumed that this investment would be mobilised by producer groups as grant or subsidies from government schemes or private investments. Thus, through a Moringa based enterprise, one can almost double one's investment.

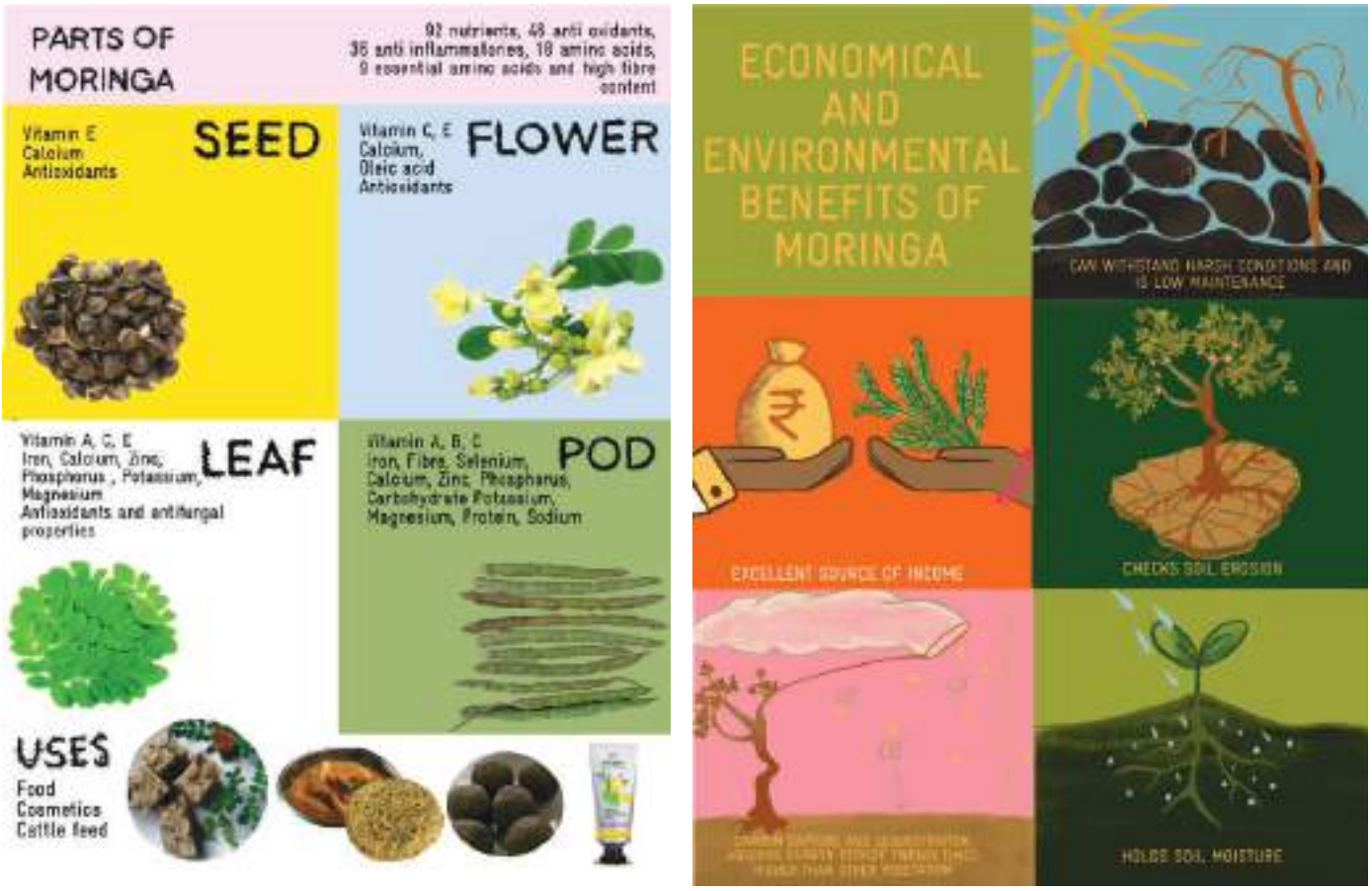

Figure 2: Different parts of Moringa tree

How can I integrate Moringa into my diet?

Fortify Your Meals with *Moringa*

Use fresh *Moringa* leaf as a seasoning in curries, vegetables, chutneys and fried rice. Add fresh *Moringa* leaves as a filling in bread, chapattis and paranthas. Add steamed drumsticks to curries and vegetables. Make patties, fritters and vegetables with Moringa flower.

Add dried *Moringa* leaf powder and dried drumstick powder to fortify sweets, smoothies, curries and soups. In limited amounts, Moringa seeds may be roasted and eaten like peanuts.

***Caution:* Moringa has strong laxative properties. Since dried leaf and drumstick powder are in a concentrated form, care must be taken to consume these in limited quanitites.**

From an Ayurvedic perspective, Moringa is considered heating and pungent. It is therefore considered a winter food. It has a heating 'virya' (action), bitter rasa (taste) and pungent 'vipaka' (post digestive effect). Moringa has deep cleansing and detoxifying effects. In Bhava Prakash, a historical Ayurvedic text, Moringa is called 'sigru' which means 'moves like an arrow'. This refers to Moringa's ability to quickly penetrate the 'dhatus' (tissue layers of the body) for deep cleansing. It has particular affinity to 'rakta dhatu' (blood) – and therefore cleanses blood, and 'meda dhatu' (fat) – and is therefore useful in reducing body weight. Its bitter, pungent nature makes Moringa excellent for balancing 'kapha' and 'vata' 'dosha' (imbalances in metabolism).

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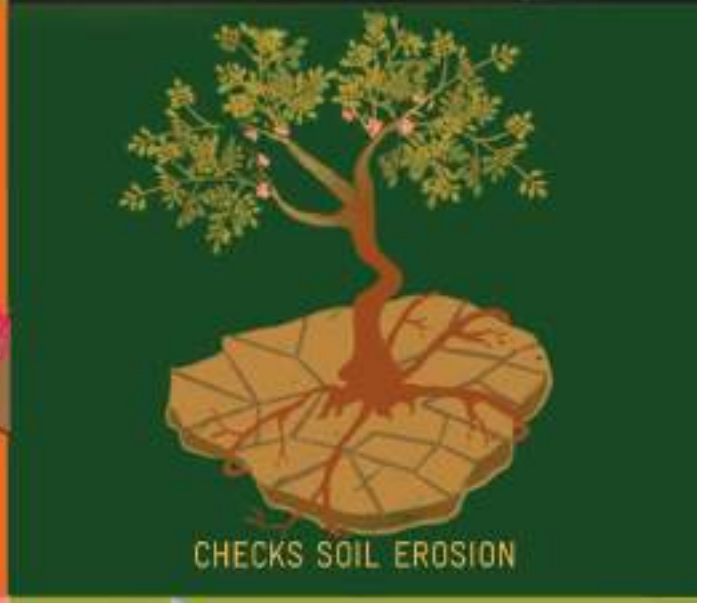
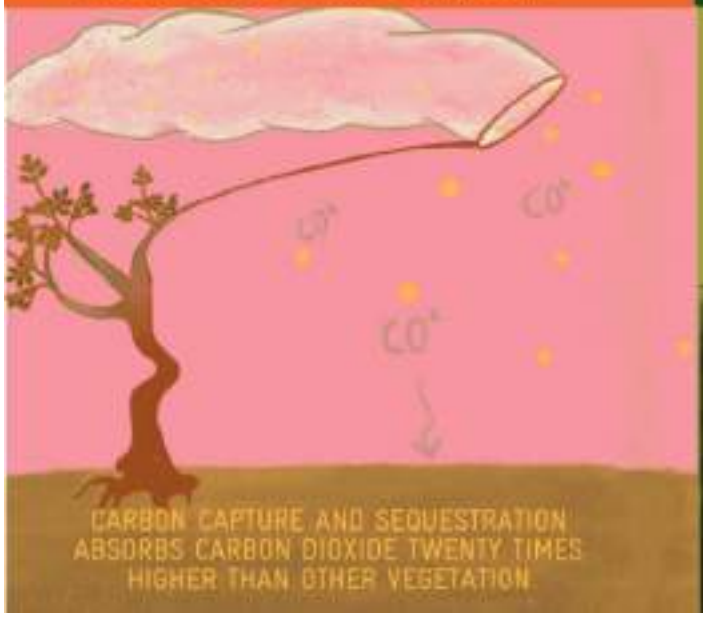
ECONOMICAL AND ENVIRONMENTAL BENEFITS OF MORINGA

CAN WITHSTAND HARSH CONDITIONS AND IS LOW MAINTENANCE

EXCELLENT SOURCE OF INCOME



CHECKS SOIL EROSION



CARBON CAPTURE AND SEQUESTRATION
ABSORBS CARBON DIOXIDE TWENTY TIMES HIGHER THAN OTHER VEGETATION

HOLDS SOIL MOISTURE

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PARTS OF MORINGA

92 nutrients, 46 anti oxidants,
36 anti inflammatories, 18 amino acids,
9 essential amino acids and high fibre content

SEED

Vitamin E
Calcium
Antioxidants

FLOWER

Vitamin C, E
Calcium,
Oleic acid
Antioxidants

LEAF

Vitamin A, C, E
Iron, Calcium, Zinc,
Phosphorus , Potassium,
Magnesium.
Antioxidants and antifungal properties

POD

Vitamin A, B, C
Iron, Fibre, Selenium,
Calcium, Zinc, Phosphorus,
Carbohydrate Potassium,
Magnesium, Protein, Sodium

USES

Food
Cosmetics
Cattle feed

Tear it from here

Success Stories

The Good Leaf: Tamil Nadu based health and wellbeing organisation which sells moringa products on digital platform

Concerned about the plight of farmers in her hometown in Karur, Tamil Nadu and their inability to access assured and remunerative markets, Deepika Ravi, left a high paying full-time job to become an agripreneur. She gradually perfected a certified organic package of practices for cultivating Moringa and began training farmers around her farm to produce Moringa the organic way. Today her enterprise, The Good Leaf, sources Moringa produce from farmers and markets an impressive range of certified organic Moringa based edible and beauty products such as leaf powder, pods powder, capsules, herbal tea, chutney powder, honey, pickle, multi millet mix, rice mix, skin brightening serum, face day cream, face pack and soap.

Fighting Malnutrition in Khandwa district of Madhya Pradesh

A joint study led by Dr. Rashmi Shukla, Krishi Vigyan Kendra (KVK) and Indo Global Social Service Society (IGSSS), one of the implementation NGO partner under the ERADA project in MP, was conducted in two villages of Khandwa district of Madhya Pradesh to observe the impact of Moringa on overcoming malnutrition. One Moringa 'ladoo' (an Indian dessert), made with roasted green moong, jaggery, ghee and Moringa leaf powder, was administered to each malnourished infant above four years at the Anganwadi Centre, two times a day for six months. It was observed that the children overcame nutritional deficiencies and achieved ideal weight. Following the success of this initiative, a range of Moringa recipes like 'khaman' (an Indian snack), cookies, pickles, and premixes with millet flour have been developed at the KVK, and plans are underway to make Moringa a part of the mid-day meals in the block.

Nisarg Organics

The organisation was one of the implementation NGO partners of the previous project of GIZ India called Sustainability and Value Added in the Cotton Economy

In 2018, Dr Yogesh Pandya, a farmer in Bhavnagar, Gujarat began organic cultivation of Moringa on his farm with 100 trees. Within a short span of five years, his plantation grew to 1,00,000 trees. During this period, he experimented continuously and developed the process and infrastructure for producing certified organic Moringa seeds, leaf powder and drumstick powder. He began selling his products through online marketing and retail outlets in Gujarat. As demand for his products grew, he also began selling Moringa seeds to other farmers at ₹6000 per kg. Gradually, 60 farmers owning 6,00,000 Moringa trees began selling their produce to him. Today, he has state-of-the-art processing facility on his farm. In addition to Moringa, Yogesh also makes a range of products such as haemoglobin supplement, vitamin B12 supplement, detox supplement, ashwagandha root powder, etc.

What are the Government initiatives? How may I benefit from them?

Promoting Moringa: Convergence between DAY-NRLM/SRLMs and Mahatma Gandhi NREGS

DAY-NRLM is promoting Moringa through nurseries for distributing saplings among SHG members, training and deploying Krishi Sakhis who are well versed with plantation and agri-nutri garden promotion, and promoting producer groups (PGs) for promotion of agroecological practices and forward linkages.

Role of National Rural Livelihoods Mission (DAY-NRLM) / State Rural Livelihoods Mission (SRLM):

- Integrate Moringa plantations as an essential component of agrinutri garden initiatives.
- Identifying Cluster Level Federations (CLFs) to serve as Project Implementing Agency at the gram panchayat / block / district level for Mahatma Gandhi NREGS activities.
- Training and hand holding support to livelihood staff, CLFs, PGs, Krishi Sakhis and SHG members for taking up Moringa cultivation.
- Identifying vulnerable SHG members for promoting Moringa cultivation on individual lands in a cluster of villages to ensure sufficient marketable surplus.
- Integrate Moringa as a part of Integrated Farming Clusters.
- Providing advice, hand holding support and linkages to plantation beneficiaries for cultivation, disease management, harvesting, processing and market development.
- CLF to provide each SHG member saplings / seed for cultivating upto 5 Moringa trees.
- Establish forward linkage for developing market for Moringa produce/products.
- CLF to monitor quality of works, geotagging and other maintenance and facilitate Social Audits as required under Mahatma Gandhi NREGS
- SRLM to propose and place the plantation works to panchayat at block level to be included in their Annual Action Plan, and finalised by the Gram Sabha.

Role of Mahatma Gandhi NREGS:

- Moringa Plantation is permissible works under Community Asset or Individual Asset (for vulnerable households) under Mahatma Gandhi NREGS.
- Identification of vulnerable households for individual plantations must abide by criteria laid out in para 5, Schedule 1 of Mahatma Gandhi NREGA: scheduled castes, scheduled tribes, nomadic tribes, de-notified tribes, families below poverty line, women-headed households, physically handicapped-headed households, beneficiaries of land reforms, beneficiaries under Pradhan Mantri Awaas Yojna -Gramin, and beneficiaries under the Scheduled Tribes and Other Traditional Forest and Dwellers Act.
- The cost estimate prepared for plantations should include maintenance cost for three to five years. All costs should form part of one estimate.
- Other Mahatma Gandhi NREGS assets such as vermi-compost units, water harvesting structures, can be integrated into the moringa plots.
- Nurseries for moringa saplings can be created in convergence with Mahatma Gandhi NREGS

Note: Joint government advisories on moringa are annexed in the end of the toolkit.

Success story of Moringa in convergence between Madhya Pradesh SRLM and Mahatma Gandhi NREGS in Khandwa, MP

Ms. Leela Mahajan
Farmer, Khalwa Block
Khandwa District, MP

Leela Mahajan is a farmer from Khalwa block, Khandwa district in MP. She and her husband initially used to earn INR 50,000 annually through agriculture. Through Moringa cultivation and management of moringa nurseries, Leela's annual income from Moringa cultivation itself is INR 45,000 in 2023, with a projected increase to one lakh in the next two to three years. The support under ERADA project included awareness creation on the nutritional and market potential of moringa, developing the plantation through Mahatma Gandhi NREGS and other support programmes on one acre of her barren land, trainings at the KVK, Khandwa on maintenance, bio-inputs and value addition possibilities of moringa, certified micro-enterprise development programme by the Entrepreneurship Development Institute (EDII) of India and further technical support for unlocking access to credit and market linkages. She got the seeds from KVK, Khandwa and the plantation was done through the Mahatma Gandhi NREGS under individual category of land. Within one year of plantation, her land is now lush green with full of moringa trees taller than herself. She harvests leaves and make different products to make it part of the regular food diet.

Leela Mahajan is also the leader of the Cluster Level Federation (CLF) including several women SHGs in Khalwa block. She led the 'Har Ghar Moringa' campaign (translates from Hindi to English as 'moringa tree in every household') and motivated at least 2,000 women SHG members to undertake moringa plantations.

You can check out the link below to see a video on the success story of Ms. Leela Mahajan on the GIZ India youtube channel.

https://www.youtube.com/watch?v=G8pJRC6s70g (Har Ghar Moringa: Enabling Rural Livelihoods)

Bio-input Resource Centres for promoting Natural Farming

If you are a progressive farmer, you may set up a Bio-input Resource Centre (BRC). NITI Aayog (translates in English as the planning commission of India) has endorsed natural farming for upscaling Bharatiya Prakritik Krishi Paddhati (BPKP) programme, as one of the important directions for Indian Agriculture. By year 2027, this initiate would establish 15,000 clusters covering 7.5 lakh hectares and one crore farmers across the country. To make Natural Farming viable and profitable by providing farmers adopting natural farming with easy access to time tested, locally prepared bio-inputs and technical training, Department of Agriculture and Farmers Welfare through National Coalition for Natural Farming (NCNF) is supporting the establishment of BRCs to cater to these clusters. These BRCs are for-profit enterprises run by individuals or groups who have expertise on natural farming approach and methods.

The following are the prerequisites for potential BRC entrepreneurs:

- May be an SHG or a family.
- Recognised as a progressive farmer and possessing experience in Natural Farming.
- Possess a shed, attached to their home or farm, for production and storage of inputs.
- Possess a demo plot for field visits.
- Have access to cattle by-products.
- Financially sound to share the costs of setting up the BRC.
- Ability to maintain records and record farmers' feedback.
- Good communication skills.

Bio-inputs products marketed by women SHG enterprise in Khandwa, Madhya Pradesh

You may expect the following support from the government for setting up the BRCs:

- Capacity building and training for cultivation practices for local crops, preparation, handling, and quality control of bio-inputs.
- Linkage and exposure visits to resource organisations and other BRC entrepreneurs, knowledge documents, monthly hand holding meetings for one year and refresher trainings.
- Linkages for procuring quality mother cultures and other inputs required for setting up the BRC.
- Business model with a three year plan.
- Linkages with financial institutions for loans for setting up BRC.

Depending on your resources and the local demand, you may opt for a low investment (working capital INR 2,500) low-income Business to Consumer (B2C) business model or high investment (working capital: INR 1 lakh) high-income (Business to Business (B2B) plus B2C) business model. Products could at 40-50% margin, making an income of about INR 25,000 to INR 1,00,000 in one season.

Fighting Malnutrition: Forest Department, Churu, Rajasthan

Moringa needs special care to grow in the desert climate of Churu in Rajasthan. Undeterred, in year 2022, the Forest Department of Churu began an initiative to promote the consumption and cultivation of Moringa to overcome anaemia and malnutrition among girls. About 18,000 girls were covered under this initiative.

Being a cultural habit, it is difficult to change the eating habits of a community. Therefore, the Department launched a communication and awareness campaign to change the mindset of the people and ensure acceptance of Moringa into their diet. The Department not only educated families on how to incorporate Moringa into their daily diet, but also provided saplings, grown in nurseries maintained by the Forest Department, and technical support for cultivation of the plant.

The Department plans to increase Moringa trees by a minimum of ten percent in the next forest target.

A convergence Sanjeevni Project in Rajasthan

'Sanjeevni' (translates in English as life giving) is an integrated community level Mahatma Gandhi NREGS programme to enhance livelihood diversification for climate adaptation and ecological security initiated in Rajasthan. The model includes moringa plantations, nursery, medicinal plants, ponds, composting, and work shed among other things through convergence with different line departments including Rural Development Department under Mahatma Gandhi NREGS programme. A model developed on 80 Ha of public land benefitted 2,500 households in Baran district, Rajasthan.

CECOEDECON, the implementing NGO partner under the ERADA project in Baran, identified women from the indigenous Sahariya tribal community from Bamangawa panchayat in Shahabad block of Baran district in Rajasthan for an innovative community-driven initiative, Project Sanjeevini. It aimed at both the environmental conservation and socio-economic development of mainly the women from the Sahariya community by utilising and enhancing the livelihood generation potential of the Mahatma Gandhi NREGS programme. A series of collaborative efforts ranging from involving the SHGs linked with the State Rural Livelihoods Mission (SRLM) for mobilisation and identification of women, converging with the Forest Department for intensive training, engaging continuously with the GP officials, Block Development Officer, and district level Mahatma Gandhi NREGS officials to develop the roadmap and collective execution. Main objective was to create awareness, mobilise and upskill women to undertake moringa plantations and other related activities for income generation at household level. Mobilisation and orientation meetings were also continuously undertaken to ensure community interest and inclusion in the project. A two-day intensive training programme was conducted with the support of the Forest Department to 35 women with a special focus on moringa cultivation. Superintendent Engineer, Mahatma Gandhi NREGS praised the initiative in Baran and advised that under Sanjeevni Project the focus of the activities should go beyond the immediate task of planting and nurturing the moringa saplings and directed towards creating a sustainable ecosystem that would facilitate long-term livelihood opportunities.

Planning meeting on Project Sanjeevini between State and District Officials in Baran District, Rajasthan

The land was identified using the GIS based approach with the community following E-Kadam module for digital planning. In consultation with the Gram Panchayat head and the Mahatma Gandhi NREGS engineer, the land was finally selected and sanctioned through Gram Sabha. About INR 50,000 was supported by the panchayat for fencing and irrigation facility. About INR 1,20,000 Corporate Social Responsibility (CSR) funds were also mobilised for saplings, and nursery bags.

To convert this asset into a source of livelihood, efforts are ongoing for setting up a processing center for moringa powder through CSR funds. Over INR 2,00,000 in CSR support has been mobilised to provide drying and processing equipment to an SHG for setting up this processing center. Training and regular handholding is provided to help the members to initiate starting the processing of moringa leaves through the ERADA project. It's an successful example of holistic approach for moringa plantations to generation of livelihood for women and other rural households through convergence in Rajasthan.


सहजन पौधशाला प्रबंधन प्रशिक्षण कार्यक्रम हुआ

Training on moringa nursery at Bamangawan GP, Baran

Participatory planning exercise at village level

Notes 1: By cultivating Moringa, I can obtain the following benefits:

1. .....

.....

2. .....

.....

3. .....

.....

Note 2: Please check the correct box:

☐ I am interested in taking up Moringa cultivation.

☐ I am not interested in taking up Moringa cultivation.

Note 3: I possess the following resources:

.....

.....

.....

Note 4: I will need support for the following:

.....

.....

Note 5: I am not interested in taking up Moringa cultivation because

.....

.....

