



# Book of Abstracts

## Supplementary

# GLOBAL CONFERENCE ON WOMEN IN AGRI-FOOD SYSTEMS (GCWAS-2026)

**DRIVING PROGRESS,  
ATTAINING NEW HEIGHTS**



 **March 12-14, 2026**

 **Bharat Ratna C. Subramaniam Hall, ICAR Convention Centre,  
National Agricultural Science Complex (NASC),  
Pusa Campus, New Delhi-110012, India**

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# **BOOK OF ABSTRACTS**

**(SUPPLEMENTARY)**

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Indian Council of Agricultural Research (ICAR)  
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# PREFACE

We are pleased to present this Supplementary Book of Abstracts from the **Global Conference on Women in Agri-Food Systems (GCWAS 2026)**, held from 12–14 March 2026 under the theme “Driving Progress, Attaining New Heights.” This publication serves as an addendum to the main ‘Book of Abstracts’ published earlier and distributed during the conference. It compiles additional research and valuable insights that could not be included in the primary volume, completing the record of scholarly and practical contributions shared in form of poster presentations during this conference.

The conference brought together >850 researchers, policymakers, practitioners, industry leaders, and grassroots innovators from around the world to examine and strengthen the role of women in building resilient, sustainable, and inclusive agri-food systems. GCWAS 2026 focused on four key objectives: assessing women’s participation and leadership in agri-food systems; identifying scientific, economic, institutional, and policy barriers limiting their access to resources, technology, markets, and decision-making; highlighting innovative and gender-responsive approaches that empower women entrepreneurs and leaders; and developing actionable recommendations to advance gender equality across the sector.

Through keynote lectures, technical sessions, panel discussions, and oral and poster presentations, participants engaged in meaningful dialogue on topics such as women’s leadership, climate-resilient agriculture, inclusive value chains, nutrition-sensitive farming, and emerging technologies for women’s empowerment. These discussions reflected diverse perspectives and experiences from across the globe. By bringing these additional abstracts to light, we hope this complete collection serves as an even more comprehensive and valuable resource for researchers, educators, policymakers, development professionals, and students committed to advancing equitable and sustainable agri-food systems.

The successful organization of GCWAS 2026 and the compilation of its proceedings were made possible through the collective support of many institutions and individuals dedicated to gender-inclusive agricultural development. We extend our sincere gratitude to Dr R.S. Paroda, Chairman, Trust for Advancement of Agricultural Sciences (TAAS), and Chief Patron of the conference, for his visionary leadership.



We also acknowledge the guidance of the Conference Patrons—Dr M.L. Jat (DARE–ICAR), Dr Ismahane Elouafi (CGIAR), and Dr Trilochan Mohapatra (PPV&FRA), whose leadership strengthened the vision and outreach of the conference. Our appreciation also goes to the International Advisory Committee, comprising distinguished global leaders in agricultural research and development, for their valuable insights in shaping the scientific framework of the event.

Our sincere appreciation is extended to the organizing institutions – ICAR, TAAS, CGIAR, and PPV&FRA, as well as to co-organizing and partner institutions, sponsors, and knowledge partners whose financial and technical support enabled the successful conduct of this conference.

We thank the Steering Committee, chaired by Dr Renu Swarup, with Dr Rajbir Singh (ICAR) as Co-Chairperson, along with members from leading international organizations and academic institutions, for guiding the conference programme. They were ably supported by Dr Rishi K. Tyagi and Dr Rajarshri Roy Burman; and the Co-Convenors, Dr Anuradha Agrawal, Dr Mridula Devi, and Dr Anupama Singh, along with organizing committee members and volunteers whose dedication ensured the smooth conduct of the conference and preparation of this publication.

Very special thanks are due to Dr K.K. Vinod, Professor, Division of Genetics & Associate Dean, ICAR, IARI, New Delhi and Dr Amlendu Ghosh, Senior Scientist, Division of Pathology, ICAR–IARI, New Delhi, for their meticulous compilation and editing of the main and Supplementary Abstract Book

Thanks to Dr Malavika Dadlani, Dr Bhag Mal, Dr J.L. Karihaloo and the entire staff of TAAS (especially Ms Simmi Dogra) for all their help in various ways. All personnel from the ICAR Extension Division and DKMA deserve deep appreciation for their hard work and support.

Finally, we extend our heartfelt appreciation to all plenary and keynote speakers, panellists, session chairs, authors, reviewers, exhibitors, and participants from India and around the world. Their contributions and engagement enriched the conference and advanced the global dialogue on women's empowerment in agri-food systems.