.....

.....

Knowledge Check 1 (Introduction)

A.	Recognising Moringa: Please a tick in the box, that most closely matches your understanding:		
A.1	This is Moringa Tree		
☐		☐ 	☐ 
A.2	This is Moringa Leaf		
☐		☐ 	☐ 
A.3	This is drumstick (fruit / pod of moringa tree)		
☐		☐ 	☐ 
A.4	This is Moringa seed		
☐		☐ 	☐ 
A.5	Moringa is a native of		
☐		☐ 	☐ 

Tear it from here

B. Nutritional Benefits of Moringa: Place a tick in the box that most closely matches your understanding:

B.1 Edible parts of Moringa are

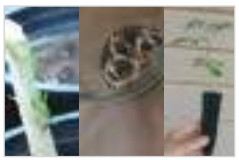
☐ 	☐ 	☐ 

B.2 By giving 5 gms (1 tablespoon) of Moringa powder daily to my children above 5 years, I can give them nutrition equivalent to:

☐ 	☐ 	☐ 

C. Cultivating Moringa: Please a tick in the box that most closely matches your understanding:

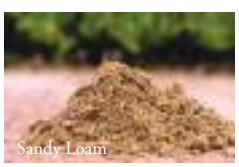
C.1 Moringa can be grown from

☐ 	☐ 	☐ 

C.2 The most successful method of propagating Moringa is through

☐ 	☐ 	☐ 

C.3 Soil most suitable for Moringa is:

☐ 	☐ 	☐ 

Tear it from here

C.4 Moringa thrives in

☐ 	☐ 	☐ 

C.5 After sowing, Moringa needs special care for about

☐ **15 days**	☐ **30 days**	☐ **2 ½ to 3 months**

D. Economic benefits: Please a tick in the box that most closely matches your understanding:

D.1 Annual income I can earn from cultivating 500 trees of Moringa on 1 acre is about

☐ **7,00,000**	☐ **30,000**	☐ **25,000**

D.2 By developing a mother tree of Moringa for seeds, income I can earn from selling 1 kg. of seed is

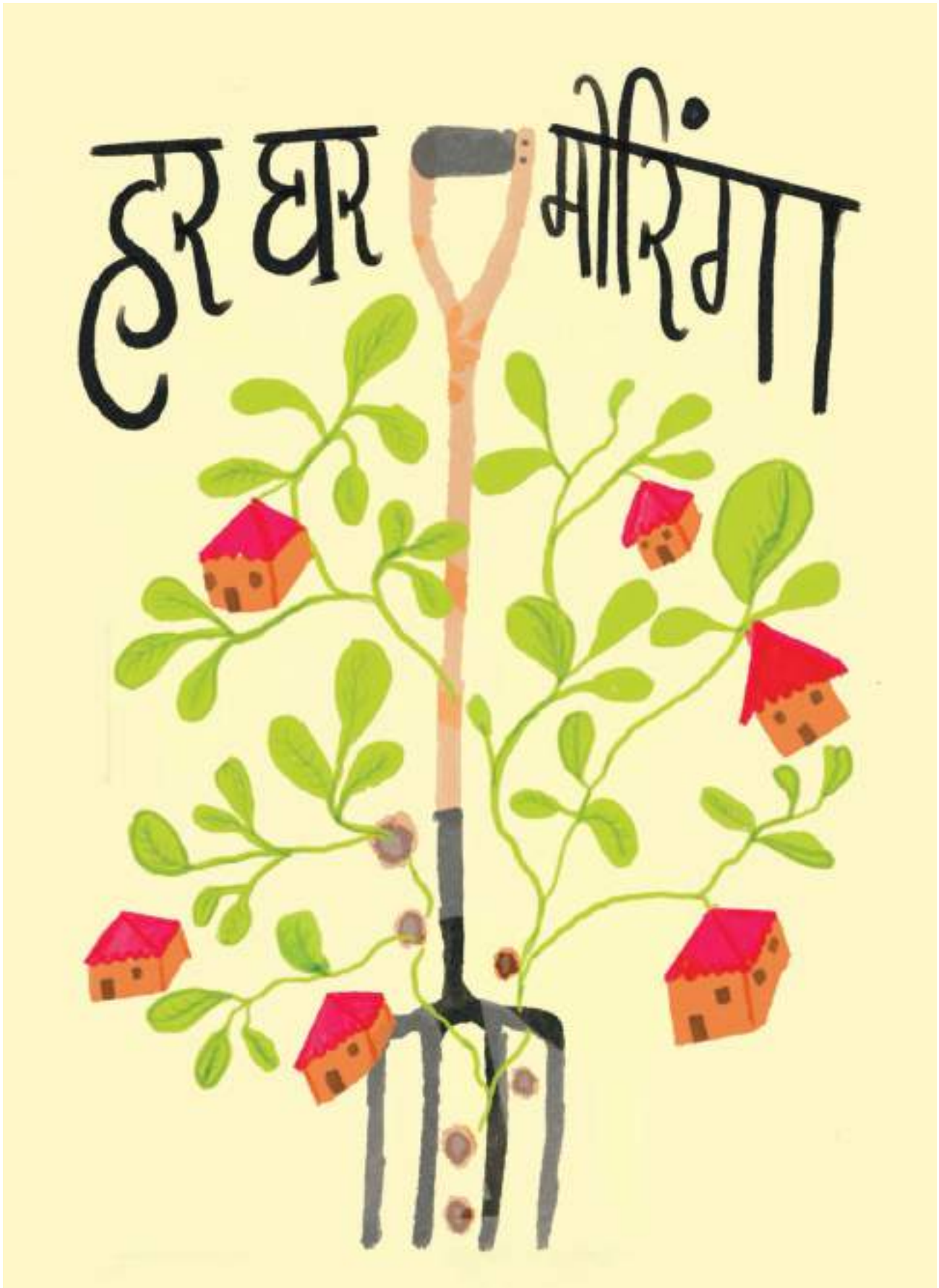
☐ **6,000**	☐ **500**	☐ **1000**

C.3 Soil most suitable for Moringa is:

☐ **40-50%**	☐ **100%**	☐ **10%**

Tear it from here

Tearable posters for awareness creation in the field with SHG members, farmers and community



Tear it from here

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Ministry of Rural Development
Government of India

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DEUTSCHE ZUSAMMENARBEIT

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Ministry of Rural Development
Government of India

KNOW YOUR MORINGA TREE

Flower

5 Petal unequal and long, mild and sweet flavour

Seed

1-1.5 cm round with 3 papery wings 2.5 cm long. Brown colour, oily and bitter

Leaf

Compound Tripinnate, tear drop shaped, dark green in colour

Pods

20 to 45 cm three sided like a drumstick with 15 - 20 seeds. Sweet and fibrous

Bark

Whitish grey surrounded by thick cork, young shoots have purplish or greenish white hairy bark

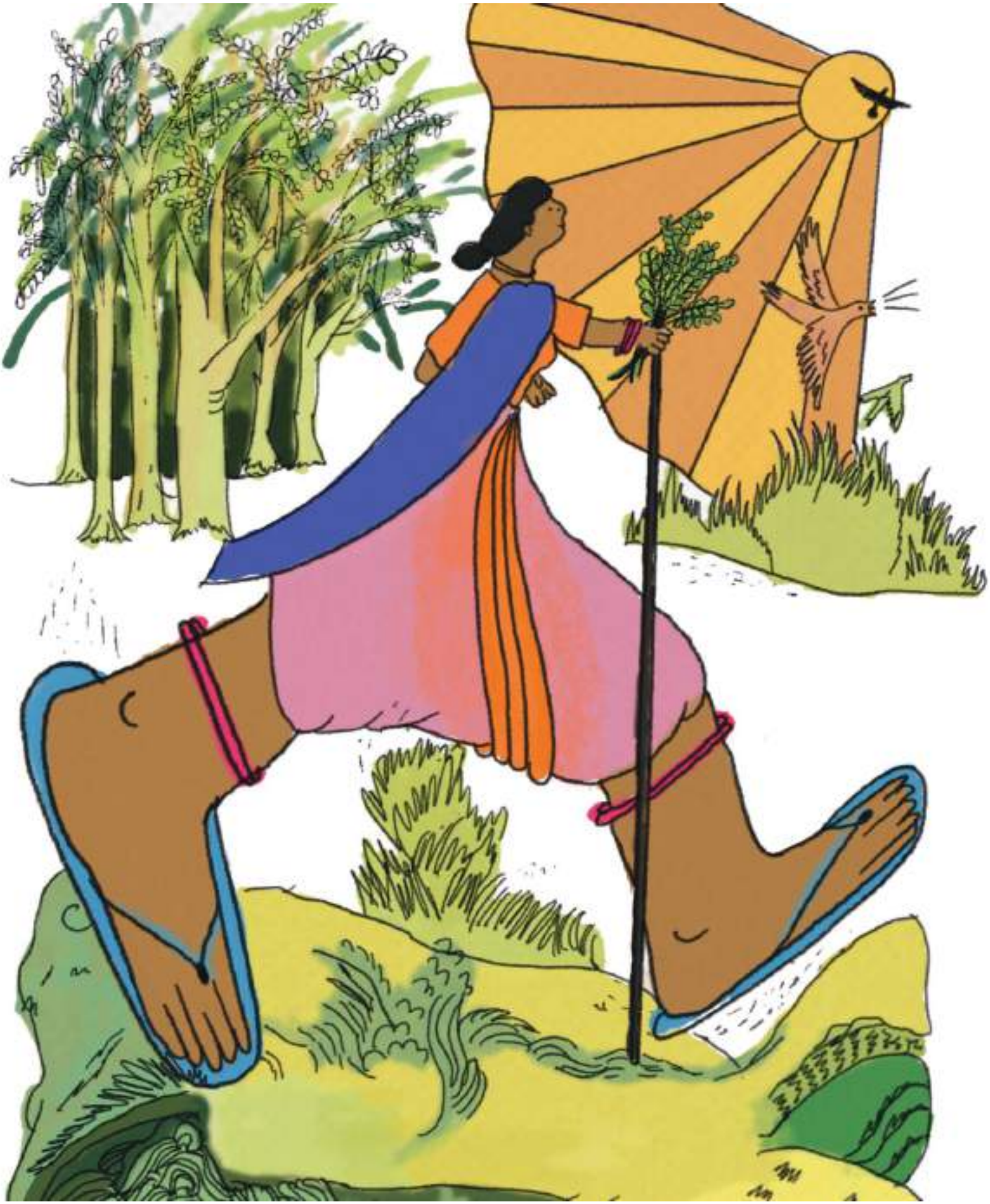
Root

Large tap root, pungent flavour. Has anti oxidant property.

Gum

White in colour. Becomes reddish brown to brownish black on exposure to air.

Tear it from here



02
Cultivating Moringa

What kind of climate and soil do moringa plants prefer?

Climate

- Tropical and subtropical climate.
  - Optimal temperatures between 25-35˚ C.
  - Annual rainfall ranging from 250-1500 mm.
  - Elevations up to 600 m above mean sea level.

Soil

- Moringa tree can survive even on degraded soil. However, when cultivating Moringa as a crop, to ensure optimum growth and productivity, pick soil with the following characteristics:
  - Drains well and is loose in nature. Sandy or a mix of sand and loam is best.
  - Slightly acidic. Can tolerate pH between 6.5 to 8.0

The Nature of Moringa

- Moringa plants like loose soil that allows its strong taproot system to develop and grow deep into the soil, quickly. This helps the plant to find water and nutrients deep in the soil and survive, even in low rainfall or drought conditions.

Protecting Moringa from temperature extremes

- At temperatures above 40˚ C or below 12˚ C during the flowering stage, the flowers start falling off.
- At very high temperatures, provide shade during afternoons. Mulching the base of the tree will help to retain soil moisture. Anti-transpirants, such as turmeric spray (1 tablespoon of turmeric in 4 litres of water) may also be used to reduce radiation stress.
- At very low temperatures, wrap the tree with fabric during the cold nights and remove them during the day. Grow lights may also be used.

Notes 1: The land I have in mind for Moringa has the following problems, for which I would need support:

Note 2: I do not have land. Can I still grow Moringa?

How to select a site for planting moringa?

Points to consider when selecting a site for commercial plantation and agroforestry:

✓✓ **Must Have**

1. Choose land with well-drained sandy loam soil.
2. Ideally, minimum one acre land that is open to receive full sunlight.
3. For group farming, permission from Gram panchayat for cultivation of community land.

✓ **Good to Have**

1. Within easy reach of the hamlet.
2. Close to the main road / highway for easy transportation.

✗ **Must Avoid**

1. Clayey soils that become sticky when wet and very hard when dry.
2. Soils that are prone to waterlogging.
3. Termite-infested soils.

Which Moringa variety should I grow?

The wild variety of Moringa is bitter and considered medicinal and inedible. The domesticated types are edible as well as medicinal. Broadly, there are two types of Moringa – perennial and annual. The perennial varieties have longer productive life (about 10 years) than the annual cultivars (about 3-4 years). However, the annual cultivars are more resistant to drought, pest and disease and are therefore preferred for large scale plantations.

The purpose for which you are growing Moringa would determine the variety (natural eco type) / cultivar (developed through artificial selection) that would best suit your purpose. Characteristics of cultivars most preferred and popular for commercial production (PKM1, PKM2 and ODC3) have been tabulated below.

ODC 3 pods are distinctively more dark green, have wider girth, are more fleshy and bear larger number of seeds.

Purpose	Cultivar	Characteristics
Preferred for Leaf Production		
• Leaf production • Pods (200-225 pods/tree/year. Weight of each pod about 280 grams). • Oil	PKM2	• Annual Cultivar • Seed propagated. • Productive life - 3-4 years. • An improvement over PKM1 with more lateral branches and more leaves at lower branches than PKM1. Shows 48% higher yield than PKM1. • Pods are fleshier than seeds (harvestable in 7-8 months). • Requires more water than PKM1. • Can be grown in wide range of cropping systems.
• Leaf production • Pods (200-225 pods/tree/year. Weight of each pod about 150 grams). • Oil	PKM1	• Annual Cultivar • Seed propagated • Productive life – 3-4 years. • Bushy and dwarf plant, reaching a height of 4m. • Dark green and wide leaves. • Early-maturing (3-4 months for flowers, 6-7 months for pods). • Flexible uniform pods with an extended shelf life. • Rapid regrowth.

Purpose	Cultivar	Characteristics
Preferred for Pod Production		
• Pods (65-75 tonnes/ha). • Oil (Seeds). • Leaf	ODC 3	• Perennial cultivar. • Seed propagated. • Productive life – about 10 years. • Requires less water than PKM1 and more drought-resistant. • Can be grown in wide range of soils. • Can grow well even in areas with high fluctuations in weather and climate. • Pods evenly fleshy with more girth, tasty and have higher shelf life than PKM 1. • Pods harvestable in 6 months. • Seeds have about twice the amount of oil as compared to PKM1. • Leaves darker green and leathery than PKM1.
Cultivars such as MOL'E (for leaf harvesting) and MOMAX 3 (for seed oil production) are also becoming popular for commercial plantations.		

Besides the cultivars tabulated above, there are many stem propagated perennial varieties such as Chemmurungai, Moolanur, Valayapatti that provide good yield and have high commercial value. These perennial varieties are grown widely especially in Tamil Nadu, Andhra Pradesh and Karnataka.

Moringa samplings in the nursery ready to be planted

Note 1: I would like to take up Moringa cultivation,

☐ On my own farm ☐ On Community Land

Note 2: Having learnt about the different varieties / cultivars of Moringa, I am interested in cultivating,

☐ ODC 3 ☐ PKM 1 ☐ PKM 2

For the following reasons:

Knowledge Check 2 (Selecting site and variety / cultivar)

A. Climatic Conditions

A.1 Optimal temperature for growth is

☐ **10-15° C** 	☐ **25-35° C** 	☐ **Above 40° C** 

A.2 Optimal rainfall required is

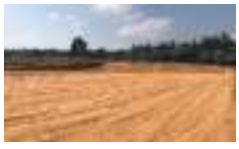
☐ **250-1500 mm**	☐ **Below 250 mm**	☐ **Above 2000 mm**

A.3 Most efficient method of irrigation for commercial plantation is

☐ **Flood** 	☐ **Sprinkler** 	☐ **Drip** 

B. Selecting Site

B.1 Must avoid

☐ **Open to receive full sunlight** 	☐ **Levelled and well drained** 	☐ **Water logging** 

C. Selecting Variety

C.1 For leaf production		C.2 For pod production	
☐ **ODC3**	☐ **PKM1 or PKM2**	☐ **PKM1 or PKM2**	☐ **ODC3**

Tear it from here

In practising LEISA, what are the principles that should guide our selection of methods and inputs?

Broadly, Low External Input Sustainable Agriculture (LEISA), is an agroecological approach to agriculture development. LEISA aims to improve the yields and income of poor farmers, lacking access to capital and credit, without the use of expensive inputs and without degrading the resource base on which they depend. It aspires to achieve, especially for small and marginal farmers, the triple goals of

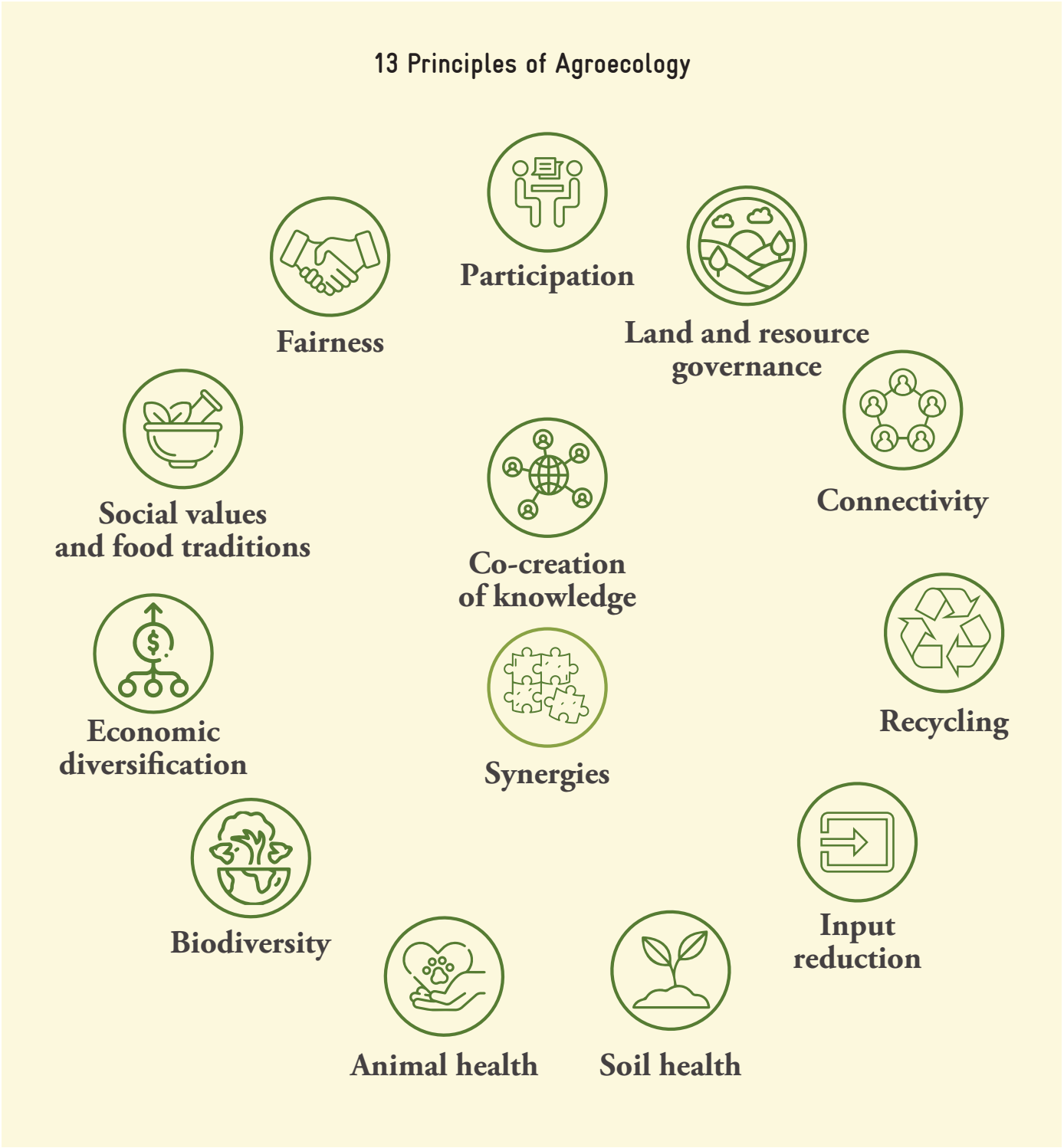
a) Economic profitability b) Environmental sustainability and c) Social justice

The 13 principles of agroecology are the cornerstone of LEISA, and briefly these are,

- recycling and input reduction for improving resource efficiency,
- soil health, animal health, biodiversity, synergy and economic diversification for strengthening resilience, and
- social values and diets, fairness, participation, land and natural resource governance, connectivity, and co-creation of knowledge, for securing social equity.

LEISA includes those methods of farming that rely on the application of locally evolved and adapted knowledge, use of local (farm, village or region) resources, and ensure autonomy of local communities. Organic agriculture, regenerative farming, natural farming, zero budget natural farming, zero till farming and biodynamic farming are all different ways of practising LEISA.

Thus, LEISA relies on integrating techniques such as, nutrient cycling, biological nitrogen fixation, inter cropping, soil regeneration, green manuring, mineral bearing rocks, conservation tillage, water conservation, and natural enemies of pests, into food production processes.



Evolved by Food and Agriculture Organisation (FAO).

What does LEISA avoid?

LEISA does NOT advocate the use of synthetically compounded fertilisers, pesticides, livestock feed additives, growth regulators, etc.

What are the bio-inputs that I can prepare on my farm?

To aid appreciation of the ease with which you can prepare your own bio-inputs, some bio-inputs, commonly used in Moringa Farming, that can be prepared using local resources have been reproduced here. They have been taken from Bio-input Resource Centre's Natural Farming Technical Process Manual, prepared by National Coalition for Natural Farming. Besides those illustrated here, there are many more. The vermicompost and NADEP compost units developed through Mahatma Gandhi NREGS can also be an excellent infrastructure for creating bio-inputs.

Bio-inputs: Anti-fungal

Beejaraksha: Used as a seed coat or treatment at the amount of 10 gms per Kg of seed. Store it in earthen pots in a dry place.

Ingredients

- Red soil - 100 grams
- Hill soil - 100 grams
- Ash from sticks
- Cow dung - 100 grams
- Asafoetida Powder - 20 grams
- Turmeric Powder - 20 grams
- Cow Urine - 10 ml

Preparation Method

All the ingredients should be converted into fine powder by using Mesh and sprinkle cow urine on the ingredients and mix the powder thoroughly and allow to dry in shade.

The estimated cost of the product is same as the cost of asafoetida and soil (if purchased separately).

Sour Buttermilk: It controls fungal infection. It can be used as foliar spray or in soil application, 20 days after sowing at the amount of 06 liters of sour buttermilk in 100 L of water.

Ingredients

- Buttermilk

Preparation Method

Take 2-3 litres of milk and make it into curd and convert that curd into buttermilk and allow it ferment for 4-6 days.

The estimated cost of the product is same as the cost of the milk for buttermilk preparation.

Source: Krishi Vigyan Kendras & Tamil Nadu Agricultural University Agritech Portal

Disclaimer: The image used is for reference purposes only and should not be construed as a recommendation of specific brand or organisations.

Bioinputs - Broad spectrum Pesticides

Neem seed Kernel extract: For Controlling of small bollworms and sucking pest, 3 litres per acre as a foliar spray.

Ingredients

- 5kg Neem seed kernel powder
- Water – 20 litres
- Soap nut powder - 100gm

Preparation Method

Soak neem seed kernel powder in 20 litres of water using a cotton cloth for one night. Remove the cloth next day and add the soap nut powder to it and mix it thoroughly.

Estimated Cost: ₹150/-

Herbal Tea: It will be useful for controlling of many pests and control of many leaf spots and it will enhances the growth of the crop it can be mostly used in all most all types of vegetable crops. Dilute with 200 litres of water and use as a foliar spray.

Ingredients

- Holy basil (tulsi) leaf -1kg
- Tobacco leaves-1 kg
- Papaya leaves-1kg
- Aloe Vera leaves-1kg
- Bougainvillea leaves-1kg
- Teak wood tree leaves-1kg
- Neem leaves-1kg
- Cow dung - 5 kgs
- Cow urine - 5 litres
- Neem leaves - 5 litres
- Jaggery - 100 grams

Preparation Method

Grind 5 types of leaves and make it as a paste. Add 5 liters of cow urine, 5kgs of cow dung in a pot and add these 5 types of leaves paste into it. Stir it every morning and evening thoroughly for 7 days. Add 5 liters of water to it and filter the liquid.

Source: Tamil Nadu Agricultural University Agritech Portal

Bioinputs - Enhancing Soil Microbial Activity

Ghan Jeevamrutham: It is not a fertilizer but it can enhance the microbial activity and convert all the nutrients in plant available form. Soil application @100kg per acre, 2-3 times in a season.

Ingredients

- 100 kg cow dung
- 10 litre cow urine
- 1kg to 2kg jaggery
- 1kg to 2kg pulse flour
- Handful of the best quality soil available (preferably from the base of an old tree or forest soil)

Preparation Method

Spread the dung on the floor, spread urine, jaggery, flour and soil over the dung and mix thoroughly. Then make it in to small balls, dry them in shade. Leave for about 1 week to dry. Convert dried balls in to powder. Store in gunny bags.

Estimated Cost: ₹6/- per kg.

Vermiwash: It enhances growth and resistance of crop. Spray @1000 kg per acre.

Ingredients

- Tank/Plastic can from 25 liters
- 100 liters capacity as per our convenience
- Stones
- Coconut coir
- FYM
- Water
- Earth worms

Preparation Method

Take a pot with wide mouth. Drop stones to ¼ part as an initial layer, and then arrange another layer as coconut coir to half of the container, and then arrange FYM as another layer, which is the topmost layer, add half kg of earthworms, then pour 1 litre of water. Allow the vessel to settle down for a week, but ensure moisture presence inside. After 1 week again pour 1 litre of water and can obtain vermiwash from the bottom. This process of pouring water and collecting vermiwash can be done 4-5 times.

Source: Krishi Vigyan Kendra, Khandwa

Disclaimer: The image used is for reference purposes only and should not be construed as a recommendation of specific brand or organisations.

What are the steps involved in preparing soil/land for growing moringa?

- **Clearing and sterilising the land:** All unwanted weeds, large rocks, debris, or clumps should be removed.
- **Levelling:** The field should be levelled / flattened to ensure that there is no water stagnation.
- **Soil Testing:** Conduct a soil test to determine the soil's pH, nutrient levels, and other important characteristics.
- **Ploughing / Tilling:** Prior to sowing, deep ploughing or tilling of the land (to a depth of at least 12-18 inches) followed by harrowing is required to loosen the soil and make it light so as to ensure proper drainage and root penetration into the soil. It is also helps to incorporate the fertiliser into the soil.
- **Manuring:** About 15 days before sowing, apply 10 to 20 tonnes of farm yard manure or 3 tonnes of vermicompost mixed with 3 tonnes of farm yard manure and 100 to 200 kg. neem cake to the soil. Please note that the quantity of fertiliser applied to the soil would depend on the quality of the soil as indicated by the soil testing report.
- **Irrigation:** Irrigate the soil to facilitate absorption of nutrients into the soil. Drip irrigation is the most efficient and effective method of irrigation for large scale cultivation of Moringa.
- **Mulching:** Apply a layer of organic mulch around the base of the future moringa plants. This helps retain moisture, suppress weed growth, and regulate soil temperature.
- **Pre-sowing care:** Allow the prepared land to settle for a few days after tilling and amending the soil before planting. This allows the soil to regain its natural structure.

Soil Solarisation

- To kill pathogens, nematodes and weed seeds, irrigate and mulch the soil with organic matter and cover with biodegradable mulch for 4-6 weeks during the hot summer months.

Treat heavy or compact soil

- If the soil is clayey, compact or heavy, treat the soil with gypsum, (about 5 tonnes per acre) and compost. Reapply gypsum, if required, till the soil becomes light and loose.

How should I treat the seeds before sowing?

Hydropriming is effective for increasing germination:

- Peel off the white wings that wrap Moringa seeds.
- Soak / immerse the seeds in warm clean drinking water for 24 hours.
- Throw away the seeds floating on the water. Remove the soaked seeds, wash with clean water and place on a wet paper towel or cotton cloth.
- Tio avoid fungal attack, coat the seeds with Trichoderma viride at five grams per kg of seed.
- Wrap the seed and tie a knot around the neck.
- Place the wrapped seeds in an airtight bottle or zip lock bag and store in a dark moist place.
- Check every day to ensure that the cloth / paper towel remains moist.
- In about one week, the seeds would germinate.

What are the methods for propagating Moringa?

1. Direct Seeding

- Moringa seeds have no dormancy period and are best planted as soon as they are harvested from the tree. Freshly harvested seeds retain excellent germination rates for up to one year.
- Sow the seeds, directly in the field, just before the beginning of the rainy season – between last week of June to end of July.
- Plant spacing is an important consideration in cultivating Moringa , to allow the plant sufficient space to grow.

Plant spacing

- Plant to Plant: 8 to 10 feet
- Line to Line: 10 to 12 feet

- Make pits of dimension 45 X 45 X 45 cm dimension.
- Mix 5 kg vermicompost and 5 kg farmyard manure with the top soil from the pit and fill the pit. In each pit, apply 20 gms azospirillum and phosphobactertia.
- Plant 1-2 seeds per pit at a depth of two centimetres.
- Avoid heavy watering in the first two to three weeks. Keep the soil consistently moist, preventing the topsoil from drying out and hindering seedling emergence.
- Two weeks after germination or when seedlings reach a height of four to six inches (10-15 cm), keep the healthiest seedling, and remove the rest.

2. Transplanting

Sapling Production

- Choose trays with 50 cells (three to four centimetres) or individual poly bags (18 cm height, 12 cm diameter).
- Fill these containers with a well-draining sterile potting mix of peat moss, vermicompost, sand & potting soil in the ratio of 1:1:1.
- In the absence of a potting mix, three parts soil and one part sand can be used. If your mix is not sterile, consider sterilising it (autoclave or bake at 150°C for two hours).
- Sow two to three seeds per cell or bag, selecting the strongest seedling after germination.
- Water gently every morning to prevent soil disturbance and damage to young plants.

Field Planting

- When transplanting seedlings (60-90 cm tall), ensure the soil surrounding the roots is retained, and transplanted promptly. Maintain the recommended spacings, as discussed in the direct seeding method.
- Plant cuttings directly in well-draining, sandy soil, inserting one-third of their length into the ground. For infertile soils, add balanced fertiliser or compost.
- Ensure regular irrigation to maintain soil moisture without overwatering.

For leaf production, closer plant spacing may be practised:

- Plant to Plant: 3-7 feet
- Line to Line: 5-7 feet

What are the cropping systems used in moringa cultivation?

Besides plantations on community land, agroforestry on individual plots is also effective. Moringa can be sown either as a single crop or on the raised bunds surrounding the agricultural fields, and associated with such other crops such as maize that do not have deep roots and would therefore not compete with Moringa for water and nutrients. Sunflower is particularly recommended for helping to control weed growth. When cultivated as an intercrop, Moringa must be oriented East-West to ensure that the main crop receives sufficient sunlight.

Based on our experience, we have observed that for large scale plantations, Moringa performs best in a mono culture cropping pattern.

How do I prune my plants?

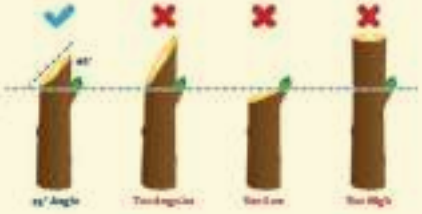
Pruning plays a vital role in maximising leaf production from Moringa trees. When left to grow naturally, these trees tend to develop long vertical branches with fruits mainly at their tips, resulting in lower yields. To optimise leaf harvest, it is crucial to encourage lateral growth, shaping the Moringa into a bush-like form.

How to Prune Moringa

Formative pruning in the first three years to establish Central Leader Tree Form

Cut off:
1) Water Shoots, 2) Crossing branches, 3) Broken branches, 4) Dead branches, 5) Diseased branches, 6) Hanging branches, 7) Suckers.

1. Smooth, clear cut at 45 degree angle, to prevent water from stagnating on the cut.
2. Apply, fresh cow dung or turmeric paste as pruning sealer to prevent the sap from drying out and prevent fungal attack.



Sterilise your tools
Dip your pruning shears / scissors in a solution of bleach and water (1 part bleach to 9 parts water) for 30minutes. Rinse and dry.

Step-by-Step Pruning Guide

Formative Pruning also called training: The purpose is to develop balanced shape, strong structure and large number of branches. A minimum of three pruning before first flowering.

Step 1: When your Moringa plant reaches a height of approximately 60 cm (about three months after sowing), carefully trim the main stem, leaving about ten centimetres from the top.

Step 2: Secondary branches will emerge roughly a week later. Once they reach around 20 cm in length, trim them, leaving about ten centimetres from their ends.

Step 3: Prune the plant when they reach a height of 1.5 metre, 2 metre and 2.5 metre.

As the process continues, tertiary branches will develop, gradually giving your Moringa tree the desired bushy shape, with readily accessible leaves for harvesting.

Maintenance or Regular Pruning: To maintain this bushy form, consider periodic maintenance pruning, especially after harvesting leaves. The purpose is to maintain the size of the tree to a reachable height and prevent overgrowing and allow for better air circulation, light penetration and improvement of pest and disease management. Trim all branches above 50cm from the ground. In cases where leaves have not been harvested during the dry season, Moringa trees may lose their bushy shape and will require pruning before the rainy season.

Hard Pruning: Also called 3G pruning, this is performed after the last harvest of the year. The tree is cut down to a height of three to four feet above the ground. Retain the thick branches and prune off all the thin branches.

Pruning: Points to remember

- Disinfect / sterilise your pruning tools with alcohol or bleach before using them.
- Make smooth and clean pruning cuts at a slight downward angle (about 45 degree) to prevent water from stagnating on the cut, with the high point a little above the desirable bud, just outside the collar (wider ring of the bark at the base of the branch).
- Use pruning sealers also called pruning paint to aid the healing of pruning cuts or minimise sap loss. A thick paste of turmeric may be applied to seal the wound. Alternatively, a paste of fresh cow dung may be applied. Pruning sealers, made from beeswax, available in the market may also be used.

Vegetative propagation nursery

What are the weed management practices in Moringa plantations?

Weeds pose a significant challenge to moringa growth, competing for essential resources like soil nutrients, water, and sunlight. Timely weed control is essential, particularly during the critical seedling and plant establishment stage. Keep your field weed free for the first five months after sowing.

Seedling Stage: Weeds can be most problematic during the initial growth period. It's vital to control them from germination to when the moringa plant reaches a height of one meter or more.

30-90 Days After Sowing: The period between 30 to 90 days after sowing is crucial for weed management. Effective weed control during this phase significantly impacts the final crop yield.

Weeding methods

Physical Methods:

Hand Weeding: This hands-on approach involves pulling out annual and biennial weeds or non-creeping perennials. It works best when the soil is moist and before weeds produce seeds. Hand weeding is practical for small patches or individual moringa plants.

Mowing: When weeds become too numerous for manual removal or too large for cultivation, mowing is a valuable method. It's essential to perform this task before weeds have a chance to set seed. Mow as close to the ground as possible to prevent regrowth.
Cultural Methods:

Tillage: Employ both preplant tillage and interrow cultivation to effectively manage weeds. These practices disrupt weed growth and help maintain a weed-free moringa field.

Cover Cropping: Consider using crops such as sunflower. These cover crops can effectively control weeds, and their residues left on the soil surface continue to suppress weed growth as they decompose.

Mulching: Mulching is a powerful weed control method. Several mulch materials work well, including clean straw, hay, manure, and sawdust. Mulches block sunlight, preventing weed germination and growth. After mulch breakdown, be sure to reseed the bare patch with competitive vegetation to prevent new weed infestations.

Trash Mulching: This technique involves applying a 12 cm thick layer of plant debris shortly after moringa emergence. Trash mulching not only suppresses weeds but also conserves soil moisture and enriches the soil with organic matter.

Direct seeded healthy moringa seedlings

What is the nutrient requirement of moringa?

Moringa grows well in most soils without adding very much fertilisers. Once the tree is established, the extensive and deep root system of the moringa is efficient in mining nutrients from the moringa. However, in intensive cultivation like for leaf production, the application of fertilisers can produce optimum growth and yields.

- Moringa crop requires a total of 75 kg nitrogen (N), 30kg phosphorous (P), 20 kg potash (K) per acre of land. Apply about one-fifth of this during land preparation. Split the above requirement in equal doses. Apply the next dose after 45 days of sowing / planting and subsequently 15 days after each cutting. Applying of synthetic fertilisers like urea, super phosphate etc. is strictly prohibited under all practices following an agroecological approach.
- Apply first fertilisation when the ground is being prepared. Four to five tonnes per acre, of well-decomposed dried cow dung with equal quantities of vermicompost should be mixed throughout the field at the time of the last tilling. In the case of pits, pits are filled with well-mixed soils, 10-15kgs of farmyard manure along with equal quantities of vermicompost.
- Apply the second fertilisation, 45 days after sowing.
- Subsequently, it is advisable to fertilise once or twice each year especially during flowering and fruiting for better productivity. Manure is to be applied before the start of the rainy season when trees are about to start intensive vegetative growth. A second application may be done before the dry season to maintain vegetative growth.

Significance of Integrating Livestock

- All farming systems within the agroecological framework of Low External Input Sustainable Agriculture (LEISA) rely heavily on the use of cow dung and cow urine for the production of bio-inputs. Therefore, in order to control your cost of cultivation by producing your own bio-inputs, it is advisable and strongly recommended that you maintain a herd of 1-2 cattle.

Organic mulching

How to irrigate your moringa plants?

In moringa cultivation, the choice of irrigation strategy depends on the type of moringa variety being grown. Annual moringa varieties, particularly those cultivated from seeds, require more frequent and consistent irrigation compared to their perennial or indigenous counterparts. The succulent and rapidly spreading roots of annual moringa varieties necessitate regular watering, typically on a schedule of every 7-10 days throughout their growth period. In contrast, perennial moringa types exhibit greater resilience and can be irrigated less frequently, with intervals ranging from 10 to 15 days, contingent upon specific soil characteristics during their vegetative phase.

When to irrigate

- Check soil moisture by inserting your finger about 1 inch deep into the soil near the base of the Moringa plant / tree. If the soil feels dry, it is time to give water.
- Plants need both air and water. Infrequent deep watering allows the top two inches of soil to dry, thus allowing air to occupy the soil's limited pore space. It also helps the root system to develop and grow deeper into the soil. Deep roots are less susceptible to temperature variations on the surface, thus making the plant more resilient.

To promote optimal growth in annual moringa varieties, a brief period of water stress, typically lasting 10-15 days, immediately after pruning is beneficial as it encourages lateral growth. Additionally, inducing controlled soil moisture stress for a duration of 20-30 days, dependent on soil composition, can effectively trigger flowering in moringa plants.

However, it is essential to exercise caution during the peak flowering and fruit-setting stage of moringa. Subjecting the plant to soil moisture stress or over-irrigation during this critical phase can lead to undesired outcomes, such as premature flower drop and immature fruit loss. As the moringa fruits progress into their peak development and maturation stage, providing moderate irrigation becomes crucial to ensure optimal results. Insufficient irrigation during this phase can result in overly succulent fruits, reduced palatability, and a shorter post-harvest lifespan. Nonetheless, as the fruits approach maturation, characterised by a transition to a straw yellow colour, it is advisable to cease irrigation, particularly when the primary objective is seed production.

When to Irrigate

Irrigation practices should also include watering,

- Before sowing,
- On the 3rd day after sowing, and
- Subsequently at 10 to 15 days intervals, adjusting according to soil type and specific growth stages.

Note 1: I shall be taking up Moringa cultivation on ..... acres of my land.

Note 2: I own ..... cattle, and therefore will be able to make my own bio-inputs.

Note 3: My farm is,

☐ Rainfed ☐ Irrigated

Note 4: I am interested in obtaining support for assured irrigation.

☐ No ☐ Yes

Note 5: I have sufficient labour for managing my Moringa plantation.

☐ No ☐ Yes

Note 6: I shall need support for purchasing tools necessary for cultivating Moringa.

☐ No ☐ Yes

What are the common pests in moringa and how to manage them?

Common pests, their management, identification characteristics and symptoms

Management:

- Plough around trees and kill pupae.
- Remove and destroy damaged buds.
- Set up light trap

Bud Worm: Dark brown forewings, white hind wings with a dark brown border. Eggs - oval, creamy, white on flower buds. Caterpillar - Dirty brown, striped, black head.

Symptoms: Shedding of flower buds.

Management:

- Plough around trees to expose and kill pupae.
- Make perches for birds that may feed on the worms.

Leaf Caterpillar: Dark forewings, transparent hind wings. Eggs - creamy white on underside of leaf.

Symptoms: Caterpillar feed on leaf and make them transparent and papery. Severe attack - complete defoliation.

Management:

- Destroy eggs andcaterpillar
- Light trap to attract and kill adult
- Burning torch to kill larvae

Hairy Caterpillar: Yellow or drab, with reddish - brown markings on their wings. Eggs - laid on leaves and stem. Larvae - whitish, speckled with black, and black hairs

Symptoms: Severe defoliation and scrap the bark.

Management:

- Destroy damaged fruits.
- Fish meal trap, citronella oil, eucalyptus oil, vinegar to attract and kill.

Pod Fly: Yellowis, red eyes. Eggs - long cylendrical white.

Symptoms: Oozing of gummy fluid from pod. Fruit drying.

Moringa plants can face challenges from various insect pests, including bud worms (*Noorda moringae*), hairy caterpillars (*Eupterote mollifera*), pod flies (*Gitona distigma*), bark caterpillars (*Indarbela tetraonis*), and leaf caterpillars (*Noorda blitealis*). These pests can significantly harm your crop and cause substantial losses.

Bud Worm (*Noorda moringae*): These small insects have dark brown forewings and white hind wings with a dark brown border. They lay oval, creamy white eggs on flower buds. The caterpillars are dirty brown with a prominent mid-dorsal stripe and a black head and shield. After feeding, full-grown caterpillars pupate in small brownish cocoons, usually in the soil or on the ground under dried leaves and debris. The entire life cycle, from egg to pupa, lasts around 3-16 days.

Damage

The Larva bores into flower buds and causes shedding to a large extent.

Management

- Plough around trees to expose and kill pupae
- Collect and destroy damaged buds along with caterpillar
- Set up light trap at one per hectares of area

Leaf Caterpillar *(Noorda blitealis)*: Adult moths are medium-sized, with uniformly dark forewings and a small white streak near the base. Hind wings are transparent with a broad black marginal band. They lay creamy white eggs in batches on the underside of leaves. Caterpillars feed on leaf lamina, turning them into transparent structures. Peak infestation occurs in March-April and December-January.

Damage

The caterpillars build silken webs by joining the ventral side of the adjacent leaflets and remain inside the web on the leaves and make them papery. Severe infestation causes complete defoliation.

Management

- Plough around trees to expose and kill pupae.
- Collect and destroy silken webs and caterpillars in the initial stages of infestation.
- Set up light trap @ 1/ha.
- Provision for sitting arrangements for birds above the height of the moringa crop, enabling the birds to visit and prey on the worms.
- Spiders are found inhabiting in large numbers on new flush which exert natural control on the increasing population.

Hairy Caterpillar *(Eupterote mollifera)*: Adults are yellow or drab, with reddish-brown markings on their wings. They lay eggs in clusters on leaves and tender stems. Larvae are whitish, speckled with black, and have dorsal tufts of black hairs.

Damage

They are seen in groups in tree trunks feed gregariously and scrap the bark. It feeds on leaves voraciously causing sever defoliation.

Management

- Collect and destroy egg masses and caterpillars
- Set up light trap @ 1 / ha to attract and kill adults immediately after rain.
- Use burning torch to kill congregating larvae on the trunk.

Pod Fly *(Gitona distigma)*: These small, yellowish flies have red eyes and lay cigar-shaped, white eggs on tender pods. Maggots enter fruits through small holes, causing oozing of gummy fluid and fruit drying. Each fruit can have 20-28 maggots, and they pupate in the soil.