## **Organizing Committee**

GCWAS 2026





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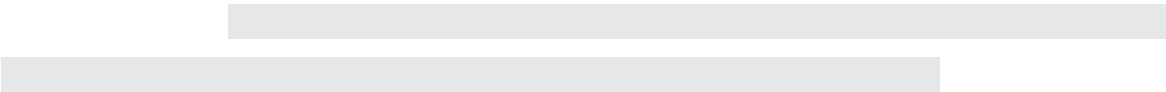
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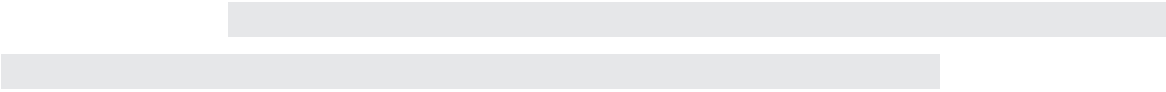
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# **POSTER PRESENTATIONS**

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## Women Artisans' Perspectives on the *Kouna* Craft Entrepreneurial Ecosystem in Manipur

Maibam Suraj Singh, Loukham Devarani

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The handicraft sector is vital to India's economy, providing substantial employment and boosting exports. Manipur's *Kouna* craft, is a time-honoured traditional handicraft deeply rooted in the culture of Manipur, India, where women have been its primary custodians and innovators for generations. Made from the aquatic herb, *Schoenoplectus lacustris* (water reed), this craft occupies a unique niche due to their aesthetic appeal and eco-friendly attributes. This eco-friendly art form involves meticulously harvesting, drying, splitting, and weaving the grass into an array of utilitarian and decorative items such as mats, bags, hats, jewellery boxes, baskets, and even contemporary fashion accessories. Women, comprising nearly 95% of the artisans, dominate every stage of production, from reed cultivation to intricate patterning, transforming a once-simple household necessity into a vibrant symbol of female ingenuity and economic self-reliance. Historically passed down as a rite of passage from grandmothers to young girls in Meitei communities, *Kouna* weaving complemented men's agricultural labours, fostering gender harmony while providing women—especially rural widows and married practitioners, who form over 70% of the workforce—with vital income streams amid scarce opportunities. Recognizing their market potential, various actors are aiding artisans through capacity building, value addition, and market linkages, spurring a vibrant entrepreneurial ecosystem. To bolster local women artisans, this study examined Manipur's *Kouna* crafts with three objectives namely, to understand women significance in *Kouna* crafts; to identify entrepreneurial ecosystem components supporting the women artisans; and conduct a situation analysis of the existing entrepreneurial ecosystem from the women artisan's perspective. Conducted in Thoubal (primary hub) and Imphal East districts, the research surveyed 80 women artisans using mixed methods. Key findings showed that women in Manipur's *Kouna* crafts are central custodians of cultural heritage, economic earners (₹8,000–12,000/month), and empowered rural artisans sustaining livelihoods through *Kouna* crafts. Ecosystem analysis via framework (network/engagement, support services, education/training, regional culture, physical infrastructure, government framework), showed artisans' strongest links with community stakeholders, then market intermediaries, and weakest with academic/research institutions. Input supply was the top service used; financial/logistic services saw low uptake, with negligible mentoring/incubators. Few received entrepreneurship training. Most artisans viewed entrepreneurship favourably, supported by conducive regional culture. Transportation and internet infrastructure was adequate, but storage lagged. Nearly all were excluded from development schemes. Five value chain pathways emerged, with "Growers–Artisans–Master artisans–Wholesaler/supplier–Retailer–Customers" most prevalent. The chain remains unorganized with multiple players. SWOT analysis highlighted strengths like profitability over rice cultivation; weaknesses such as technology gaps; opportunities including high demand and eco-consciousness; and threats from the fragmented chain. TOWS matrix strategies addressed these. Recommendations include raising artisans' awareness for scheme access (technology/infrastructure), entrepreneurship/ICT training, participatory value chain development, and product diversification to mitigate competition and enhance market reach.