Damage

The maggots of moringa fruit fly cause frothing and gummosis leads to drying of fruits from tip. In addition to drying, it also causes splitting of fruits from tip. Oozing of gummy exudate from fruit

Management

- Collect and destroy all the fallen and damaged fruits
- Use attractants like citronella oil, eucalyptus oil, vinegar (Acetic acid), dextrose or lactic acid
- Set up fish meal trap to attract and kill them

Monitoring for pest management

To manage these pests, regular pest surveillance is crucial. Use monitoring devices like pheromone traps and coloured sticky traps. Field scouting should involve observing 300 fruits from 100 plants per acre, focusing on 15 spots at reasonable distances. Monitoring for fruit flies using traps should begin during the fruiting stage.

Some of the other pests include Sap feeders (Aphis gossipii) and Ceroplastode cajani that damage the tender shoots by sucking the sap and affect the vigour of the plant. Stem borer(Batocera rubus Linn.) damage the stem bark of young twigs. Root feeders (white grub) damage the roots. Their adults feed on leaves as well.

Pest and Disease Management

- Clearing of weeds, which are often hosts to diseases, should be practiced regularly.
- Pruning tools should be sterilised before use.
- Leaves and young shoots should be checked regularly for symptoms of fungal attacks.
- Neem oil is effective against a wide range of fungal diseases and pests. Mix soap with water and add two table spoons of neem oil. Shake this mixture and spray on the infected / infested area.
- Garlic and cinnamon are also effective organic fungicides.
- Fermented buttermilk spray may be applied against sucking pests and insects. 5 litres of buttermilk with a piece of copper metal, that aids fermentation of buttermilk, are placed in a clay pot and the mouth covered with bio -degradable plastic and allowed to ferment for 15 days. The mixture is filtered. 250-500 mil mixture is diluted in 15 litres of water and sprayed as a foliar spray successively for 4 to 5 days.

What are the common diseases in moringa and how to manage them?

Other common pests and their management			
Pests type	**Pest**	**Damage**	**Management**
Flower Feeders	Bud midge: *Stictodiplosis Moringae*	The larva feeds on the internal content of the flower buds causing shedding of buds in large numbers.	- Plough around trees to expose and kill pupae - Collect and destroy damaged buds along with caterpillar N Set up light trap @ 1/ha
Leaf Feeder	Hairy caterpillar, *Metanastira hyrtaca*	The hairy caterpillar feeds on leaves causing defoliation	- Collect and destroy egg masses and caterpillars - Set up light trap @ 1 / ha to attract and kill adults immediately after rain - Use a burning torch to kill congregating larvae on the trunk
	Hairy caterpillar, *Pericallia ricini*	The hairy caterpillar feeds on leaves causing defoliation	
	Ash weevils	The adult weevils cause the notching of leaves. Grubs feeds on roots and cause wilting of plants	- Collect and destroy the adult weevils
Sap Feeders	Cotton Aphid: *Aphis gossypii*	Both nymphs and adults damage the tender shoots.	Release First instar larvae of Chrysoperla carnea @ 1,00, 0000 per hectare.
	Scale, *Ceroplastodes cajani*	Both nymphs and adults suck the sap and affect the vigour of plants.	
Borers	Bark caterpillar: *Indarbela tetraonis*	Caterpillars create zig-zag galleries beneath bark, feeding superficially. They hide in burrows during the day and emerge at night to feed on bark.	- Clean all webbed material and excreta - Plug the holes with cotton wool soaked in fumigants like chloroform, formalin or petrol and seal it with mud.
	Stemborer: *Batocera rubus Linn.*	lays eggs in tree bark cracks. Hatched grubs tunnel under the bark, feeding on internal tissues, leading to branch or stem death.	
Root feeders	White grub	The grub feeds on roots of Moringa trees. The adults beetle feeds of leaves	

Brown Leaf Spot
(Cercospora moringicola)

Symptoms: Appears as scattered brown spots appear on the leaves and then spread to cover them entirely. Coalescing of spots leads to irregular and blighted appearance of the leaves. The leaves also turn yellow and fall off prematurely.

Management: Foliar fungicidal application is an effective method for the control of the disease.
The disease can be controlled or prevented by using disease-free seeds, and crop rotation with non-host crops.

Septoria Leaf Spot
(Septoria lycopersici Speg.)

Symptoms: Circular spots with whitish-gray center and dark brown margins are seen on the leaves, stem and calyx. The center of the spots shows minute black glistening pin head sized pycnidia. Severe infection causes defoliation during the rainy season.

Management: Spraying of various bio-fungicides are found to be effective against the disease. Other effective methods of keeping the disease in check include the use of clean seeds and sanitation by deep ploughing of plant residues.

Common Diseases and their Management

1. Brown Leaf Spot: High humidity and temperature-favour disease development.

Symptom: Scattered brown spots cover leaf. Leaf becomes irregular and damaged. Leaves turn yellow and fall off prematurely.

4. Root Rot: Water logging, poor nutrition, age favourable for disease development.

Symptoms: Oozing of gum from bark and stem, Leaves turn yellow and pale. Fruit vield greatly reduced.

2. Septoria Leaf Spot: High humidity favourable for disease development.

Symptoms: Circular spots with whitish gray centre and dark brown margins. If sevare-defoliation during rainy season.

5. Fruit Rat: Low temperature favourable for disease development.

Symptoms: Extensive rotting on mature pods. Green pods shrunken and ends thinner, with elliptical sunken spots having reddish brown raised margins.

3. Powdery Mildew: Cloudy weather favourable for development of disease.

Symptoms: White to grey powdery growth on underside of leaves. Yellow lesions with brown centre on upper surface. Leaves curl upwards and shed profusely. If severe, wilting and death of plant.

6. Damping off: Wet conditions and common water borne diseases-favourable for disease development.

Symptoms: Plants fail to germinate, become soft and mushy, turn brown, shrink and disintegrate.

Management: Disease free seed, bio-fungicide application, sterilised pruning tools, weed and crop residue management, well drained soil / avoid water logging.

Legal Disclaimer: The image used is for reference purposes only and should not be construed as anything else.

Note 1: This is my schedule (time allocation) for pest and disease surveillance of my Moringa crop:

Note 2: This is my plan for allocating labour for monitoring my Moringa crop:

Knowledge Check 3 (Cultivation)

A. Approach

A.1 LEISA advocates for the use of

Purchased Synthetic Inputs	Locally prepared bio-inputs	Both synthetic & bioinputs
☐ 	☐ 	☐ 

A.2 Moringa is a hardy tree. Thus during growth stage

No weeds for first 5 months after sowing / planting	Weeding – not required	Light Weeding - sufficient
☐ 	☐ 	☐ 

A.3 Recommended plant spacing for Moringa (pod production) is

10X10 ft	7X8 ft	5X5 ft
☐	☐	☐

B. Care and maintenance

B.1 During pruning, the cut should be

Slanting at 45o	Horizontal	Slanting 30 degree
☐ 	☐ 	☐ 

B.2 Pruning must be performed

Minimum 3 times before first harvest and after every harvest.	Once a year	Only at the end of the productive life of the tree
☐	☐	☐

Tear it from here

B. Care and maintenance

B.3 Irrigation should be provided

☐ **Before sowing 3rd day after sowing Subsequently at 10-15 days interval**	☐ **Once a month**	☐ **Everyday**

B.4 Fertiliser requirement of Moringa is

☐ **15 days before sowing during land preparation During sowing Before irrigation**	☐ **Once a month**	☐ **Everyday**

B.5 According to LEISA, pests can be managed by

☐ **Physical methods + light trap + bioinputs + bird perches**	☐ **Regular spray of synthetic pesticides**	☐ **Allowing nature to take its course**

B.6 Diseases can be managed by

☐ **Regular spray of synthetic fungicides**	☐ **Allowing nature to take its course**	☐ **Disease free seed, bio fungicide, no water logging, sterilised pruning tools, weed and crop residue management**

C. Bioinputs application

B.3 Fresh cow dung works as a

☐ **Pesticide**	☐ **Fertiliser**	☐ **Pruning sealant**

C.2 Sour buttermilk works as a

☐ **Fungicide**	☐ **Pesticide**	☐ **Fertiliser**

C.3 Neem cake works as a

☐ **Fertiliser**	☐ **Pathogen control**	☐ **Both fertiliser and pathogen control**

Tear it from here

03
Nursery Management

Dos ✓

Select an open and secure location.

Select a location that is raised and has good drainage.

Must have a source of assured irrigation.

Room for security guard must be located at the entrance.

Must be connected through good roads to allow for easy transportation of seedlings.

Seeds must viable and obtained from a certified / trustworthy source.

Seeds should be treated with warm water before sowing.

Soil must be sterilised through solarisation.

Apply fertilisation.

Apply irrigation 15 days before transplantation to help in uprooting the seedling without causing any damage to the roots.

During summer months, when there are no rains, flat seed beds with alleys may be prepared.

During rainy season, prepare 10-15 cm high raised beds.

During winter when wind speed is high, prepare beds that are depressed 10-15 cm.

Apply about 10 kg. per square metre of manure.

Length of the beds may be according to space available. However, width of the beds should be 1.2 metres or less so that all operations can be performed from the side of the beds.

Seeds should be sown at a depth that is four times the dimension of the seed.

Mulch the seed beds with locally available organic matter.

Apply bio-inputs for pest and disease control.

Use a greenhouse or polyhouse for cultivating the nursery.

Characteristics of a Mother Plant

- Must be of an identified variety / cultivar.
- Must have high yield.
- Produce must meet the quality parameters required by the target market.
- Must be disease and pest/insect free.
- Must be planted separately from the remaining plants.

Must have an area earmarked for producing organic bio-inputs.

Don'ts ✗

Select a location near the homestead.

Select a location that is shaded

Allow waterlogging.

Allow weed to grow unchecked.

Select termite affected area

Innovations for enhancing income from Moringa nursery in Tamil Nadu

Air layering is a technique followed in the production of seedlings for promoting vegetative propagation of trees. The novel double air layering method was developed by farmer Alagarsamy, with support from an NGO, Sustainable Agriculture and Environmental Voluntary Action (SEVA). By the double air layering method, ten to twelve air layers can be made at a time.

How to prepare a double air-layer:

- The bark (2.5 cm length) of selected branches of the mother tree are removed.
- 'Panchakavya' soaked coir pith is placed over the cut and then covered with a polythene sheet. Both ends of the polythene sheet are tied with cotton thread.
- Root growth is seen about 20 days after layering. The rooted air layers are separated from the mother tree 25 – 40 days later. The polythene sheet is removed and the layers are planted in polythene bags, containing a mixture of sand, soil and farmyard manure, for further root formation.
- The polythene bags are placed in the nursery area for 20 days. After this, the air layers are ready for planting in the fields.

Double planting in a single pit

Usually, moringa seedlings are planted at about 6 metre distance. In each pit one seedling is planted. In this method however, double planting id done in each pit. This helps to use the land soil and water in a more efficient way.

- For double planting, two adjacent pits (30 X 30 cm) are dug 60 cm apart.
- The pits are filled with soil mixed with compost. Additionally, azospirullum (100 g), phosphobacterium (50 gm) and neem cake (50 gm) are added.
- In each pit two seedlings are planted.
- Due to intertwining of branches, the trees planted in a double pit are able to withstand wind speed better than single pit planting. This also leads to increased number of pods per hectare, due to enhanced cross pollination by wind as the pollen are able to spread better as the trees are closer.
- After planting in the main field, the seedlings of the perennial Moringa start bearing fruits from 6 months onwards until 10 – 15 years of age.
- Annually, 60 to 70 rooted cuttings can be prepared as compared to 40 cuttings by the conventional method.
- The utilisation of water and manure is more efficient as there are two trees close together.

More than 50,000 farmers in seven states have adopted his variety and increased their yield of pods from 20 tonnes to 30 tonnes per acre. As compared to one days shelf life of the traditional variety, this variety has a shelf life of one week. One tree gives a profit of about INR2,000 per year. Alagarsamy's nursery employs 60 women. He makes a profit of about six lakhs per year by selling about 2.5 lakh seedlings. This new variety of Moringa developed by him called 'Pallapatti Alagarsamy Vellimalai Murugan (PAVM)' that has been tested by Tamil Nadu Agricultural University.

Moringa Nursery developed and managed by Sahariya community in Rajasthan

Under the Sanjeevani Model (details are mentioned in Chapter 1) in Rajasthan, the Moringa nursery was developed in Bamangawa Gram Panchayat (GP) in Shahbad block of Baran district, Rajasthan. The block is a tribal area with more than 20% of population belonging to Schedule Caste category as per the Census 2011. Sahariya is one of the predominant communities in the block which is declared as Particularly Vulnerable Tribal Groups (PVTGs)by the Government of India.

Through GP and community members' efforts, through Mahatma Gandhi NREGS programme a nursery was developed on common land amounting to INR 1,50,000 that produced over 15,000 saplings of the PKM-1 variety of Moringa. Additional support of about INR 2,45,000, was secured through GP development fund for fencing and protection of the plantation site, ensuring the long-term viability of the initiative. This nursery development initiative in the Panchayat generated over 8,500 person-days of work, providing significant economic benefits to the community. Sahariya women actively participated in nursery development efforts, acquiring skills in soil preparation, planting techniques, irrigation schedule and overall care of moringa plants through two-day intensive training programme by CECOEDECON, the implementing NGO partner under ERADA project in Baran. The local community in Bamangawa exhibited remarkable engagement, with women taking ownership in all aspects of the initiative. With the continuous involvement in monitoring, pest control, and safeguarding the of nursery, showcased a community-driven approach. Mahatma Gandhi NREGS funds were strategically utilised for nursery development, including watering and chaukidar support. Other line departments such as Public Health Engineering Department (PHED) along with the local panchayat contributed to the success of the activity. The Moringa Nursery development in Baran, Rajasthan, showcases how community engagement and collective efforts are important for sustaining moringa plantations. By integrating various sources of funding and leveraging local expertise, the initiative has not only enriched the lives of Sahariya women but has also created a model for replication in similar regions.

Communities working on Mahatma Gandhi NREGS site for raising moringa nursery for plantation

04

Harvesting, Storage, and Transportation

What is the process of harvesting moringa leaves?

Harvest maturity

Leaves can be harvested after plants grow 1.5-2.0 m, which usually takes three to four months in well-drained fertile soils. Subsequent harvesting can be done every 30-40 days .

Harvesting

Harvesting Leaves

Using hands

Using shears

- Sterilise harvesting tools.
- Maintain hygiene by washing and drying hands.
- Moringa leaves can easily lose moisture. Therefore, harvesting at the coolest time of the day – early morning (5-7 am) or late evening (6-8 pm).
- Ensure that there is no dew on the produce before harvesting to avoid rot during storage or transportation.
- Cut all shoots at about 1 metre above the ground.
- Retain only dark greens leaves. Discard yellow and pale green leaves.

Harvesting Green Pods

- Harvest the green pods when they are still young (about 1 cm in diameter) and can be snapped easily using hands.

Harvesting Pods for Seeds

- Allow the pods to become mature i.e. turn brown and dry, on the tree itself.
- When pods turn brown and dry, they should be harvested. Delay may cause loss of seeds as they would fall to the ground.
- Dry the pods in the sun for two days, before extracting the seeds.
- Seeds may be stored in well-ventilated sacks in cool, dry and shaded area.
- Seeds remain viable for planting, for about 1 year.

Harvesting methods

With hands: Harvesting can be done by removing the leaves at the base of the petiole with bare hands. This is the quicker way of harvesting leaves, but the tree will not have benefitted from good pruning, and following growth is therefore less vigorous.

Using shears to cut branches: Manual harvesting of shoots and leaves with a pair of shears, a sickle or a sharp knife is recommended. All shoots should be cut at the desired height, i.e. 30 cm to 1 m above ground.

How do I handle the leaves after harvesting?

Cooling

Once the leaves are harvested, washing is done prior to storage. The cooling method used is hydro cooling. Cold storage or refrigeration is used if the fresh leaves are kept for future use.

Transportation

Transportation in moringa leaf production is a critical step in ensuring the quality of leaves for consumption and wastage of leaves. There are two options for the transportation of moringa leaves:

- Transporting the entire large branches to a nearby processing centre before defoliating.
- Removing the leaves from branches before transporting them to the processing centre. Leaves can be tied together in bunches by their stem or better, thinly spread out on trays or mesh to reduce temperature build-up.

Ensure that:

- Freshly harvested leaves are transported to the processing centres as quickly as possible to avoid deterioration.
- The fresh leaves, transported loosely, should be well-ventilated.
- For shorter distances aerated baskets or bio degradable packaging with perforations should be used to transport the leaves.
- For longer distances, the leaves should be transported in air-conditioned or refrigerated vans to keep them cool until delivery at the processing unit.
- Avoid using open vehicles for transportation and under no circumstances should people or goods be placed on top of leaves.
- Transportation is done during cooler parts of the day: early morning, evening, or night.

How and when to harvest the pods?

Harvesting maturity

Pods of sufficient length and girth are harvested before they develop fibre when they are young, tender, and green. For perennial varieties, the pod can take nearly a year to bear fruits. The pods are harvested mainly during March-June and a second crop is during September-October.

For annual moringa, the crops in September come to harvest in six months. The harvest periods extend for two to three months.

Handling pods after harvesting

Pods can be packed in wooden boxes with dried grass as filling material, crates, or corrugated fibre boxes with coir as filling material.

When to harvest the seeds?

Harvesting maturity

The pods must be harvested as soon as possible when they reach maturity i.e. when they turn brown and dry. Fruits should open easily. Seeds are stored in well-ventilated sacks in a cool, dry, and shaded area. Harvesting of pods at 20 days after anthesis led to a recovery of good quality seeds.

Measures to be taken to reduce losses in harvesting of Moringa leaves

- ✓ Harvest young tender leaves preferably early morning or late evening to minimise moisture loss.
- ✓ Shade drying of leaves should be practiced for better nutrition retention.
- ✓ Harvesting of leaves should be done manually at 100-150 cm above ground level*.
- ✓ Leaves harvested should not be placed on the ground to avoid contamination.
- ✓ Shade nets of 50% or above should be used to collect leaves to reduce losses.
- ✓ Use sharp tools for harvesting to avoid bruising and cuts.

Measures to be taken to reduce losses in harvesting of Moringa pods

- ✓ Harvesting should be done once the pods reach a length of 50 cm or above*.
- ✓ Pods of PKM variety can be harvested after sufficient flesh and seed setting as it has been found to be palatable thus can be harvested even at a pod length of 60 cm and above**.
- ✓ Avoid climbing trees, especially the young trees as it can break the moringa tree.
- ✓ Use sharp tools for harvesting to avoid bruising and cuts.
- ✓ Moisture management of Tender pods should be done to increase their shelf life and reduce losses***.
- ✓ Maintain a clean and hygienic environment during processing and storage to minimise contamination.

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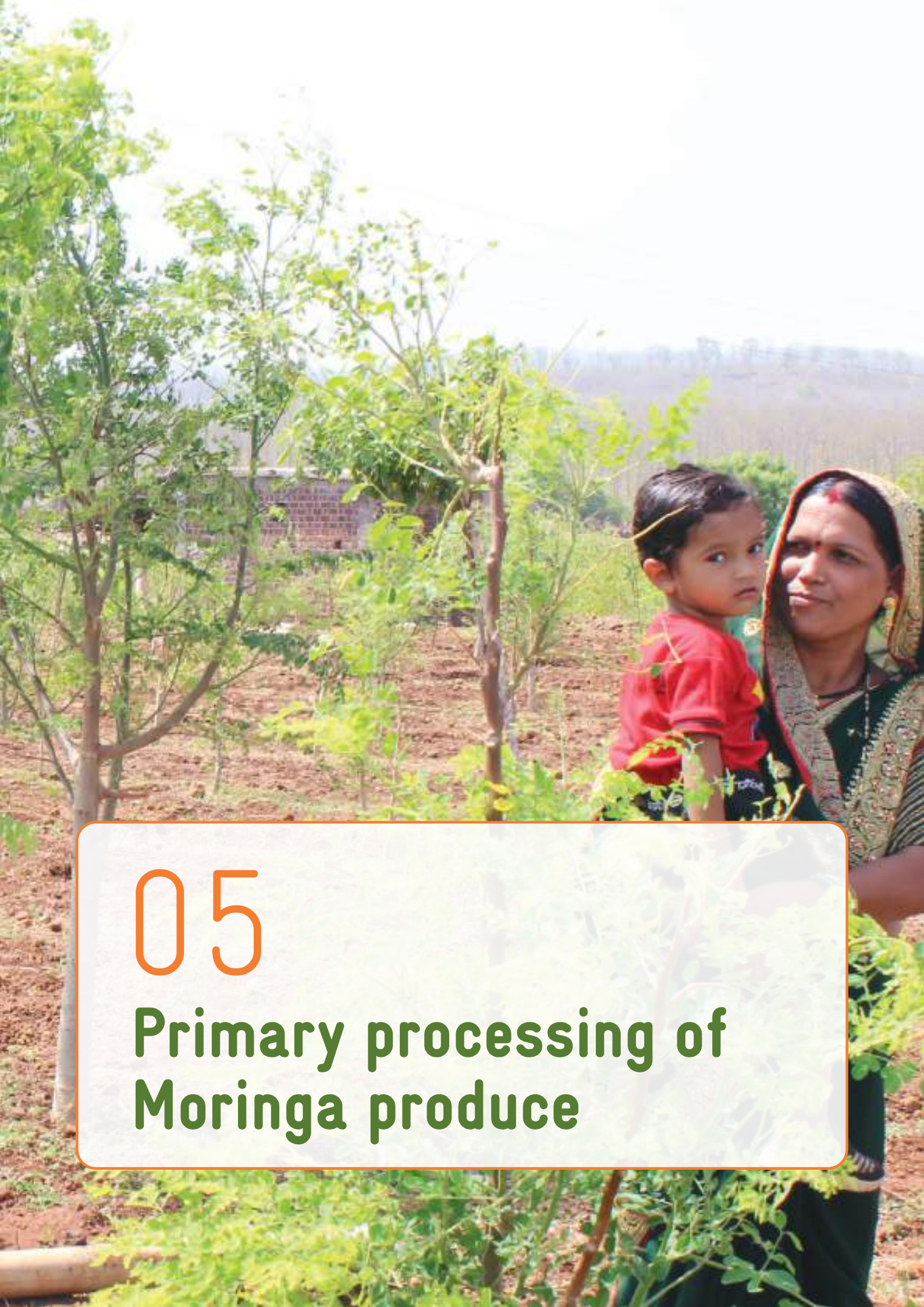
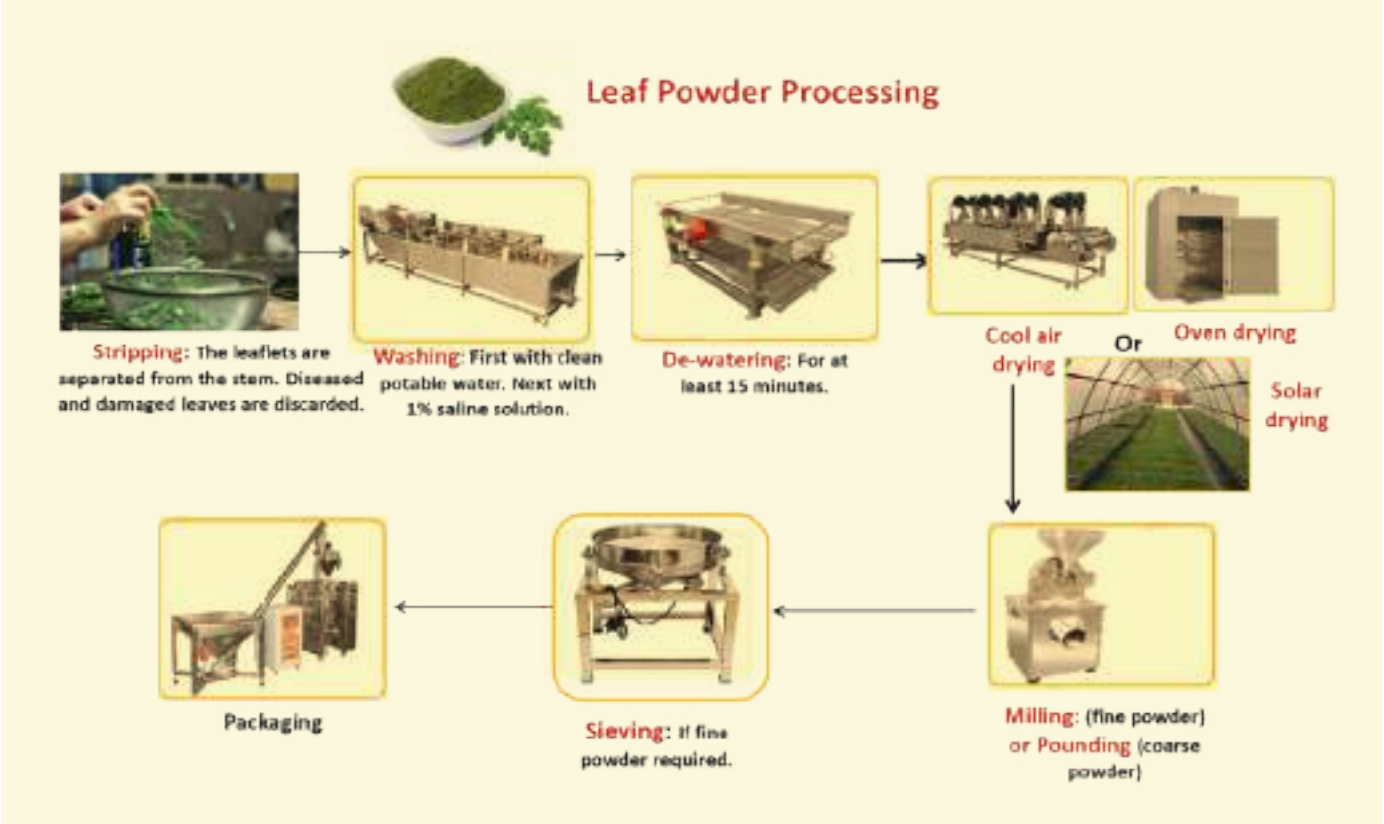


05

Primary processing of Moringa produce

What are the steps for processing Moringa leaves into powder?

Processing of moringa leaves must start immediately after harvesting and transporting the leaves to the processing point. The processing of moringa leaves into powder involves seven basic steps: Stripping the leaves, washing, draining, drying, milling, sieving, drying the powder, and packaging and storage.



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Stripping of leaves

Remove all the leaflets from the leaf's petiole. This can be achieved by directly detaching them from the branches if the leaves have not been separated from the main branch during transportation. During this process, any leaves that are diseased or damaged should be discarded.

Washing

Wash leaflets in troughs using clean potable water to remove dirt. Wash leaves again in one percent saline solution for three to five minutes to remove microbes. Finally, wash again in clean water. The leaves are now ready for drying. Drain each trough after each wash: fresh leaves must always be washed with fresh water.

Draining

Strain water from the leaves in buckets that have been perforated, spread leaflets on trays made with food-grade mesh, and leave them to drain for 15 minutes before taking them to the dryer.

Drying

There are three main methods of drying moringa leaves.

- **Room drying:** Spread the leaflets thinly on mesh tied on racks (mosquito net mesh can be used) in a well-ventilated room. This room should be insect, rodent, and dust-proof. Air circulation can be improved by using ceiling and floor-level vents protected with a clean filter to keep the sun and dust out. It is possible to use a fan, but the air must not be directly oriented towards the leaves, as it can increase contamination with germs in the air. It is advisable to turn the leaves over at least once, with sterile gloves, to improve uniform drying. Leaves should be completely dry in about four days. The loading density should not exceed one kilograms per metre square. However, due to the risk of high bio-load, we do not recommend this method.

- **Solar drying:** Solar dryer is recommended (ensure that temperature does not go above 55ºC). The air intake should be filtered to keep out dust. Organza or muslin cloth can be used as a filter.

  Spread the leaves thinly on mesh and dry in the dryer for about four hours (The temperature range is 35ºC to 55ºC on a very sunny day). The final product should be very brittle. We recommend solar drying for both small and large-scale processing, particularly for those in rural communities where there is no electricity. Loading density should not exceed two kilograms per metre square.

- **Mechanical drying:** Mill dry leaves using a stainless-steel hammer mill. For personal or household use, leaves can be pounded in a mortar, or milled with a kitchen blender. Small-scale processors can use a burr mill or rent a commercial hammer mill for routine milling of their produce.

Milling

Mill dry leaves using a stainless-steel hammer mill. For personal or household use, leaves can be pounded in a mortar, or milled with a kitchen blender. Small-scale processors can use a burr mill or rent a commercial hammer mill for routine milling of their products.

Sieving

Sieve the leaf powder if needed. When you mill with a hammer mill, the fineness of the product will depend on the size of the screen used in milling. If too coarse, sift using a sifter with the desired screen size. Recommended particle sizes are Coarse (1.0 mm - 1.5 mm); N Fine (0.5 mm - 1.0 mm) and Very Fine (0.2 mm - 0.5 mm).

Drying the leaf powder

Moringa leaf powder strongly attracts moisture and the product can reabsorb humidity during or after milling. For this reason, moringa leaf powder should be dried at 50ºC for 30 minutes to reduce moisture content considerably below 7.5%.

Packaging and storage

Moringa leaf powder can easily be contaminated by molds as it strongly attracts moisture. In addition, finely milled powder makes it easier for bacteria to penetrate the particles.

Personal hygiene

All persons involved in the packaging of moringa leaf products must ensure that, while on duty, personal cleanliness and hygiene are maintained. Personal protective equipment (PPE) such as head caps, nose masks, disposable gloves, etc. must be always used.

Packaging in bulk

The temperature and humidity must be controlled in the packaging room, to avoid dehumidification of the product. After drying, the powder is left to cool and packed into clean, single-use polythene bags and sealed. This is enclosed in a second polythene bag and heat-sealed. This is to maintain freshness and dryness prior to further use. The bags should be stored in a cool, dry place.

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Ministry of Rural Development
Government of India

TECHNICAL HANDHOLDING

- Building group dynamics.
- Training on package of practices (LEISA/Certified Organic).
- Linkages with expert farmers, KVK and other agencies.
- Product development. Establishing aggregation and market linkages. -Convergence with government schemes for mobilising funds and technical support

MARKETING LINKAGES

- Local Mandi, Hyperlocal market at cluster and district levels.
-Supply contracts with established exporters of organic produce.
- Establish an online presence.

MORINGA POWDER PROCESSING & PACKING FACILTY

Post Harvest Management of Moringa

Tear it from here

Final packaging

The temperature and humidity must be controlled in the packaging room, to avoid dehumidification of the product. Moringa leaf products should be packaged in clean, dry, and opaque containers made of materials that do not affect the quality of the product. Each package must be properly sealed to prevent content leakage as well as moisture absorption. 1

Labelling

Each package of moringa leaf product must be legibly marked with the following information:

a) Name of product
b) Net content
c) Name and address of the producer
d) Country of origin
e) Lot/batch identification number or code
f) Instructions for use
g) Production date
h) Nutritional information (optional)

Quality maintenance

Moringa leaf powder can easily be contaminated by mold as it strongly attracts moisture. In addition, finely filled powder makes it easier for bacteria to penetrate the particles.

All the persons involved in the packaging of moringa leaf products must ensure that, while on duty personal cleanliness and hygiene are maintained.

Personal protective equipment such as head caps, nose masks, disposable gloves, etc. must be used at all times.

In bulk packaging of moringa powder, the temperature and humidity must be controlled in the packing room, to avoid moisture absorption of the product. After drying, the powder is left to cool and packed into clean, single-use polyethylene bags and sealed. This is enclosed in a second polyethylene bag and heat-sealed. This is to maintain freshness and dryness prior to further use. The bags should be stored in a cool, dry place.

Processing of seeds

Harvested pods must be dried for one or two days under shade with good ventilation. The seeds are extracted manually by opening the pods using gentle pressure on them. On opening, the seeds are separated freely. Small, shrivelled, and damaged seeds are removed. Grading is carried out with a specific gravity separator.

Healthy Moringa seeds

Knowledge Check 4 (Harvesting, Transportation & Processing)

A. Harvesting

A.1 The best time for harvesting is

☐ **Mid noon when the temperature is high**	☐ **During mornings (5-7 am) and evening (6 to 8 pm)**	☐ **Anytime**

A.2 Before storage or transportation

☐ **There should be no dew on leaves. Leaves should be washed and cooled**	☐ **Leaves should be moist.**	☐ **Leaves should not be washed.**

A.3 Leaves should be

☐ **Allowed to remain with the stem.**	☐ **Stripped and spread out thinly to prevent temperature build up**	☐ **Spread in dense layers to ensure temperature build up**

B. Transportation

B.1 Transportation should be undertaken

☐ **In clean, cool and well-ventilated transport**	☐ **Closed transport**	☐ **Along with passengers**

B.2 Transportation should be undertaken

☐ **Anytime**	☐ **Mid-day**	☐ **When the temperature is cool (early morning or late evening)**

Tear it from here

C. Processing

C.1 No. of stages in leaf processing are

☐ **4 (Washing, Drying, Milling, Packaging)**	☐ **7 (Stripping, Washing, De-watering, Drying, Pounding / Milling, Sieving, Packaging)**	☐ **2 (Washing, Drying, Milling)**

C.2 During handling (harvesting, processing, packaging) Moringa produce, the following is true

☐ **Only personal hygiene of handler is important.**	☐ **Facilities and equipment should be sanitised. Personal hygiene of handler is not important.**	☐ **Personal health status and hygiene practices of handler is as important as hygiene of facilities and equipment.**

Tear it from here

06

Value-Added Products of Moringa

Preparations from Leaves

a) Moringa leaf powder

The leaves after harvest should be stripped off the stems, washed, and dried in shade (sunlight can destroy vitamin A). The dried leaves are made into fine powder which can be stored in an air-tight container. Vitamin A retention is enhanced if the leaves are blanched before drying. As a nutritional additive, two or three spoons of the powder can be added to soups or sauces. Moringa leaf powder can be stored for up to six months when protected from light and humidity.

b) Moringa juice

Fresh leaves are crushed and pounded in a mortar with a small amount of water. For larger production, a hammer mill is used to pound young moringa shoots (not more than 40 days old) together with little water (about one litre per ten kilograms of fresh material). Then it is filtered and diluted with water and sugar is added for taste. Alternatively, a spoonful of more moringa leaf powder can be added to a litre of water. Then it is stirred together, strained and sugar is added. Juice or juice concentrate is stored in a refrigerator.

c) Moringa leaf sauce

Two cups of fresh leaves are steamed for a few minutes in one cup of water. Chopped onions, salt, butter and any other seasonings are according to taste.

Preparations from Flowers

The flowers are a good source of calcium and potassium and should be cooked and consumed.

Fried alone or with a batter they have a taste reminiscent of mushrooms. Moringa flowers can be mixed with any leaf recipes or steamed and eaten as a salad.

Preparations from Pods

The entire young and pliable pod is cooked and eaten or used in the preparation of curries. In older pods which develop tough exterior, the pulp and immature seeds remain edible just before ripening begins. A dish is made by slicing pods into five centimeters lengths and boiled in water along with lentils. The flesh inside the pod sections is eaten.

Alternatively, pods can be opened and the flesh and young immature seeds scraped out pods are boiled in water for a few minutes. The seeds of edible pods should be white in colour. The seeds should be scraped out with the winged shells intact and as much of the soft white flesh as possible. It is rinsed with water to remove the sticky, bitter film. It is mixed with rice or roasted or fried in oil to give a taste like sweet groundnuts. The flesh can be cut into strips and steamed or fried, used to make a soup or be added to other sauces.

Indian Ayurveda claims that moringa oil also possess antitumor, antipyretic, antiepileptic, anti-inflammatory, antiulcer, antispasmodic, diuretic, antihypertensive, cholesterol lowering, antioxidant, antibacterial and antifungal activities.

Cosmetic Products

Moringa oil has tremendous cosmetic value and is used in body and hair care. Moringa oil has been used in skin preparations and ointments. It has nourishing and emollient properties, making it an excellent massage oil due to the presence of palmitoleic, oleic and linoleic acids, vitamins A and C and unsaturated fatty acid.

This moringa oil is in demand because it is so stable and resistant to rancidity and it has long been valued for its enfleurage property by the perfume industry. It is useful in the manufacture of perfume and hairdressings. The oil is known for its capacity to absorb and retain volatile substances and is therefore valuable in the perfume industry for stabilising scents and the oil has been used in skin preparations and ointments since Egyptian times.

Moringa based body cream

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07

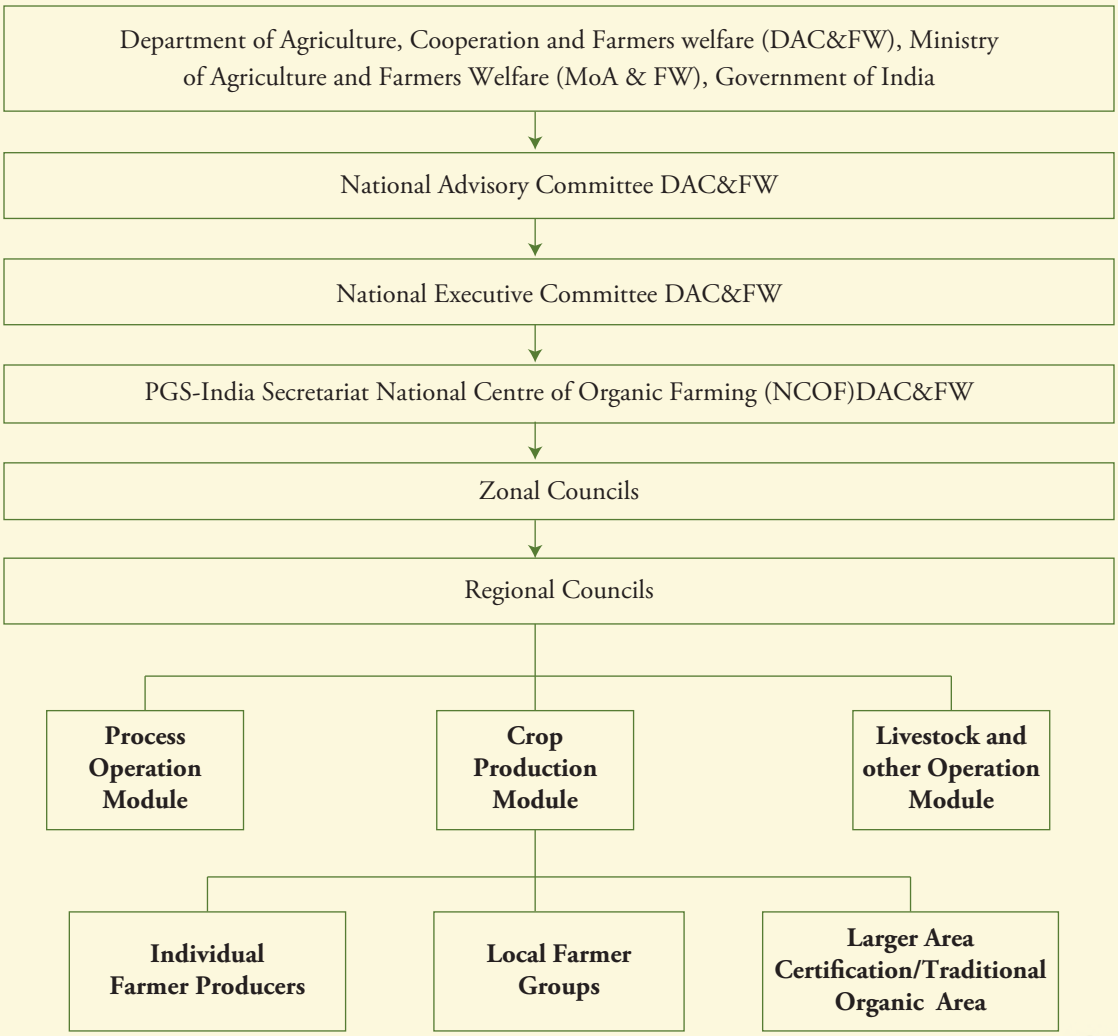
Internal Quality Assurance

What is Participatory Guarantee System?

The expansion of organic markets is mainly driven by consumers' concerns over food safety and environmentally friendly production. Certification reassures consumers' confidence in the organic integrity of the chain of custody of agricultural and agri-business processes. Given the plethora of organic certification standards, in year 2004 International Federation of Organic Agriculture Movements (IFOAM) and MAELA (Latin American Agroecological Movement) jointly organised the first International Workshop on Alternative Certification in Brazil. It was in this workshop, that the concept of Participatory Guarantee Systems (PGS) was adopted.

PGS India standards are the same as that of India's National Standards of Organic Production (NSOP) under National Programme for Organic Production (NPOP) operated by Agricultural and Processed Food Products Export Development Authority (APEDA).

PGS India: Operational Structure



Participatory Guarantee System (PGS) India

PGS India is a quality assurance initiative that is locally relevant, emphasises the participation of stakeholders, including producers and consumers, and operates outside the frame of third-party certifications. It is a non-hierarchical, national network established on the guiding principles of participation, shared vision, transparency, and trust.

Participation embodies the principle of collective responsibility for ensuring the organic integrity of the PGS. This is reflected through shared ownership of PGS, stakeholder engagement in the development and operation process, understanding how the system works and direct communication between producers, consumers and other stakeholders.

Shared vision drives the collective responsibility for implementation and decision making within PGS.

Transparency is created by having all stakeholders, including producers and consumers, to be aware of how decisions are made and how the guarantee system works to include the standards and the organic guarantee processes (norms) with clearly defined and documented systems.

Trust is rooted in the idea that producers can be trusted and organic guarantee system can be an expression and verification of this trust. This idea assumes that individual producer has a commitment to protecting nature and consumers' health through organic production.

PGS is **horizontally networked** and operates on democratic processes. Producers are engaged directly in the peer review of each other's farms and transparency is ensured in decision making processes. The movement for promoting and upscaling PGS, is provided an institutional structure by PGS India, that networks the groups under a common umbrella through various facilitating agencies, Regional Councils and Zonal Councils. National Centre of Organic and Natural Farming is the custodian of data, defines policies and guidelines and undertakes surveillance through field monitoring and product testing for residues. Regional and zonal councils build capacity of the groups and provide technological support to the groups.

PGS India also provides traceability of certified products on its website.

The related links can be found in Resources chapter of the toolkit.

What are the advantages of PGS India over third party certification?

- It is a government programme operated by Department of Agriculture and Farmers' Welfare. Procedures are simple, documents are basic and in local language. Peer appraisers are among the group and live in the same village, and therefore have better access to surveillance.
- Mutual recognition between Regional PGS groups ensures better networking for processing and marketing.
- Empowers farmers with increased capacity building to conduct farm appraisals. Brings consumers to the farm without the need for middlemen. Consumers and buyers are often involved in production and verification processes.
- Offers every farmer with individual certificate and each farmer is free to market their produce independent of the group.
- Random residue testing at regular intervals ensures quality assurance and increases consumers' trust.

How is PGS India programme different from PGS of PGSOC?

PGS of Participatory Guarantee Systems Organic Council (PGSOC) is similar to PGS India, but it is a private certification labelling initiative operated by a group of NGOs which are the practitioners and supporters of PGS in India.

Can PGS India certified products be exported to other countries?

PGS India certification programme is applicable for local and domestic market only and cannot be exported to other countries as organic, but can be exported as conventional to obtain premium price, if available.

What are the costs of PGS India certification?

For Individual farmer	For a farmer group	For processing facilities	For trading
Depending on the size of the land holding, the cost would vary between INR 4000-INR 10000	Depending on the size of the group, the cost of certification may vary between INR 17,000-INR 26,000	For 5 products INR 18,000 and for every product above 5 products INR 1,000.	For 5 products INR 16,000 and for every product above 5 products INR 1,000.

Note: Depending on market conditions, the above-mentioned costs of certification are liable to change.

Steps involved in PGS India Certification

1. Formation: Formation of Local Group (LG) & Identification of Lead Resource Person (Group Leader) Minimum: 5 members, Ideally: 20 – 25 members

2. Registration: Collection of prescribed format from Regional Council (RC) Uploading of filled in formats on PGS web portal (https://pgsindia-ncof.gov.in). Approval and Activation of unique id for LG by RC.