**Keywords:** Artisan, Enterpreunership, *Kouna* crafts, Manipur

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## Technological Interventions in Backyard Pond Aquaculture in Deltaic Gangetic Region in India: An Ethnographic Study on Women Fishers' Resilience and Livelihood Transitions

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The women fishers of Indian Sundarbans, which is home to 4.4 million fishers and one of the largest mangrove reserves in the world, are traditionally associated with inshore fishing, fish drying, gleaning, fishing gear fabrication, fish sorting, and seasonal agricultural activities facing odds against climate change, cyclones, floods, rising water levels, tiger attacks and remoteness of location. The study was carried out in the deltaic Gangetic region comprising four groups of women fishers from four villages in Basanti Block at South 24 Parganas district in West Bengal. An ethnographic perspective framework was used to highlight the historical challenges faced by the deltaic women fishers, the resilience strategies adopted by them, and the livelihood diversification maneuvers acquired by them. The four women groups who were traditionally involved in riverine prawn seed and fish seed collection, have emerged themselves into profitable fish farming clusters. The clusters were strengthened through regular monitoring by the stakeholders with hand-holding support from ICAR-CIFRI through the Scheduled Caste Sub Plan Centrally Sponsored Scheme and National Mission for Clean Ganga since 2017. Physical inputs such as fish feed, fish seed and lime were provided to women beneficiaries to help them in backyard pond culture. Technical guidance on improved aquaculture practices, water quality management and disease prevention enabled women fishers to address the on-field challenges faced in inland fisheries and aquaculture. Resilience of the women fishers was studied based on indigenous knowledge, experiences, community cohesion and social capital. Physical inputs such as fish feed, fish seed and lime were provided to women beneficiaries to help them in backyard pond culture. Technical guidance on improved aquaculture practices, water quality management and disease prevention enabled women fishers to address the on-field challenges faced in inland fisheries and aquaculture. Data was analyzed with the grounded theory of social sciences with qualitative analyses, which illustrated the resilience of women fishers in terms of social resilience (essence of Sundarban mangroves, presence of fishers' society, women-centric Self Help Groups, and female-headed households because of male labour migration); economic resilience (income diversification, natural assets, traditional handicrafts, entrepreneurial opportunities, and subsidies); ecological resilience (ecosystem services, conservation of resources, local and traditional ecological knowledge, ecosystem-based adaptation, and integrated aquaculture); and household resilience (land ownership, possession of fishing craft and gear, direct marketing without middlemen, formal education in family, and family unit and kinship structures). The average monthly income of women fishers increased from ₹ 1,900 in 2019 to ₹ 4,500 in 2025. The study demonstrates that women are increasingly becoming more involved in backyard pond aquaculture activities, which has increased their adaptive capacity and ability to mitigate the impacts of climate change, and face the social and ecological challenges.

**Keywords:** Aquaculture, Economic resilience, Gangetic region, SHGs

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## Women-Led Climate-Smart Agri-Entrepreneurship: Insights from the Women Technology Park (WTP) Project

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Climate change poses significant challenges to rural livelihoods, with women being disproportionately affected despite their central role in agriculture and natural resource management. Limited access to technology, finance, and decision-making further constrains their adaptive capacity. A benchmark survey was conducted among 240 women engaged in agriculture and allied sectors in the Meerut and Muzaffarnagar districts of Western Uttar Pradesh using a random sampling method. The survey assessed livelihood patterns, empowerment status, income generation, leadership dynamics, and adoption of climate-smart agricultural practices. The findings revealed a substantial gendered income gap (GIG) of 88.7%, with women contributing an average annual income of ₹19,512 compared to ₹1,72,960 contributed by men, primarily through off-farm labor, followed by farm and livestock activities. Despite this disparity, women demonstrated significant engagement in climate-smart agriculture by cultivating high-potential crops such as *Aloe vera*, mint, mentha, lemongrass, basil, and marjoram in backyard spaces and small farm plots. In livestock management, women showed a preference for indigenous cattle and goat breeds, which are more resilient to local climatic stressors. To address these challenges, the Women Technology Park (WTP) Project, funded by the SEED Division, Department of Science and Technology (DST), Government of India, implemented a participatory climate-smart agri-entrepreneurship model. The initiative enabled women to adopt sustainable crop management practices, develop eco-friendly enterprises, and convert farm waste and agricultural by-products into value-added products. Field demonstrations included the establishment of organic herbal gardens, intercropping and boundary planting of herbs with main crops such as sugarcane to enhance income, resilience, and environmental sustainability. Capacity-building interventions focused on essential oil extraction from lemongrass, eucalyptus, and tulsi; natural dye extraction from marigold petals, pomegranate and beetroot peels, and eucalyptus bark; development of naturally dyed and printed textiles; and preparation of herbal Holi colors. Women were also trained to utilize residual by-products for producing incense sticks, eco-friendly candles, diyas, and home décor items. Market linkages were strengthened through participation in exhibitions and exposure to the Agri-Business Incubation Programme of ICAR-IIFSR, which provided training in quality control, enterprise registration, marketing, and business expansion. This integrated, women-centric approach highlights the potential of climate-smart agri-entrepreneurship to enhance rural livelihoods, promote sustainable agricultural practices, and empower women in Western Uttar Pradesh.

**Keywords:** Agriculture, Climate-smart, Empowerment, Livelihoods

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## Case Study on Floriculture in Senapati District, Manipur

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In recent years, Senapati district of Manipur has shown rapid growth enterprises in floriculture especially among farm women, giving rise to many sustainable floriculture enterprises/units to grow. In the light of above fact, KVK-Senapati has carried out a case study carried out in 2025 to have an insight behind the success of floriculture in the district. Ms Chokhone Krichena, a floriculture entrepreneur from Rikhumai Taphou village, was selected for the study since she emerges to be the most successful entrepreneur in the district.

Ms Chokone presently owns 1.5 ha for open cultivation of different species flowers and three greenhouse as protected cultivation of flowers. Senapati district provides an ideal condition for growing different species of flowers. She started growing flowers in 2017 in 0.2 ha of farm land since, then her activities went on the rise in term of income and area. She produces floricultural products {including wild flowers} ranging from fresh cut flowers, preserved flowers to value added products like flower tea, curated flowers etc. She employs methods like shade drying, embedded oven drying, silica & sand dying and sun drying for production of dried flowers and uses natural and food colour for dyeing dry flowers with biodegradable packaging material replacing synthetic material.

Now, she could earn an annual average gross income of Rs 15 lakhs from the sale of flowers, she also supports 300 farm women voluntarily in selling their floricultural products that generates collectively 54,000 mandays per annum. Now, her floricultural products have found access to markets of 16 states of India and the products are sold under the brand name “Dainthe”. She received a no of awards and recognitions of state and national levels for her significant contribution in the field of floriculture in Manipur. Due to her ever-increasing popularity in the field of floriculture, as covered by print and electronic media, her name has been coined as ‘Flower Lady of Manipur’. This case study has highlighted that floriculture entrepreneurship has significant potential in Manipur for income generation, employment creation, and promotion of agribusiness provided adequate technical guidance, finance and market support are ensured.

**Keywords:** Agribusiness, Entrepreneurship, Floriculture, Manipur

## Empowering Rural Women through Value-Added Agri-Food Enterprises

**Anjali Verma, S.K. Tomar, P.K. Mishra, V.B. Singh, Prem Shankar, Hariom Mishra, R.V. Singh**

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Women play a key role at every stage of the agri-food value chain, yet their economic contribution often remains undervalued due to limited access to skills, finance, and markets. This paper presents extension-led, women-focused agri-food entrepreneurship models implemented through Krishi Vigyan Kendra (KVK) interventions, showing how capacity building, value addition, and institutional support can strengthen women's economic participation and leadership. Based on field experiences, the study highlights three extension-led models: (i) Women-led Value Addition Model, (ii) Nutrition-Sensitive Enterprise Model and (iii) SHG-Based Collective Marketing Model.

Women were trained in hygienic processing, standardization, packaging, branding, and market linkage. As a result, participating women reported 20-40% increase in household income, improved decision-making at the family level, and higher confidence in managing enterprises. Improved awareness and availability of processed foods also contributed to better household nutrition. The study identifies key enabling factors such as convergence with government schemes, access to microfinance through SHGs, and continuous mentoring by KVK scientists. These low-cost, locally adaptable models are easily replicable and demonstrate the strong potential of women-led agri-food enterprises in building inclusive, resilient, and sustainable agri-food systems.

**Keywords:** Agri-food value chain, Extension models, Rural livelihoods, SHGs, Value addition, Women entrepreneurship

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## Economic Assessment of Kitchen Gardens at the Farmer's Household Level

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Kitchen gardening plays an important role in improving dietary diversity and nutritional security among rural households. Krishi Vigyan Kendra (KVK), Faridkot conducted demonstrations on kitchen gardening among 50 farm families in two villages, namely Virewala and Jalaleana, to assess the economic impact of the technology and identify constraints faced by the growers. The demonstrations promoted a healthier and sustainable lifestyle among rural families. The results revealed that the average income generated from *rabi* vegetables was ₹ 3474.30, while *kharif* vegetables contributed ₹ 3005.85. Thus, a total vegetable income of ₹ 6480.00 was obtained from an area of 200 m<sup>2</sup> within a three-month period. The vegetables were produced with minimal use of chemical inputs. However, several constraints hindered the successful adoption of kitchen gardening. Major constraints perceived by the growers included brackish irrigation water, high soil pH and electrical conductivity, lack of awareness about suitable varieties and insect-pest and disease management practices, and inadequate knowledge regarding the preparation of quality farmyard manure.