3. Training: Minimum 50% farmers of each LG to attend training by RC/Service Provider/State Government. Ideally, 2 training attended per farmer of each LG.

4. Meeting: Perennial – Minimum 2 times every year. Annual – 4 times every year.

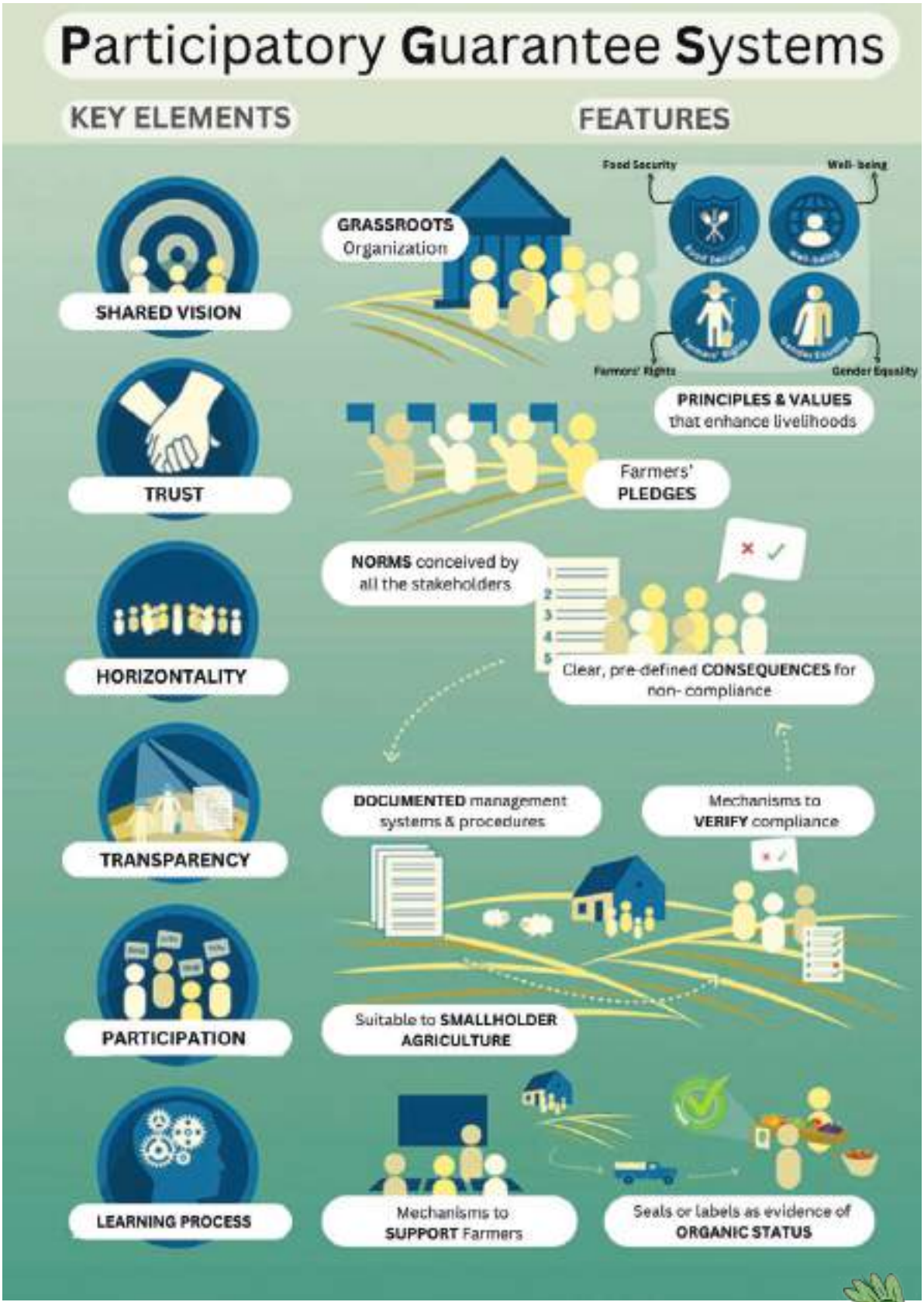
5. Peer Inspection: Minimum 2 in each season – 15 days after sowing and one month before harvest. Inspection team: Minimum 3 peer appraisers.

6. Summary Decision: Prepared by inspection team. Discussion on compliance and non compliance in meeting with all LG members. Submitted to RC for issue of certificate.

7. Issue of Certificate: PGS India Green Certificate (during conversion – 2 years for seasonal crops, 3 years for perennial crops) PGS India Organic Certificate (completely organic).

8. Marketing: Updating actual yield (5% variation) on PGS India web portal. Registering online on Jaivik kheti web portal (https://www.jaivikkheti.in)

Participatory Guarantee Systems Key elements and features



Source – PGS India website

Organic Standards: General Considerations

Integrate agroforestry.

Gradually, convert entire landholding along with livestock to organic. Conversion period: 36 months for perennial plants, 24 months for other crops, 12 months, if documents prove de-facto organic for several years, Zero months if no history of conventional practices and ban on such practices by administration (to be verified by PGS India Regional Council).

Integrate livestock.

Cropping: Mixed cropping & Intercropping (after first harvest), Crop Rotation (annual cultivars).

Buffer zone between organic and conventional plots.

Water: Conserve and harvest rainwater.

Raised bunds to prevent rainwater runoff from conventional to organic plots.

Source: PGS India

Organic Standards: Cultivation

Mulching, Composting, Green Manuring

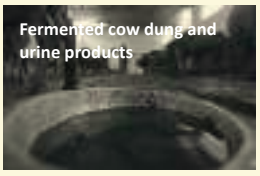
Pest management: Removal of infested plants / parts, Destruction of eggs / larvae, Light traps, yellow and blue sticky traps., pheromone traps, tilling, scraping hoeing, pest predators, parasites, pathogens, installation of bird perches, products certified by bodies certified under NPOP, microbial pesticides.

Weed management: Mowing, livestock grazing, mechanical weeding, flame/heat/electrical means, mulching with biodegradable material or plastic/synthetic mulches provided such mulches removed from field after harvest

Microbial preparations – biofertilizers, biodynamic preparations, EM solutions.

Mined mineral fertiliser in their natural composition.

Off-farm inputs derived from plant or animal origin approved by NPOP.



Raw dung-urine products after controlled fermentation.

Organic or chemically untreated seeds/planting material/plants.

Source: PGS India

Organic Standards: Storage, Processing, Handling and Transportation

Separate storage, processing, handling and transportation for inputs, organic farm produce and conventional produce.

Good manufacturing practices ensuring cleanliness and hygiene.

Use of physical barriers, sound, UV-light, traps, temperature control, controlled atmosphere and diatomaceous earth.

Labelling for identifying, segregating and tracking products.

Processing equipment and machinery washed and made contamination free.

Extraction with water, ethanol, plant and animal oils, vinegar, carbon dioxide, nitrogen or carboxylic acids. All solvents used in processing of food grade quality.

Packaging material – biodegradable, recyclable, reusable and eco-friendly.

Last resort - treatment with pest regulating agents, on the condition that the organic products do not come into contact with such substances.

Source: PGS India

Organic Standards: Don'ts

Not Recommended

Mono cropping

Excessive and improper use of water

Clearing or destruction of forests

Simultaneous production of same crop under organic and conventional practices

Not Permitted

Direct or indirect contact between organic products and prohibited substances

Persistent or carcinogenic pesticides and disinfectants

Synthetic preservatives, chemicals, fumigants or storage aid

Packaging material that contaminate food

Strictly Prohibited

Genetically modified/engineered seeds/planting material/plants

Mineral nitrogen and all synthetic fertiliser chemical hormones, synthetic growth promoters

Sewage, sludge, human excreta or their products

Synthetic herbicides, fungicides, insecticides and other chemical preparations, synthetic plant growth regulators, synthetic dyes, genetically engineered organisms

Irradiation: Exposure to ionising radiation

Voluntary certification and Trading

To maximise the potential of Moringa as a super food, there are some resources within the Ministry of Ayush.

To encourage Good Agricultural Practices (GAP) and Good Field Collection Practices (GFCP) in medicinal plants and enhance quality and safety of these plants, the National Medicinal Plants Board (NMPB), in collaboration with the Quality Council of India (QCI), has launched a Voluntary Certification Scheme for Medicinal Plant Produce (VCSMPP) for medicinal plants.

The certification can be obtained for the following levels based on customer needs as per the requirements prescribed for each level:

Level 1:

- **Focus:** Addresses the quality and safety of medicinal plant produce.
- **Certification requirements:**
  - **Producers:** Compliance with GAP as outlined in Annex A of the VCSMPP scheme. This includes practices like maintaining soil health, using organic manure, proper irrigation, and pest management.
  - **Collectors:** Compliance with GFCP as outlined in Annex B. This includes practices like sustainable harvesting techniques, identification of species, and proper drying and storage procedures.
  - **Identification:** Species identification through Thin Layer Chromatography (TLC) profiling may be required in specific cases.
  - **Contaminant testing:** Testing for permissible levels of contaminants as listed in Annex D of the scheme.

Level 2:

- Builds upon Level 1: Requires adherence to all Level 1 requirements.
- Additional focus: Ensures the produce meets the quality standards specified by official compendia like the Ayurvedic Pharmacopoeia of India (API), Unani Pharmacopoeia of India (UPI), or Homoeopathic Pharmacopoeia of India (HPI).
- Target audience: Primarily caters to drug manufacturers and stakeholders involved in processing medicinal plants for the AYUSH (Ayurveda, Yoga, Unani, Siddha, and Homeopathy) industry.

Key benefits of VCSMPP:

- Improved quality and safety: Promotes sustainable harvesting practices and reduces the risk of contamination in medicinal plants.
- Enhanced market access: Certification serves as a mark of trust for producers and facilitates entry into domestic and international markets.
- Increased income potential: Certification can potentially command premium prices for certified medicinal plant produce.

National Medicinal Plants Board (NMPB) has joined hands with major Ayush and herbal industry bodies given below for promoting medicinal plant cultivation:

- Association of Manufacturers of Ayurvedic Medicine (AMAM)
- Ayurvedic Drug Manufacturers Association (ADMA)
- Ayurvedic Medicine Manufacturers Organisation of India (AMMOI)
- Association of Herbal and Nutraceutical Manufacturers of India (AHNMI)
- Federation of Indian Chambers of Commerce & Industry (FICCI)
- PHD chamber of commerce and Industry (PHDCCI)

(Sources: National Medicinal Plants Board (https://qcin.org/ck-docs/1634820731.VCS%20MPP%20Brochure%20English.pdf) and Quality Council of India (https://www.nmpb.nic.in/content/voluntary-certification-scheme-medicinal-plant-produce-vcsmpp)

08

Programme Management

What are the important components of a programme for promoting Moringa-based livelihoods, especially among vulnerable and poor households?

Broadly there are three important components which form the pillars of a robust programme designed to address poverty by making Moringa an attractive livelihood option:

- Establishing marketing linkages.
- Building a collaborative platform for ensuring convergence of resources.
- Mobilising farmers for adopting Moringa cultivation.

The success of any agribusiness development programme hinges critically on establishing tie-ups for sale of the produce. Let us take a look, at two promising initiatives.

Building a hyper local market

In Khandwa district of Madhya Pradesh, GIZ India worked closely with their partner organisation, Mahatma Gandhi Sewa Ashram (MGSA) with a two pronged approach:

a) Create a demand among the producers themselves for local consumption of Moringa produce.

b) With support from Department of Horticulture, they set up a small processing unit to develop value added products, such as Moringa leaf powder. Through a tie-up with MGSA organisation, rights, based organisation working towards building self-reliant rural communities, they established an assured market for more than one lakh producers at the Anant Mandi, an organic farmers' and local artisans' market. This in turn attracted more producers into the cultivation of Moringa.

Contract Farming

bioRe, one of the implementation partners of the previous project of GIZ India called Sustainability and Value Added in the Cotton Economy, entered into a contract farming agreement with Super Vedic, an exporter based in Gujarat serving markets in USA, to promote Moringa cultivation among its cotton producers. Super Vedic provides seeds and marketing support to the farmers while bioRe works closely with the farmers for production of organic Moringa according to standards defined by Super Vedic. Based on two years of learnings, bioRe plans to upscale the initiative to establish Moringa plantations on 1000 acres.

Establishing Convergence

In year 2022, Government of Bihar launched a pilot programme for promoting Moringa on wasteland in 12 districts, with a subsidy of 50% on the total cost of cultivation estimated at about INR 74,000 per hectare. The subsidy would be released in two instalments, on the condition that 90% of the planted trees survive at the end of two years.

Basis their study conducted in Gaya district Prerna, an NGO in Bihar, realised that almost every household had two to three Moringa trees growing near their homestead, being used largely for household consumption but having sufficient marketable surplus. In collaboration with Anganwadi Centres, they rolled out a pilot in Gaya district to procure and sell the produce of 500 existing Moringa producers from five SHGs. They mobilised funds from the Cluster Level Federation to set up a processing unit for leaf powder production, that was profitably sold through retail outlets in Gaya and Patna.

To make productive use of wasteland, they established one Moringa plantation, with support from Joint Forest Management Committee.

In order to cater to the large number of dairy producers, they began local sales of Moringa leaf powder as cattle feed supplement.

Based on their learnings they are now planning to a) Establish Moringa plantations, b) Create processing infrastructure, and c) Provide market access to more producer groups. They have dedicated one personnel for interfacing with government departments at district and state levels and establishing agreements with market players.

Har Ghar Moringa: A Campaign for Comprehensive Coverage

In Khandwa district of Madhya Pradesh, GIZ India partnered with IGSSS, a national level NGO, to launch a campaign christened 'Har Ghar Moringa' in twelve gram panchayats. The campaign raised awareness among producers, buyers and also government departments.

- About 2,000 women SHG members participated in Moringa Mahotsav.
- About 2,000 SHG members planted Moringa trees for the first time.
- 57 farmers planted Moringa through convergence with Mahatma Gandhi NGREGS, Nandanphlodhyan.
- About nine acres of community land was earmarked for Moringa plantation with support from Mahatma Gandhi NGREGS.
- Training programmes for production of bio-inputs were conducted.
- Training on entrepreneurship development was conducted in partnership with KVK and EDII.
- Two SHGs were selected and trained for setting up processing units.
- Aggregation centres were set up.
- A buyer database was created.

Overall, the campaign enlisted the support of major stakeholders and created a platform for future tie-ups, to facilitate large scale cultivation of Moringa in the area.

Steps for Moringa cultivation

Identification of CLF	Training of the CLF members	Identification of potential buyers; traders and convergence schemes of the state	Land identification for developing a production cluster	Training of farmers

The calendar for moringa production for pods and leaves is attached Resources chapter of the toolkit. A A3 size physical print file is attached in the back pocket of toolkit. For digital copy of the calendar please scan QR code mentioned in the inside of back cover page of the toolkit.

Potential marketing linkages for moringa

Ayush industry owners/extract manufacturers/ exporters, etc. for participation in the cultivation of medicinal plants with a pre-decided price, buy-back agreement, and volume. They will share cultivation costs on the terms that are agreeable to the parties, clusters, farmers, industry owners, etc.
Presently, the Ministry of Ayush has a Centrally Sponsored Scheme (CSS) of the National Ayush Mission (NAM). Under the 'Medicinal Plants' component of the NAM scheme supporting market-driven cultivation of prioritized medicinal plants in identified clusters/zones within selected districts of States and deployed in a mission mode across the country.

As per the scheme guidelines, the support is offered for:

- Post-harvest management with forwarding linkages.
- Cultivation of prioritized medicinal plants on farmer's land.
- Establishment of nurseries with backward linkages for raising and supply of quality planting material.
- Primary processing, marketing infrastructure, etc.

Under this scheme, subsidy at the rate of 75%, 50%, and 30% of the cost of its cultivation is offered for the cultivation of 140 prioritised medicinal plants including moringa on farmer's land.
Ministry of Ayush has set up an e-market platform that can be used to access the market. It is called e-Charak portal and can be accessed on the link https://echarak.in/echarak/main.do. The e-charak portal has a mobile app version and has resources on potential markets and price trends. It can be accessed through the link https://echarak.in/echarak/mobileApp.do .

In the state of Madhya Pradesh Mahatma Gandhi NREGS has converged with AYUSH department under the Devaranya scheme. "Devaranya" Scheme is flagship initiative which links AYUSH with the livelihood of the STs. The scheme, now under implementation, creates a complete value chain for the production and distribution of AYUSH medicines. The scheme would be connecting the tribal farmer with the pharmaceutical industry directly as market linkages. Given that majority of the ST depend on forest resources for their living and

livelihood, the State initiatives would go a long way in the conservation of tribal rights and ensuring economic upliftment, as well".

Note: Taken from M.P. State Planning Commission, Government of Madhya Pradesh. The state letter on convergence is attached in the annexure in the end of the toolkit.

India is the main supplier of moringa worldwide, accounting for around 80% of global demand. The standardisation of moringa leaf powder, such as the protein content or the omega-9 and vitamin E content are some important parameters. For tapping the export market, it must ensure that the product is of international quality. For example, in order to export moringa to Europe, they must make sure that the product has the following features: hygiene, traceability, Maximum Residue Levels (MRLs) for pesticides and Polycyclic Aromatic Hydrocarbons (PAHs) and so forth.

Agricultural And Processed Food Products Export Development Authority (APEDA) under the Ministry of Commerce and Industry, Government of India, responsible for the export promotion of agricultural products. APEDA was established by the Government of India under the Agricultural and Processed Food Products Export Development Authority Act passed by the Parliament in December 1985.

It supports entrepreneur and industry for the following:

- Promotion of exports of agricultural and processed food products. Promotion of export-oriented production and development of the Scheduled products.
- To make Improvement in numerous areas such as packaging, marketing for the Scheduled products outside India.
- Setting standards and specifications for the scheduled products for the purpose of exports.
- Financial assistance, reliefs, and subsidy to the relating industries.
- To provide training in the related areas.

09
Resources

german cooperation
DEUTSCHE ZUSAMMENARBEIT
Implemented by
giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH
Ministry of Rural Development Government of India

LAND

- Minimum one acre sandy loam soil. Well drained and received full sunlight.
- Not water logged.
- Not shaded.

LABOUR

- About two to three persons per care mainly during sowing, harvesting and processing.
- Rest of the time, two persons can track and maintain about one lakh trees.

BIO INPUTS

- Vermicompost, fermented farmyard manure, Mycorrhiza, Trichoderma, Gypsum.
- Other bio fertilisers and pesticides prepared using local material.

IRRIGATION

- Assured irrigation required for growing stage of the plant.
- Drip irrigation most efficient and preferred

PLANTING MATERIAL

- Seed from reliable sources, such as KVK, Agricultural University, SHG/CLF/BRC (Bio Resource Centre), a neighboring farm with established performance.
- Use certified organic seed.

FARM TOOLS

Equipments like Tractor, pH meter, pruning shears

Resources for Commercial Cultivation of Moringa

Tear it from here

This chapter have the contact details of government organisation, names and links to get more information about moringa.

Contact details of government organisations in India engaged in promoting moringa production:

Name of Organisation	Website / email id
Deendayal Antyodaya Yojana – National Rural Livelihoods Mission (DAY-NRLM) Ministry of Rural Development – Government of India	www.nrlm.gov.in
Agricultural and Processed Food Products Export Development Authority (APEDA)	www.apeda.gov.in head(at)apeda(dot)gov(dot)in ppwaghmare(at)apeda(dot)gov(dot)in
Mahatma Gandhi National Rural Employment Guarantee Act 2005, Ministry of Rural Development, Government of India	www.nrega.nic.in
National Health Mission, Ministry of Health and Family Welfare	www.nhm.gov.in www.mohfw.gov.in
Integrated Child Development Services, Ministry of Women and Child Development, Government of India	officeofmos-wcd@gov.in www.wcd.nic.in
Mission for Integrated Development of Horticulture (MIDH)	jsmidh-agri(at)gov(dot)in www.midh.gov.in
Ministry of Environment, Forest and Climate Change, Government of India	www.moef.gov.in
National Mission on Natural Farming, Ministry of Agriculture and Farmers' Welfare, Government of India	www.naturalfarming.dac.gov.in secy-agri(at)gov(dot)in
National Centre of Organic Farming 19 Hapur Road, Near CBI Academy, Ghaziabad – 201002, Uttar Pradesh	www.ncof.dacnet.in email: nbdc(at)nic(dot)in

Here are some weblinks that provide useful information related to Moringa:

Weblink	Search
https://pgsindia-ncof.gov.in	PGS India Certification Standards
https://nisargorganicfarm.com	Certified Organic Products
https://apeda.gov.in	NPOP Certification Standards
https://indiaclimatecollaborative.org	Bio-input Resource Centre Manual
https://thegoodleaf.in	The Good Leaf
https://biore.ch	bioRe Sustainable Cotton Standards
https://www.cecoedecon.org.in	CECOEDECON NGO
https://wwww.mahatmagandhisevaashram.org	Mahatma Gandhi Seva Ashram
Facebook	Anant Mandi, Bhopal
apcnf.in	Andhra Pradesh Community Managed Natural Farming, An initiative of Rythu Sadhikara Samstha, Government of Andhra Pradesh.

Notes

Farmers Moringa Plantation Tracker

I) Farmers' Profile at a Glance

Year of starting Moringa cultivation: .....