**Keywords:** Dietary diversity, Kitchen gardening, Vegetables

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## A Case Study on Empowerment of a Woman Farmer through Rice-Based Crop Diversification in Imphal West District, Manipur

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One case study documented on successful transformation of a rice-based mono-cropping system into a diversified, profitable, and sustainable farming enterprise through scientific intervention and institutional support. Smt. Ph. Santibala Devi, a 44-year-old woman farmer from Phumlou village of Imphal West District, Manipur, traditionally cultivated rainfed *kharif* rice, leaving her land fallow during the *rabi* season due to inadequate awareness of suitable rice-based system options. Consequently, cropping intensity remained at 100%, with an average rice yield of 41.5 q/ha and a modest net annual income of ₹81,500 per hectare. In the year 2024-25, ICAR-Krishi Vigyan Kendra (KVK), Imphal West intervened through Front Line Demonstrations, capacity-building programmes, and continuous technical guidance to promote rice-based crop diversification. Improved climate resilient rice varieties, with scientific Agronomic practices were facilitated the next crop like potato, field pea and rapeseed in residual soil moisture situation. The timely sowing of *rabi* is the main aspect in rainfed situation and the intervention resulted yield advantage of 25 t/ha (potato), 15.02 q/ha (field pea), and 10.32 q/ha (rapeseed) in cropping system without affecting the rice yield. This scientific practice increased the system productivity, cropping intensity net annual income and the overall benefit–cost ratio from 2.16 to 3.13. This intervention strengthened the farmer's confidence, leadership, and social recognition, positioning her as a local role model for women-led agricultural transformation. The case highlights the effectiveness of KVK-led, women-centric extension approaches in enhancing productivity, income, and sustainability of rice-based farming systems in the North Eastern Hill region.

**Keywords:** Diversification, Income, Productivity, Sustainability

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## Entrepreneurial Behaviour of Women Vendors in Ima Keithel

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Ima Keithel, nestled in the heart of Imphal the capital of Manipur, India. It is a vibrant and historically rich marketplace renowned for its cultural significance. The name beautifully translates from the Manipuri language as "Mother's Market," with '*Ima*' meaning mother and '*Keithel*' meaning market. Ima Keithel is a vibrant marketplace in Imphal, where over 3,000 women run their businesses daily. This unique all-women market is not only a thriving hub of commerce but also a reflection of Manipur's rich cultural heritage. It stands as a powerful symbol of women's empowerment, resilience, and their central role in the community. The objective of this study is to evaluate the entrepreneurial abilities of these women vendors. A total of 100 participants were randomly selected for the research. Data was gathered using a structured interview schedule, conducted through personal interviews. The analysis employed statistical tools such as frequency, mean, standard deviation, and variance. The study reveals that majority of the women vendors have medium level of Innovativeness (60.00%), Self-confidence (67.00%), Achievement motivation (72.00%), Economic motivation (72.00%), Leadership skill (70.00%), Decision making ability (73.00%), Risk taking ability (70.00%), Managerial skill (58.00%), Business / marketing skill (72.00%), Problem recognition and Solving skill (62.00%). Overall, they are having medium level of Entrepreneur skill (66.00%). Despite of facing different challenges like low return from market, not being able to spend quality time with the family and bandh/ strikes etc. they run their respective enterprises and support their families financially at the same time help in the economy of the state. To enhance their livelihoods, it is essential to implement effective extension strategies that raise awareness among women vendors socially, politically, technically, and educationally. Additionally, government agencies must take proactive measures to support and foster the development of women entrepreneurs at Ima Keithel, ensuring they receive the necessary resources and opportunities to thrive.

**Keywords:** Commerce, Empowerment, Entrepreneurship, Vendors

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## Ericulture: A Promising Enterprise for Economic Development of Women

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Eri silk culture is indigenous to North-Eastern India and plays a vital role in the rural economy. India holds a unique position as the only country producing all major varieties of natural silk, including mulberry, tassar, muga, oak tassar, and eri silk. In Assam, particularly in Kokrajhar district, eri silkworm rearing has been traditionally practiced by tribal women, primarily for pupae consumption, with cocoons as a secondary product. However, several studies have reported a declining trend in traditional practices, leading to reduced livelihood security and migration of rural youth in search of alternative income opportunities. With the objective of conserving and revitalize this age-old agro-based tradition of ericulture, scientific interventions were implemented from 2018 onwards by KVK, Kokrajhar under the ARYA (Attracting and Retaining Youth in Agriculture) project, covering 90 unemployed rural women to evaluate the sustainability and economic impact of scientific eri silkworm rearing over traditional methods. Results indicated significant improvements in productivity and profitability. Scientific practices enabled year-round food plant availability, increasing crop cycles from 2-3 to 6-7 per year. Cocoon yield increased from 18 kg to 160 kg annually, while pupae production rises from 60-70 kg to 600-700 kg. The adoption of scientifically designed mountages improved cocoon uniformity and marketability. Further, income enhancement was achieved through the introduction of solar-powered spinning machines, natural dyeing of eri yarn using plant extracts, vermicompost production from silkworm excreta, and incorporation of traditional tribal designs in eri silk fabrics. The study concludes that scientific eri silkworm rearing offers a sustainable livelihood option and substantial employment opportunities for tribal women through integrated value chains from farm to fibre and fibre to fabric.

**Keywords:** Eri silk, Improved cocoons, Solar power, Vermicompost

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## Empowerment of Women through Integrated Farming System: A success story from Unakoti District of Tripura

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Across rural India, women play a critical role in reshaping their communities and achieving sustainable livelihoods through resilience, innovation, and collective action. Despite numerous socio-economic challenges, women remain the backbone of their households and communities, driving sustainable agricultural practices, small-scale industries, and local enterprises. One such inspiring example is a woman from the Radharani Self-Help Group (SHG) of Kaulikura village in Unakoti district of Tripura. Through her SHG, she initially received a loan of ₹5 lakhs, which she invested in agriculture and allied sectors. On her 2.5-acre landholding, she cultivates rice and vegetables, raises flower nurseries, prepares vermicompost for her own farm as well as for sale, and engages in value-added activities such as pickle making, handloom, and handicraft production. These products are marketed through the SHG and displayed at various exhibitions. Through these integrated farming and enterprise activities, she earns an annual income of ₹8–10 lakhs. She is not only an inspiration to other women but also a role model in agriculture and rural entrepreneurship. Despite having a good educational background, she chose farming as her profession, empowering herself to become self-reliant and economically independent.

**Keywords:** Integrated farming, SHGs, Tripura

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## Processing as a Pathway to Livelihood Security: A Case Study of a Rural Woman Agripreneur

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Promotion of processing and value addition of agricultural produce plays a vital role in ensuring livelihood security among rural youth and farm women, particularly in economically vulnerable regions. This paper presents the inspiring entrepreneurial journey of Smt. Savara Tulasi, a rural woman from Sasthrulapeta village of Hiramandalam Mandal, Srikakulam District, who emerged as a successful agripreneur despite significant socio-economic challenges. Smt. Savara Tulasi, a tenth-class dropout, initially entered as an agricultural labour along with her husband to support her family. Owning only one acre of agricultural land and having limited resources, her family faced severe financial crises, which adversely affected the education and well-being of her children. Like many small and marginal farmers, she struggled with low returns from agricultural produce due to the absence of processing skills, market linkages, and value addition facilities. Recognizing the potential of food processing as a sunrise sector, Smt. Tulasi ventured into the processing and value addition of agricultural produce. With a focus on improving farm income and reducing post-harvest losses, she adopted innovative practices in processing, packaging, and marketing. Her involvement with Suvarnamiki Farmer Producer Organization (FPO) further strengthened her entrepreneurial capabilities. Currently, serving as the Chief Executive Officer (CEO) of the FPO, she plays a pivotal role in mobilizing farmers, promoting collective marketing, and enhancing income opportunities for rural households. This case highlights how capacity building, institutional support, and promotion of agro-processing enterprises can transform the lives of rural women. The success of Smt. Savara Tulasi demonstrates that value addition in agriculture not only improves farm profitability but also contributes to women empowerment, employment generation, and sustainable rural development. Her journey serves as a motivational model for aspiring rural women entrepreneurs and underscores the importance of policy and technical interventions in fostering inclusive agripreneurship.