Name of Farmer	Age	Educational Level
No. of family members	Number of family members engaged in agriculture/ allied	Number of family members engaged in agriculture/ allied
Livelihood Activities	1)	2)
	3)	4)
Current monthly household expenditure to track (in ₹)	Current loans (in ₹)	Current outstanding loans (in ₹)

Name of SHG	Name of Farmer Group	Name of Producer Company	Name of Cluster Level Federation	Name of any other association
Village	Gram Panchayat	District	State	Distance of village from nearest Mandi

Total Area Under Cultivation (in acres)	Total Area Under Moringa (in acres)	No of Moringa trees

List of on-farm inputs used	Cost (in ₹)	List of external inputs used	Cost (in ₹)

Quantity in kg.	Leaves		Pods		Seed	
	First Harvest	Second Harvest	First Harvest	Second Harvest	First Harvest	Second Harvest
Total production						
Marketable Surplus						

Ii) Activity Tracker

Activity	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
If group farming, permission from gram panchayat for cultivation on community land												
Meeting with members for preparation of cultivation plan												
Soil testing												
Linkages for seed and other inputs												
Linkages for sale of produce												
Land preparation												
Preparation of bio-inputs												
1. FERTILISATION												
First Application												
Second Application												
Third Application												
Fourth Application												
Fifth Application												
Sixth Application												
2. SOWING												
3. IRRIGATION												
First Application												
Second Application												
Third Application												
Fourth Application												
Fifth Application												
Sixth Application												

Activity	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4. WEEDING												
First Time												
Second Time												
Third Time												
Fourth Time												
Fifth Time												
5. DISEASES & PET SURVEILLANCE												
First Time												
Second Time												
Third Time												
Fourth Time												
6. PRUNING												
First Stage												
Second Stage												
Third Stage												
Fourth Stage												
7. HARVESTING												
First Harvest												
Second Harvest												
8. PROCESSING												
First Batch												
Second Batch												
9. SALES												
First Lot												
Second Lot												
Income Calculation (in ₹)												
Profit (in ₹)												

Annual Activity Calendar

Activity	Leaf Production Month	Pod Production Month	Comments
Sowing	March	March	Sept-Oct in southern India
Irrigation			
Initial application	March	March	Land Preparation
1st Application period	March-June	March-June	Once for every 7-10days
2nd Application period	November-December	November-December	Irrigation may not be required during the rainy season
Irrigation in Subsequent years			Follows same as in 1st year
Fertilisation			
1st Application	March	March	Land Preparation
2nd Application	April-May	April-May	
3rd Application	August	August	
4th Application	October	October	Before dry period
First Applicatio: 2nd year	June	June	Next production cycle: Before the monsoon
Subsequent Applications in 2nd Year	Follows the previous years'	timings	This is the same for year/years after 1st year
Weeding			
Time	April-July	April-July	Weeding during 30-90 days after sowing is crucial for final crop yield
Pruning			
1st pruning	June	May	For leaf production, pruning is to be carried out after every harvest.
2nd pruning	August	June	
3rd pruning	October	July	
4th pruning	December	August	For pod production, a minimum of 3 prunings to be done
5th pruning	February		
Ratooning/Hard Pruning (cutting at 1-2 feet above the ground): **@ end of 1st year**	March	March	Prunings in 2nd year follow same /similar timings as in 1st year.
Harvesting			
1st harvesting	June	September-November	There could be more than 5 harvests in leaf production.
2nd harvesting	August		
3rd harvesting	October		
4th harvesting	December		
5th harvesting	February		

Moringa and its growth potential

The biggest reason moringa is gaining popularity world over is because studies have been carried out over time that prove its biological, nutritional, and health-promoting properties. At present, there are over a thousand scientific articles on its health and wellness benefits. A study published in 2014 in the International Journal of Scientific Study* found moringa leaf can cure malnutrition in children. The study was conducted in Karnataka, and it found 52% of the children who were given moringa gained weight in just two months.

There is multiple research that suggests that Moringa oleifera holds promise in the prevention and treatment of various chronic diseases. Its diverse properties make it a valuable addition to both nutrition and health promotion. Some of the key aspects of Moringa which could be further promoted are mentioned below:

- Nutraceutical properties of Moringa:
  - Rich in Nutrients: M. oleifera is abundant in proteins, vitamin A, minerals, essential amino acids, antioxidants, and flavonoids.**
  - Natural Antioxidants: Its leaves are a good source of beta-carotene, vitamin C, vitamin E, and polyphenols.***
  - Blood Lipid Reduction: Extracts from M. oleifera exhibit blood lipid-reducing functions.****
- Pharmacological functions of Moringa:
  - Anti-Inflammatory: M. oleifera has anti-inflammatory properties.
  - Antioxidant: It acts as an antioxidant, protecting cells from oxidative stress.***
  - Anti-Cancer: Some studies suggest its potential in cancer prevention.
  - Hepatoprotective: It supports liver health.
  - Neuroprotective: May have benefits for neurological well-being.
  - Hypoglycemic: Helps in regulating blood sugar levels.
- Moringa as Bioactive Phytochemicals:
  - The beneficial effects of M.oleifera are linked to its flavonoids and isothiocyanates.*****

* V S Srikanth, S Mangala, and G Subrahmanyam (2014). Improvement of Protein Energy Malnutrition by Nutritional Intervention with Moringa Oleifera among Anganwadi Children in Rural Area in Bangalore, India. International Journal of Scientific Study, https://www.ijss-sn.com/uploads/2/0/1/5/20153321/ijss_apr-08.pdf

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Annexure

Government advisories on Moringa (2021, 2023 and 2024)

2021

F.No K-11062/05/2021-22/LH/Moringa

Government of India
Ministry of Rural Development
Department of Rural Development
(Mahatma Gandhi NREGA Division)

Krishi Bhawan, New Delhi
Dated 27th September, 2021

To,

The Additional Chief Secretaries/ Principal Secretaries/ Commissioners
(in charge of Mahatma Gandhi NREGS)
Rural Development Department,
All State/UTs

Sub: - Joint Advisory for promotion of Moringa/Drum Stick in convergence with DAY-NRLM/SRLMs.

Madam / Sir,

You are aware that Moringa/Drum Stick (*Moringa oleifera Lam.*) planation is a permitted horticulture activity as Community Asset or Individual Asset (for vulnerable sections for households under Paragraph 5 of the Schedule of the Act) and as Public Works. The Ministry has issued guidelines on 04th May, 2020 for promoting nutri-garden for individual beneficiaries and community in convergence with State Schemes and NRLM.

DAY-MRLM is promoting Moringa planation through its various initiatives. Some of the SRLMs have raised Moringa nurseries for distribution among SHG members. DAY-NRLM has also trained and deployed a large number of Krishi Sakhi whoare well versed with plantation and agri-nutri garden promotion. DAY-NRLM has established a large number of Producer Groups (PGs) with women farmer members for introduction of agro-ecological practices and forward linkages.

In order to promote Moringa planation activity under Mahatma Gandhi NREGAthis advisory has been formulated.

2. **Role of National Rural Livelihoods Mission/ State Rural Livelihood Missions:**

i. Integrate Moringa plantation as an essential component of agri-nutri garden initiative of farm livelihoods interventions.
ii. Identifying Cluster Level Federations (CLFs) for implementation of the project – Promotion of Moringa / drumstick under the individual lands of SHG members.
iii. Train livelihoods staff, CLFs, PGs, Krishi Sakhi and SHG members for training on promotion of Moringa / Drumsticks and taking up plantation works.

iv. Providing hand-holding support to CLFs, SHGs, PGs, Krishi Sakhi, and individual beneficiaries in implementation of promotion of Moringa/drum stick.
v. Identifying the suitable SHG members (as per Para 5 of the Schedule-I of Mahatma Gandhi NREGA) for promotion of Moringa / Drumstick in individual lands in a cluster of villages to ensure marketable surplus and in each village block approach may be adopted to ensure marketable surplus.
vi. Forward linkages for sale of Moringa / drumstick products in the market.
vii. Providing advice to the plantation beneficiaries about the inter – cropping activities that could be taken up to generate additional streams of income, which sustain the interest of beneficiaries till plantation starts bearing fruit.
viii. Will set up a communications network for advisories and support for disease and growth monitoring.
ix. NRLM and SRLMs will obtain appropriate package of practices for Moringa / Drumstick from State Agriculture Universities.
x. Each SHG member may be provided five plants from the nursery raised by CLFs.
xi. DAY – NRLM is promoting Integrated Farming Clusters (IFC) – Moringa can be an important component of these also.
xii. DAY – NRLM and SRLMs should promote value addition of Moringa products viz leaf, pods and seeds to realise more income by the SHG members.
xiii. CLF wherein it is an agency for implementation, will be responsible for non-negotiable like quality of works, Geotagging, maintenance and all other non-negotiable of Mahatma Gandhi NREGS in the States.
xiv. No contractor will be allowed for the execution of nursery raising/ Moringa Plantation as per this advisory.

3. **Role of Mahatma Gandhi NREGA:**

It should be ensured that only permissible works under Mahatma Gandhi NREGA are taken up after following due process. Therefore, following points need to be adhered:

i. All non-negotiables (Social Audit for all works etc.) under Mahatma Gandhi NREGA will be followed while taking up activities for promotion of horticulture plants like creation of shelf of works for the promotion of Moringa / Drumstick.
ii. The cost of material component including the wages of the skilled and semi-skilled workers shall not exceed forty percent at the district level.
iii. The relevant provisions mentioned in Paragraphs -5 of the Schedule – I of the Act need to be adhered to in selection and prioritising individual beneficiaries.
iv. The estimate prepared for plantation activities should include the maintenance period for 3-5years(depending on the species). All costs should form part of one estimate.

4. **Monitoring & Coordination:**

i. The monitoring of progress should be done at the State/UT level under Chairmanship of state Secretary(in charge of SRLM and Mahatma Gandhi NREGS) alongwith State Mission Director, SRLM and Commissioner, Mahatma Gandhi NREGS.

ii. At district level, the monitoring should be done by District Level Coordination Committee (DLCC) for convergence headed by the Collector / DPC alongwith District Programme Manager (DPM), SRLM and Additional DPC (ADPC).

5. **Miscellaneous:**

i. For durability and productivity of plantation, it is necessary that month wise schedule of activities for tree plantation and responsibility of stake holders is worked out by the SRLM which will vary from State to State.

ii. For enhanced participation of women in Mahatma Gandhi NREGA implementation, efforts should be made to progressively engage Federation of women Self Help groups as Project Implementing Agencies (PIAs) at the Gram Panchayat/ Block/District level.

iii. The Cluster Level Federations (CLFs) constituted under the National Rural Livelihoods Mission could also act as the Programme Implementing Agencies (PIAs). This could be especially helpful for promotion of livelihood enhancing category B (Individual) assets.

iv. For all such works (individual/ Community) of nursery raising and Moringa plantation where CLF, as identified by SRLM, is the programme implementing Agency, this will be the duty of SRLM to propose/place the works to Panchayat at intermediate level (Block Level) to be included and finalized in the Annual Action Plan . The decision of Block Panchayat will be final.

v. For all such works (individual/ Community) of nursery raising and Moringa plantation where Gram Panchayat is the Programme Implementing Agency, this will be the duty of SRLM to propose/place the works to Gram Panchayat to be included in the Annual Action Plan of Gram Panchayat and will be finalized by the Gram Sabha. The decision of Gram Sabha will be final.

The State / Union Territories are requested to promote Moringa/Drumstick plantation activities after following due process in accordance with guidelines of the concerned scheme.

Joint Secretary (RL)
चरणजीत सिंह / CHARANJIT SINGH
संयुक्त सचिव / Joint Secretary
भारत सरकार / Govt. of India
ग्रामीण विकास मंत्रालय/M/o Rural Development
कृषि भवन, नई दिल्ली/Krishi Bhawan, New Delhi

Joint Secretary (RE)
रोहित कुमार / ROHIT KUMAR
संयुक्त सचिव / Joint Secretary
भारत सरकार / Govt. of India
ग्रामीण विकास मंत्रालय/M/o Rural Development
कृषि भवन, नई दिल्ली/Krishi Bhawan, New Delhi

नागेन्द्र नाथ सिन्हा, आई.ए.एस.
सचिव
NAGENDRA NATH SINHA, IAS
SECRETARY

सत्यमेव जयते

भारत सरकार
ग्रामीण विकास मंत्रालय
ग्रामीण विकास विभाग
कृषि भवन, नई दिल्ली–110001
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DO # J-11060/4/2019-RE-VI (366816)

January 6, 2022

Subject: **Advisory for CLF as Programme Implementing Agency (PIA) for general plantation (including Moringa Plantation) and nursery raising (including Moringa) at block level and for Individual beneficiary project of eligible beneficiary from NRLM compliant SHG household -reg.**

Dear Chief Secretary,

As you are aware that Mahatma Gandhi NREG Act to provide for the enhancement of **livelihood** security of the household in rural areas of the country by providing at least one hundred days of guaranteed wage employment in every financial year to every household whose adult members volunteer to do unskilled manual work and for matters connected therewith or incidental thereto.

2. As per the guidelines the Cluster Level Federations (CLF) constituted under the NRLM could also act as the Programme Implementing Agencies (PIA). This could be especially helpful for livelihood enhancing category B (individual) assets. The selection of eligible individual beneficiary is based on the provision under para 5 of the Schedule-I of the Act.

3. For enhancing participation of women in Mahatma Gandhi NREGA, efforts should be made to progressively engage NRLM compliant CLF for individual beneficiary plantation work particularly Horticulture plantation **(including Moringa Plantation)**, Nursery raising **(including Moringa)** at block level and Individual beneficiary project of eligible beneficiary from NRLM compliant SHG household under Mahatma Gandhi NREGS. Works creating individual assets shall be prioritized on land or homestead owned by household belonging to the:

(a) Scheduled Castes
(b) Scheduled Tribes
(c) Nomadic tribes
(d) denotified tribes
(e) other families below the poverty line
(f) women-headed households
(g) physically handicapped headed households
(h) beneficiaries of land reforms
(i) the beneficiaries under the Pradhan Mantri Awass Yojana-Gramin

contd....

(j) beneficiaries under the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 (2 of 2007), and After exhausting the eligible beneficiaries under the above categories, on lands of the small or marginal farmers as defined in the Agriculture Debt Waiver and Debt Relief Scheme, 2008 subject to the condition that such households shall have a job card with at least one member willing to work on the project undertaken on their land or homestead.

4. For all such individual plantation works (particularly Horticulture plantation) and Nursery raising at block level, where CLF as programme implementing Agency, this will be the duty of BPM/DPM of SRLM to propose/place works to the Panchayat at intermediate level (Block Level) through Programme Officer (PO), Mahatma Gandhi NREGA, to be included and finalized in the Annual Action Plan.

5. It has further been decided that the request for individual beneficiary work from a NRLM compliant SHG household may be collected by CLF through its SHGs and village organization all such applications (request) may be placed before Panchayat at intermediate level (Block Level) by the BPM/DPM of SRLM through Programme Officer (Mahatma Gandhi NREGA) for their inclusion in Annual action plan, after the due approval of Block Panchayat.

6. The decision of Panchayat at intermediate level (Block Level) with respect to the activities at para 4 and 5 will be final.

7. The Role of PO and BPM/DPM of SRLM is detailed below:

Role of PO –

(i) PO will scrutinize the proposals as received from BPM/DPM as per the provision of para 5 of Schedule-I of the Act before submitting to the block Panchayat.
(ii) To facilitate Social Audits for such works.
(iii) To ensure that the service of Technical Assistant as required for preparation of technical estimate and also the measurement of works executed by CLF as PIA till a JTA engaged by the CLF.
(iv) All other roles as specified in the Act.

Role of BPM/DPM of SRLM –

(i) Listing of eligible beneficiary as per para 5 of the Schedule-I of the Act.
(ii) To propose/place the list of eligible beneficiaries before the Panchayat at intermediate level (Block Level) Governing Council through PO and also to attend the meeting of Governing Council of Block Panchayat for approval of Annual action plan.
(iii) Inspection of technical Agency to ensure quality.
(iv) Monitoring of works in coordination with PO (Mahatma Gandhi NREGA)
(v) To ensure Social Audit for such works.

contd....

8. The technical estimates may be prepared by the CLF in consultation with the line Department of States and (or) State Agriculture University and Tissue Lab of the State and till the Technical Assistant for CLF is not available, the Technical Assistant of Mahatma Gandhi NREGS of Rural Development Department of the concerned state will prepare the technical estimate and also the measurement of all such works taken up by CLF as PIA.

9. An Engineer / Consultant Technical Assistant (CTA) of CLF-PIA, whose function would be comparable to the Junior Technical Assistant under Mahatma Gandhi NREGS at the block level, to prepare technical estimates of the work in beneficiary households and measures labour and material on completion of work, as per Schedule of power of the concerned State Government. The Engineer / Consultant Technical Assistant (CTA) of CLF-PIA may be hired and paid by CLF. Administrative fund entitlement based on their engagement for implementation of Mahatma Gandhi NREGS will be made available by State Govt. will assist CLFs by provision for the same. SRLM and/or DPC may also assign departmental or other engineers or persons qualified to measure and certify work to the CLFs.

10. The beneficiary's household would submit demand i.e., Form-6 to the CLF. The CLF has to ensure that the demand of all eligible beneficiaries who wishes to work on a particular individual beneficiary work may be placed before the PO in the form of a demand for employment application (Form-6). Thereafter the PO (Mahatma Gandhi NREGA) will issue muster roll for all such eligible beneficiary for the same work as per the provision of the Act.

11. On completion of period (fortnightly/weekly) of a Muster Roll, the JTA/Engineer of the CLF will measure the task perform as well as material consumed and will record on the Muster Roll as a part of Measurement Book and put up her/his signature. Thereafter the Muster Roll (MR) needs to be passed/signed by CLF President and Secretary (CLF) like it is being done in case of GP as PIA (sarpanch and GRS/Gram sewak). Based on the Muster Roll and Measurement Book dully signed and submitted by the Engineer, the accountant would prepare a financial estimate by calculating the wages and material cost. The information in Measurement Book and material vouchers would be verified by CLF President, Cluster Project Manager (CPM), Engineer/CTA and accountant of the CLF before final release of payment by PO (Mahatma Gandhi NREGA).

12. The details would be entered online by the CLF as PIA for wage-list preparation following which final FTO(fund transfer order) for payment for wage as well as material would be generated by PO (Mahatma Gandhi NREGA) within 8 days of completion of work as per the guidelines of Mahatma Gandhi NREGA.

13. **The CLF as PIA will ensure the compliance of all non-negotiables under Mahatma Gandhi NREGA.**

14. The Programme Officer (Mahatma Gandhi NREGS) will act as Programme Officer for the works taken up by CLF as PIA under Mahatma Gandhi NREGS.

contd....

15. As per the provisions in the Act and the Annual Master Circular that at least 50% of the works in terms of cost shall be allotted to Gram Panchayats for implementation. The CLFs would be provided works, without reducing the prescribed 50% works entitlement for the Gram Panchayats.

16. In the light of above, I would like you to request you to instruct the concerned officers for appropriate action.

With warm regards,

Yours sincerely,

(Nagendra Nath Sinha)

The Chief Secretaries/Advisors to Administrators of all States and Union Territories (Except Delhi and Chandigarh)

File No J-11060/18/2022-RE-VI.Part (1)
Ministry of Rural Development
Department of Rural Development
(Mahatma Gandhi NREGA Division)

****

Krishi Bhawan, New Delhi

16th January, 2024

To

The Principal Secretary/Secretary/Commissioner (in charge of Mahatma Gandhi NREGA), Rural Development Department

Mission Director/Chief Executive Officer
State Rural Livelihood Mission

All States/UTs(Except Delhi & Chandigarh)

Subject : Advisory on Cluster Level Federation (CLF) as Programme Implementing Agency (PIA) under Mahatma Gandhi NREGS.

Ref: DO No. J-11060/4/2019-RE-VI (366816) dated 6th January 2022 from MoRD regarding :

i. CLF as PIA for general plantation at block level and for individual beneficiary project.
ii. Promotion of plantation works with special emphasis on horticulture plantation around 20% of the land areas of eligible individual beneficiary household

Madam/Sir,

As you are aware, an advisory on Cluster Level Federation (CLF) as Programme Implementing Agency (PIA) under Mahatma Gandhi NREGS was issued with reference to above letter on 6th January 2022 and the same has been stipulated in the Annual Master Circulars (AMC) 2022-23 (Para 6.7.2, 7.1.1 and 7.5.9) of Mahatma Gandhi NREGS for implementation of CLF as PIA.

It is reiterated that CLF constituted under National Rural Livelihood Mission (NRLM) could act as PIA under Mahatma Gandhi NREGS. This could be especially helpful for livelihood enhancing Individual works. The selection of eligible individual beneficiary is based on the provision under Para 5 of the Schedule-I of the Act.

With a view to ease out the process of implementation of CLF as PIA under Mahatma Gandhi NREGS, the following terms may be considered in addition to above references.

2. Criteria for identification of CLFs as PIA:

The State Rural Livelihood Mission (SRLM) through its district level functionaries will identify better performing CLFs and share the list with the Commissioner, Mahatma Gandhi NREGS for approving the CLFs as PIAs under Mahatma Gandhi NREGS. While identifying the CLF as PIA, the following criteria may be adopted :

i. The CLF should be a registered entity like Society/Trust/Non-Profit Company or any other legal entity under respective Acts.
ii. The CLF should be promoted under the Deendayal Antyodaya Yojana - National Rural Livelihoods Mission (DAY-NRLM) and in functioning activity for atleast ***three years***.
iii. Have a track record of managing at least INR 10 lakh of Community Investment Fund (CIF) in the past 3 years.
iv. Have a proven track record of regular book-keeping and manage community cadre engaged in accounts, book-keeping and audits and conducted Executive Committee (EC) meetings as per the norms under DAY-NRLM.
v. It has demonstrated the ability to monitor the financial transactions of Self Help Groups (SHGs) and primary federations/village organizations at regular intervals.
vi. The CLF should have placed at least 2 supporting CLF Staffs.
vii. A list of the identified CLFs to act as PIA under Mahatma Gandhi NREGS will be provided by the respective SRLM to the Commissioner, Mahatma Gandhi NREGS.
viii. Appropriate actions will be taken up by the Commissioner, Mahatma Gandhi NREGS for approval and communicate the same to the concerned authorities of the relevant Districts and Blocks to facilitate the CLFs for taking up the responsibility of PIA for identified works and to inform CLF and SRLM.
ix. After receiving the approval from the Mahatma Gandhi NREGS, the SRLM Officials will inform the same to the relevant District and Block Level Managers and the CLFs.
x. An agreement should be executed between CLF as PIA, Block Programme Manager/District Programme Manager of SRLM and Programme Officer of Mahatma Gandhi NREGS. The agreement needs to cover proposal, purpose, parties to agreement and responsibilities of parties with respect to nature of Mahatma Gandhi NREGS works for CLF as PIA as indicated at point 3 of this advisory.

3. Mahatma Gandhi NREGS works for which CLFs will act as PIA:

The Cluster Level Federations (CLFs) constituted under NRLM could act as PIA for livelihood enhancing (individual) assets for the eligible beneficiary under Schedule I, Para-5 of the Act.