**Keywords:** FPOs, Livelihood security, Success story, Women agripreneur

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## From Homemaker to Entrepreneur: A Case Study of Rural Female Entrepreneurship

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Smt. Mallela Siva Kumari's journey is a remarkable transformation from a homemaker to a skilled entrepreneur and trainer in the agri-food and rural crafts sector. Hailing from a lower-middle-class family in Kalavacharla village, East Godavari district, Andhra Pradesh, her proximity to the Krishi Vigyan Kendra (KVK) Kalavacharla played a pivotal role in shaping her skills and career. Beginning as a helper for training programs, she gradually became an official trainee, acquiring expertise in various income-generating rural crafts and home science related activities. Over the years, Siva Kumari mastered multiple artisanal skills, including palmyrah fiber extraction, screen printing, banana and sisal fiber product making, jute fabric products, coir yarn and doormat crafting, maggam embroidery, tailoring, and value-added millet products. Her dedication and continuous learning enabled her to evolve into a resourceful trainer, empowering other women by sharing her knowledge and skills. At her home-based enterprise, she produces a range of eco-friendly products such as school bags, shopping bags, clutches, wallets, and lunch box and water bottle carriers, primarily using jute and cotton fabric blends. These products cater to local retailers through indent orders, demonstrating her ability to blend traditional skills with market demands. Additionally, she contributes to the nearby carton box manufacturing industry, showcasing her versatility and commitment to balancing multiple roles. Siva Kumari's story highlights the impact of sustained mentorship and community support, particularly from KVK Kalavacharla, which provided the platform for her skill development and entrepreneurial growth. Her success breaks socioeconomic barriers and inspires women in rural India to pursue self-reliance through skill acquisition and enterprise development. This case study underscores the critical role of women leaders in driving progress within the agri-food sector by fostering innovation, resilience, and economic empowerment at the grassroots level.

**Keywords:** Agri-food enterprises, Livelihood diversification, Rural entrepreneurship, Skill development, Value addition, Women empowerment

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## Empowerment of Novice Women Farmer through High-Tech Polyhouse Adoption: A longitudinal Case Study

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In rural India, women farmers often face socio-economic barriers, including access to modern agricultural technology and inadequate income from traditional land leasing practices. Extension services like Krishi Vigyan Kendra (KVK) often training to bridge this gap, yet case specific evidence on outcomes remains sparse. This case study examines the transformative journey of Mrs. Neetu Singh, a young female farmer from Jalaun, Uttar Pradesh, India, who achieve financial self-reliance through successful adoption of innovative agricultural techniques. This study aims to evaluate the impact of Krishi Vigyan Kendra training on skill acquisition, productivity and profitability for novice women farmer.

This study employed a longitudinal case study approach to assess the pre and post intervention impacts of KVK training on a novice women farmer, Mrs. Neetu Singh, over a five year period (2020-2025). The design tracked transformative changes on agricultural practices, productivity and economic outcomes. The study revealed that post training she diversified into vegetables and field crops on open land. Key achievement is a high-tech polyhouse in one acre yielding 550 quintals of cucumbers per season and 8-10 lakhs seedlings annually. Economically, gross income reached ₹ 22-23 lakhs, net profit ₹ 12-13 lakhs, benefit-cost ratio 3.2-3.5. Paired t- test on five season confirmed yield significance ( $t=10.8$ ,  $p<0.001$ ,  $n=5$ ), validating training efficacy for novice women farmer.

**Keywords:** Case study, Economic impact, High-tech agriculture, KVK intervention, Polyhouse technology, Women empowerment

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## Research Trends on Climate Adaptation among Women Dairy Farmers: Insights from a Bibliometric Study

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Climate change has emerged as one of the most significant global challenges, exerting profound impacts on agricultural and dairy production systems through rising temperatures, sea-level rise, and increasing frequency of extreme weather events. Enhancing the resilience of dairy-based livelihoods necessitates effective adaptation strategies to mitigate climatic risks and ensure sustainability. Women constitute approximately 69 to 70 per cent of the rural dairy workforce and play a pivotal role in decision-making related to dairy management and livestock-care practices. It includes feeding, healthcare, fodder collection, milk utilization, shed maintenance and marketing. This study employs a bibliometric analysis to systematically examine the global scientific literature addressing climate-related risks faced by women dairy farmers and the adaptation strategies adopted to cope with these challenges. The analysis reveals a clear upward trend in scholarly publications since 2017, indicating growing research interest in this domain. Country-wise analysis shows that India and Ghana have contributed consistent and comparable growth in publications over the study period, while the United States and Kenya have received the highest citation impact. Keyword co-occurrence and network-based analyses identify emerging research themes, including farmers' perceptions of climate change, migration, adaptation strategies, and climate-smart dairy farming practices. Furthermore, the collaboration network highlights the presence of key researchers acting as bridges in global scientific collaboration, underscoring opportunities for strengthening interdisciplinary and international research partnership. Building on these insights, the findings underscore the need for gender-responsive climate policies that recognize women dairy farmers as central actors in adaptation and strengthen women-oriented extension and capacity-building services.