Enhancing participation of women in Mahatma Gandhi NREGA, NRLM compliant CLF should act as PIA for individual beneficiary plantation works particularly horticulture plantation (including moringa plantation), nursery raising (including moringa) at block level and other individual beneficiary works of eligible beneficiary from NRLM compliant SHG household under Mahatma Gandhi NREGS. Works creating individual assets shall be prioritized on land or homestead owned by household belonging to the Schedule I, Para-5 of the Act.

4. Engaging CLF as PIA:

As per the provisions in Mahatma Gandhi NREGS, AMC 2022-23 (Para 6.4), where the Gram Panchayat (GP) is the implementing agency, all works shall mandatorily be approved by the Gram Sabha. The Gram Panchayat is the custodian of the shelf of projects. All PIAs working in the Gram Panchayat should duly incorporate their plans in the annual plan of Mahatma Gandhi NREGS. For the works implemented by PIAs other than Gram Panchayat, approval may be obtained from the Block/Intermediate/District Panchayat, depending on the level of authorization.

5. Planning of works:

Upon notification of the CLFs as PIAs by the competent authority, the CLFs will coordinate with the Programme Officer, Mahatma Gandhi NREGS at the Block level to understand the existing shelf of projects and the implementing agencies allotted for these works along with potential of creation of employment (in person-days). Thereafter, the CLFs will assess all the works pertaining to Self Help Group (SHG) households, plantations and nursery, which they can take up in the allotted project areas.

The CLF will also plan the new works to be taken up in SHG and Village Organization (VO) level meetings. The process will facilitate the strengthening of the livelihood activity/activities identified by the beneficiary. The planned activities shall be listed, compiled and presented for approval to the concerned Block Panchayat/District Panchayat by the CLF. Approval of these works shall be communicated to the Gram Panchayat before they can be taken up, as mentioned in Para 6.4 of AMC 2022-23.

6. Administrative Sanction and Technical Sanction of Works:

The State Governments already have setup processes for providing Technical and Administrative Sanctions for Mahatma Gandhi NREGS works. The same will be followed for CLF as PIA.

The Administrative Sanction will be issued by the District Program Coordinator or any other competent authority as per the financial delegation authorized by the State Govt.

7. Administrative fund availability:

i. Para 16(5) of Mahatma Gandhi NREGA states that, 'The Programme Officer shall allot at least fifty percent of the works in terms of its cost under a Scheme to be implemented through the Gram Panchayats.'
ii. As per the guidelines issued by the Ministry of Rural Development (MoRD) on 21st August 2014 regarding breakup of administrative fund component, 'The expenditure at the GP level shall not be less than 2% of the total expenditure'.
iii. As per the Para 2.5.2(xiii) of Operational Guidelines 2013, 'Empanel agencies that can be used by State Governments as PIAs for implementation of MGNREGA works and determine the percentage value of funding that can be given to them to meet their administrative costs.'

On the basis of above Para (ii), Gram Panchayat is entitled to get administrative cost of 2% of total expenditure done by the GP. As per the Para(iii), it is proposed that same concept may be applicable for the line department i.e., 2% of total expenditure made by CLF on taking up Mahatma Gandhi NREGS works as indicated in point 3 of this advisory may be allowed as administrative cost for CLF as PIA under Mahatma Gandhi NREGS.

Administrative expenditure may be incurred as per the Para 12.5.5 of Operational Guidelines 2013 and it has to be provided as per the provision made in Receipts, Expenditure, Advances and Transfers (REAT) module and same may be followed for CLF as PIA followed by the due procedure of the Scheme. Expenditure has to be done on the basis of bills/vouchers.

Expenses not allowed under administrative costs-The following items shall under no condition be booked under the administrative costs of MGNREGA:

- Purchase of vehicles and repair of old vehicles,
- Civil works,
- Salaries/ remuneration of functionaries already engaged by the Government/ PRIs/ any other implementing agency,
- Material procurement for works.

8. Implementation of the works and its monitoring:

The implementation of works and its monitoring should be done as per Annexure-I. These are to be taken cognizance of while implementation of works.

9. Monitoring and Quality assessment-

a. The Programme Officer (Mahatma Gandhi NREGS) will act as Programme Officer for the work taken up by CLF as PIA under Mahatma Gandhi NREGS.
b. The Programme Officer (Mahatma Gandhi NREGS) and the State Rural Livelihoods Mission through its district and block level Functionary may monitor the progress and quality of works regularly.
c. If there is any process gap, irregularities, misappropriation found then responsibility may be fixed and action may be initiated on the CLF and concerned for any kind of deviations/misconduct made in work execution.
d. Recovery of embezzlement of funds/misappropriation of funds will be done from CLF as PIA as per Schedule I (26) of Act and Para 15.5 AMC 2022-23.

10. Programme Steering Committee:

The initiative of engaging CLF as a PIA requires convergence efforts at State, District and Block level. Hence, for smooth execution of the planning, implementation and monitoring roles, three member Programme Steering Committee (PSC) headed by the Principal Secretary/Secretary of Rural Development Department, Commissioner, Mahatma Gandhi NREGS and Chief Executive Officer (CEO) of SRLM as member is to be constituted.

The PSC will issue necessary advisory, approval of CLFs as PIAs, prepare joint action plan of Mahatma Gandhi NREGS and NRLM programme, monitoring of implementation of the SHG-CLF-PIA, review of the programme on quarterly basis, creation of comprehensive plan for training and capacity building of CLFs as PIA.

In the light of above, it is advised to instruct the concerned Officials for taking appropriate action accordingly.

(Amit Kataria)
Joint Secretary (RE)

Annexure-I

Implementation of works and its monitoring

Sl. No.	Activities	Responsible Officers	Remarks
1	Work entry in NREGA Soft	Programme Officer	
2	Preparation of estimate	TA/JE of respective block	Para 7.1.5 of AMC
3	Technical Sanction of work	AE or other as authorized by the State Govt.	Para 7.1.5 of AMC
4	Administrative Sanction of work	DPC or other as authorized by the State Govt.	Para 7.1.5 of AMC
5	Geo-tagging of works in all stages	Present system as authorized by the State Govt.	Para 13.2 of AMC
6	Work initiation	CLF	
7	Collection of work demand in form 6	CLF/VO/SHG	Para 4.1 & 4.3 of AMC
8	Allocation of work	Program Officer	Para 4.2 of AMC
9	Generation and issue of eMR	Program Officer	Para 4.6.1(d) of AMC
10	Capturing of daily attendance (eMR/NMMS) and daily measurement	Women Mate identified by CLF	Para 7.1.2 & 20.1(f) of AMC
11	Uploading of attendance in NREGASoft (in case of IBS work)	CLF	Para 4.6.1(d) of AMC
12	Measurement of work and uploading in MIS	TA or as authorized by the State Govt.	Para 20.2 of AMC
13	Generation of wagelist and send for payment	CLF	Para 4.6.1(d) of AMC
14	Request to vendor for supplying of materials	CLF	Para 4.6.1(d) of AMC
15	Uploading of Bills/Vouchers in NREGASoft and generation of material list	CLF	Para 4.6.1(d) of AMC
16	Generation of FTO for wage/material payment	1st Signatory at Block level	
17	Approval of FTO for wage/material payment	2nd Signatory at Block level	
18	Proper keeping of work files and Registers	CLF	Para 10.7 of AMC

19	Monitoring/Inspection of work	DPC/PO/TA/Gram Panchayat/SRLMwing. Regular inspection to be done by designated officers through Area Officer Monitoring Visit App	Para 7.12 of AMC
20	Regular Social Audit	Social audit unit as per the Guidelines issued by the Ministry of Rural Development	
21	Process Delays	The delay in wage payment is required to be compensated by the individual responsible for the delay. The timely completion of each process of the payment chain is important and is must.	Schedule II (29) and Section 7 (1) of Mahatma Gandhi NREGA, 2005.
22	Completion Certificate of work	Programme Officer	
23	Transparency and Accountability-CIB installation, Regular jobcard updation, Record keeping	CLF	
24	Training and Capacity building	At State level- Rural Development Department, SRLM and Social Audit At District level- District Programme Coordinator (DPC) and District Project Management Unit At Block level-Program Officer, Block Project Management Unit.	

Devaranya Schemes Guidelines of Madhya Pradesh

मध्यप्रदेश शासन

पंचायत एवं ग्रामीण विकास विभाग

क्रमांक/3804/MGNREGS-MP/NR-3/2021 भोपाल दिनांक 27/9/2021

प्रति,

प्रमुख सचिव,
योजना, आर्थिक एवं सांख्यिकी विभाग
मंत्रालय, वल्लभ भवन, भोपाल।

विषय -अनुसूचित जनजातीय क्षेत्रों के निवासियों के लिए आयुष आधारित आर्थिक उन्नयन योजना "देवारण्य" के क्रियान्वयन, अनुश्रवण एवं नीति निर्धारण में मनरेगा की भूमिका के संबंध में।

संदर्भ - यो.आ.एवं सां. विभाग का पत्र क्र.732/यो.आ.सा./2021 दिनांक 17.08.2021

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अनुसूचित जनजातीय क्षेत्रों के निवासियों के लिये औषधीय पौधों के रोपण से आयुष आधारित "देवारण्य" योजना को एक अंतर्विभागीय एवं अभिसरण आधारित योजना के रूप में विकसित किये जाने का संदर्भित पत्र में उल्लेख किया गया है।

औषधीय पौधों की खेती एक विशिष्ट प्रकृति की विशेष ज्ञान की आवश्यकता वाली खेती है, जिसमें यथोचित खेत का चयन, खेत के स्थान एवं भूमि के अनुसार यथोचित बीज एवं पौधे का चयन, खेती के लिए आवश्यक इनपुट तथा निदाई, गुड़ाई, कटाई, सिंचाई तथा हारवेस्टिंग आदि के कार्य के साथ-साथ औषधीय पौधों का प्राथमिक प्रसंस्करण करने की आवश्यकता की पूर्ति की अत्यंत ही संवेदनशील एवं महत्वपूर्ण भूमिका होगी।

उपरोक्त बिन्दुओं को ध्यान में रखते हुए प्रत्येक औषधीय पौधे की खेती के लिए टीएस तैयार करना, डीपीआर तैयार करना तथा खेती करने के लिए कृषकों को समय-समय पर विभिन्न चरणों में सलाह देने एवं प्रशिक्षण देने की आवश्यकता भी इसकी सफलता-असफलता में महत्वपूर्ण भूमिका अदा करेगी। इन सभी पहलुओं का तकनीकी ज्ञान नरेगा अंतर्गत उपलब्ध नहीं है, न ही संस्थागत रूप से विभागीय अधिकारियों को इस तरह के कार्य का मौलिक ज्ञान होना अपेक्षित रहा है। इस संबंध में महत्वपूर्ण भूमिका उद्यानिकी विभाग, वन विभाग, उद्यानिकी मिशन एवं जैव विविधता बोर्ड आदि अदा कर सकते हैं।

उपरोक्त उल्लेखित तकनीकी मानव संसाधन एवं विशेषज्ञ सेवाएं उल्लेखित विभागों/संस्था की ओर से उपलब्ध होने पर निम्नानुसार कार्य विभाग एवं मनरेगा से किये जा सकेंगे :-

1 संस्था द्वारा उपलब्ध कराए गए डीपीआर की स्वीकृति देना तथा कार्य को मनरेगा के वार्षिक कार्य योजना एवं सैल्फ ऑफ प्रोजेक्ट में सम्मिलित करना तथा प्रशासकीय स्वीकृति जारी करना।
2 टीएस जारी करना तथा प्रशिक्षण उपलब्ध कराना।
3 पात्र हितग्राही के खेत में कार्य संपन्न कराना।

4 मनरेगा परिषद से औषधीय पौधों की खेती के कार्यों का भुगतान किया जाना।

5 औषधीय खेती प्रसंस्करण हेतु वर्कशेड का निर्माण करना।

मध्यप्रदेश राज्य नीति एवं योजना आयोग द्वारा तैयार प्रथम योजना प्रारूप में देवारण्य वृक्षारोपण परियोजना क्रियान्वयन से संबंधित महात्मा गांधी नरेगा योजना/विभाग तथा वन, उद्यानिकी व आयुष विभाग से संबंधित प्रमुख बिन्दु निम्नानुसार है :-

1. महात्मा गांधी नरेगा योजना अंतर्गत औषधीय पौधों का रोपण अनुमत कार्य है। देवारण्य योजना में औषधीय पौधों का रोपण एवं नर्सरी विकास का कार्य अभिसरण से संपादित किया जा सकता है। इस हेतु महात्मा गांधी नरेगा योजना से मजदूरी, सामग्री मद का भुगतान जिला स्तर पर 60:40 अनुपात संधारण करते हुये किया जा सकता है। मनरेगा योजना से किये जाने वाले मुख्य घटक :-

संबंधित तकनीकी विभाग/चयनित कन्सलटेन्ट द्वारा तैयार डीपीआर के आधार पर गड्ढा खुदाई, पौधों की व्यवस्था, खाद, कीटनाशक, पौधों का रख-रखाव, पौधों की समय-समय पर सिंचाई, निदाई-गुडाई, कटाई, गेपफिलिंग कार्य। परियोजना अवधि 2-5 वर्ष तक पौधों की प्रजाति के आधार पर।

मनरेगा में गैर अनुमत कार्य यथा स्थाई सिंचाई व्यवस्था हेतु ट्यूबवेल, मोटरपम्प, विद्युत कनेक्शन व अन्य उपकरण आदि की सामग्री मद का भुगतान अन्य योजना से किया जाना अपेक्षित है।

2. ग्रामीण विकास मंत्रालय, ग्रामीण विकास विभाग भारत सरकार द्वारा जारी वार्षिक मास्टर परिपत्र वर्ष 2020-21 में मनरेगा अंतर्गत 262 अनुमेय कार्यों की सूची में सरल क्रमांक 67 पर "समूहों के लिए आजीविका कार्य-कलाप के लिए वर्कशेड का निर्माण" कार्य शामिल है-

वर्कशेड का आकार एवं तकनीकी मापदण्ड, विषय विशेषज्ञ (आयुष/वन/उद्यानिकी) विभाग के द्वारा मानक DPR के रूप में उपलब्ध कराये जाने होंगे। वर्कशेड की तकनीकी डिजाईन, उसमें होने वाले सामग्री व्यय एवं निर्मित किये जाने वाली संरचनाओं की कुल संख्या जिले के मजदूरी सामग्री अनुपात के आंकलन के पश्चात जारी की जा सकेगी।

तकनीकी स्वीकृति संबंधित विषय-विशेषज्ञ विभाग के तकनीकी अधिकारी एवं कार्यपालन यंत्री, ग्रामीण यांत्रिकी सेवा संभाग द्वारा संयुक्त रूप से जारी की जावेगी।

मनरेगा के प्रावधान अनुसार जिला स्तर पर मजदूरी सामग्री अनुपात 60:40 सुनिश्चित करते हुये प्रशासकीय स्वीकृति जिला कलेक्टर द्वारा जारी की जावेगी। नियत अनुपात सुनिश्चित नहीं होने पर अतिरिक्त सामग्री मद की राशि की व्यवस्था देवारण्य या अन्य विभाग की योजना के अभिसरण से की जाना होगी।

3. योजना अंतर्गत औषधीय पौधों का वृक्षारोपण किया जा सकता है। औषधीय पौधों के वृक्षारोपण हेतु चिन्हित क्षेत्रों के समीप स्थित मनरेगा मद से वन, उद्यानिकी व स्वसहायता समूहों द्वारा तैयार की जा रही नर्सरियों में औषधीय पौधों को तैयार कराया जा सकता है। चूंकि औषधीय पादपों का उत्पादन अत्यंत ही तकनीकी विषय है, अतः तकनीकी प्रशिक्षण एवं मार्गदर्शन हेतु सक्षम विभाग आयुष, उद्यानिकी एवं वन विभाग हो सकते हैं। उचित गुणवत्ता के एवं आयु के पौधों तथा उन पर समय-समय पर उपयोग होने वाले उर्वरक, कीटनाशक,खाद-बीज एवं पौधों की निंदाई, गुड़ाई, कटाई-छटाई आदि हेतु समस्त तकनीकी मार्गदर्शन विषय विशेषज्ञ (आयुष/वन/उद्यानिकी) विभाग द्वारा दिया जाना होगा। Agro - Climatic Zones के आधार पर उपयुक्त उत्पाद के चयन की प्रक्रिया में भी विषय विशेषज्ञ (आयुष/वन/उद्यानिकी) विभाग का प्राथमिक कार्य रहेगा। शेष कार्य मनरेगा से किये जा सकेंगे।

4. प्रशिक्षण माड्यूल विषय-विशेषज्ञ (आयुष/वन/उद्यानिकी) विभाग/कन्सलटेन्ट द्वारा तैयार किया जाना होगा। जिसमें मनरेगा के प्रावधानों का एक विषय के रूप में समावेश किया जावेगा।

कृषि कार्य/वृक्षारोपण कार्यों में रूचि रखने वाले स्व-सहायता समूहों का चयन, आजिविका मिशन की सहायता से किया जाना होगा।

प्रशिक्षण में कृषि विश्व विद्यालय, कृषि विज्ञान केन्द्र व वन, उद्यानिकी, आयुष विभाग के विशेषज्ञों की यथोचित सहभागिता सुनिश्चित करते हुये स्व-सहायता समूहों एवं मॉनिटरिंगकर्ता मैदानी अमले को प्रशिक्षण का कार्य विषय-विशेषज्ञ (आयुष/वन/उद्यानिकी) विभाग/कन्सलटेन्ट द्वारा दिया जाना होगा।

5. मनरेगा योजना अंतर्गत सामुदायिक, लक्षित वर्ग के पात्र हितग्राहियों की निजी भूमि पर एवं समूहों के माध्यम से औषधीय पौधों का रोपण कराया जाना अनुमत है।

सक्षम तकनीकी विभाग यथा आयुष/वन/उद्यानिकी एवं वन या उनके माध्यम से चयनित तकनीकी consultants और चयनित क्लस्टर्स में मनरेगा अंतर्गत पात्र हितग्राहियों का लाभान्वित किया जा सकता है।

गैर पात्र हितग्राहियों को वन/उद्यानिकी विभाग से योजनाओं से लाभान्वित किया जाना उचित होगा।

देवारण्य योजना के तहत प्रत्येक वृक्षारोपण परियोजना व रख-रखाव की अवधि के तकनीकी मापदण्ड, प्राक्कलन व तकनीकी निर्देश संबंधित विषय-विशेषज्ञ (आयुष/वन/उद्यानिकी) विभाग द्वारा तैयार किये जाने होंगे। मनरेगा में लागू Secure SOR पर मजदूरी एवं सामग्री की गणना जिले के कार्यपालन ग्रामीण यांत्रिकी सेवा द्वारा की जावेगी। तकनीकी स्वीकृति संबंधित विषय-विशेषज्ञ (आयुष/वन/उद्यानिकी) विभाग के तकनीकी अधिकारी एवं ग्रामीण यांत्रिकी सेवा संभाग द्वारा संयुक्त रूप से जारी की जावेगी।

6. परियोजना के विभिन्न चरणों में अन्य विभागों से निम्नानुसार कार्यवाही अपेक्षित है :-

क्र.	गतिविधि	अन्य विभागों से अपेक्षित कार्यवाही
1	स्थल चयन	आयुष/वन/उद्यानिकी विभाग के अधिकारियों द्वारा औषधीय पौधों के रोपण हेतु उपयुक्त स्थल का चयन किया जावे।
2	परियोजना की डीपीआर तैयार करना	आयुष/वन/उद्यानिकी विभाग द्वारा डीपीआर तैयार की जावे।
3	स्थानीय तौर पर उपयुक्त प्रजाति के उचित गुणवत्ता के पौधों का चयन	आयुष/वन/उद्यानिकी विभाग।
4	पौधारोपण	आयुष/वन/उद्यानिकी विभाग द्वारा मार्गदर्शन।
5	पौधारोपण पश्चात पौधों का संधारण, सुरक्षा एवं देखरेख	आयुष/वन/उद्यानिकी विभाग द्वारा समय-समय पर मार्गदर्शन
6	सामग्री मद के भुगतान हेतु बिलों का सत्यापन	आयुष/वन/उद्यानिकी विभाग के विशेषज्ञों के द्वारा भुगतान के पूर्व बिलों का सत्यापन किया जावे।
7	समीक्षा/मॉनिटरिंग	आयुष/वन/उद्यानिकी विभाग के अधिकारियों के द्वारा प्रतिमाह सयुक्त निरीक्षण किया जावे।

7. **देवारण्य वृक्षारोपण परियोजना का मानक (Standard) मार्गदर्शी प्राक्कलन :-**

पायलेट जिलों मे चयनित क्लस्टर्स में देवारण्य परियोजनाओं में एक रूपता होने पर राज्य स्तर से मार्गदर्शी प्राक्कलन संबंधित विषय-विशेषज्ञ (आयुष/वन/उद्यानिकी) विभाग के परामर्श से मनरेगा अन्तर्गत तैयार किया जा सकता है।

8. Regular Visit and Hand Holding Support :-

परियोजना के सफल क्रियान्वयन हेतु क्रियान्वयन एजेंसी SHG समूह व अन्य निजी कृषकों को समय-समय पर परियोजना के विभिन्न चरणों यथा- स्थल चयन, उचित गुणवत्ता के पौधों का चयन, उर्वरक की मात्रा, सिंचाई व्यवस्था, पौधों का रख-रखाव, फसल आने पर कटाई व प्रसंस्करण का कार्य आदि का विषय-विशेषज्ञ (आयुष/वन/उद्यानिकी) विभाग के मैदानी अमले द्वारा अपनी निगरानी मे सम्पादित कराय जाने हेतु नियमित दौरा कर तकनीकी सहायता व प्रबंधन में सहयोग करना होगा। परियोजना की सतत् निगरानी एवं तकनीकी मार्गदशन हेतु जिला स्तर पर संबंधित विषय विशेषज्ञ (आयुष/वन/उद्यानिकी) विभाग के चयनित कन्सलटेन्ट का समावेश करते हुये निगरानी

समिति गठित कर नियमित दौरे किया जाना अपेक्षित है। जिससे योजना क्रियान्वयन के दौरान आने वाली कठिनाईयों का मौके पर ही निराकरण हो सके।

औषधीय पादपों का उत्पादन अत्यंत ही तकनीकी विषय होने के कारण संबंधित विभागों के तकनीकी विशेषज्ञों से मार्गदर्शन लिया जाना आवश्यक होगा।

(उमाकांत उमराव)
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Notes

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