**Keywords:** Adaptation, Bibliometric, Climate, Dairy

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## Critical Gender Elements in Sustainable Goat Farming: Improved Production Practices in Resource-Limited Settings

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Women are the drivers of animal rearing in rural areas, particularly in low to middle income countries in South Asia. Goat farming in the Eastern Indo-Gangetic Plain (EIGP), is a vital source of livelihood in resource-limited settings. However, farmers in the region suffer from many challenges. The biggest deterrent to enhanced productivity is high mortality rates in goats. The present study evaluates women led traditional goat husbandry in the EIGP and examines factors contributing to goat mortality to identify counteractive strategies. As a part of the research methodology of the ACIAR Rupantar project, a baseline survey covering 1,400 households and 36 focus group discussions were conducted, as well as Village Mapping and structured meetings between the local agricultural innovation network. Together, these assessed agricultural diversification along with the current scenario and the aspirations of community members about animal farming. Goat emerged as the livestock of choice for women in key communities. To deep dive into the system, structured and semi-structured interviews were conducted with 100 randomly selected households to collect data on their goat production practices including vaccination status, housing, financial decision-making, feeding and management practices. The average mortality rate of goats was found to be around 38.4%. The data was analyzed by binary logistic regression to identify factors responsible for mortality (>30% vs. <30%), taken as a dependent variable. As would be expected, vaccination emerged as a highly significant predictor, and vaccinated flocks showed significantly lower mortality ( $p = 0.005$ ). Feeding concentrate to mother goats ( $p = 0.034$ ) and landholding size ( $p = 0.039$ ) were also significant determinants of mortality. They are both directly and indirectly related to better nutrition. Average rearing cost was negatively associated with mortality ( $p = 0.012$ ) indicating higher cost in managing diseases which results in higher mortality. When revenue is controlled by the women who handle the animals, mortality tend to be marginally ( $p < 0.10$ ) reduced, likely due to improved investment to fulfill health and nutrition needs. Separate housing facilities, anthelmintic use, fodder cultivation, and body weight at six months showed marginal significance ( $0.05 < p < 0.10$ ) for reduction of mortality. Thus, women's leadership in investment decisions towards health and resources management are key drivers in lowering mortality rates. The results underscore the importance of integrated interventions on technical and socio-economic aspects, to target and support activities that invest in women's leadership for improving goat farming outcomes in resource-poor settings.

**Keywords:** Goat, Husbandry, Mortality, Vaccination

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## Economic Empowerment of Rural Woman Through SHGs Promoted by Krishi Vigyan Kendra of Ambuja Foundation

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Self Help Groups play an important role in rural transformation. There are many successful SHGs in Gir Somnath district of Gujarat state. SHGs enhance the dignity and self-dependence of many rural women. Many more are the benefits. Rural women play a significant role in the domestic and socio-economic life of the society. Socio-economic empowerment has been considered instrumental for holistic development. This study addresses economic empowerment of women through self-help groups in Gir Somnath district of Gujarat State. Krishi Vigyan Kendra (KVK) and Ambuja Foundation formed SHGs under women empowerment programme to create an awareness and participation among residing in the rural pockets of Gir Somnath district. The diagnostic study was confined to 14 villages from which 250 SHGs and 250 non SHGs rural woman members selected for study. The selection of villages one of the criteria was the villages having more than eight SHGs were selected for the study and also conducting their livelihood activities since more than three years. A comparative study was taken out between SHG and non-SHG rural woman members. The result revealed that the independent sample 'Z' test showed that there was highly significant difference in the mean values of SHG members and Non SHG members in case of skill development, saving & investment, self-sufficiency and knowledge about banking system.

**Keywords:** Development, Empowerment, Interventions, Saving

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## From Training to Income: Impact of KVK-Supported Mushroom Cultivation among Rural Women

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Mushroom cultivation has emerged as a highly viable, low-capital micro-enterprise for landless and marginal farming communities, offering a direct pathway for the economic empowerment of rural women. This study evaluates the socio-economic impact of targeted vocational training and extension interventions in mushroom cultivation conducted by Krishi Vigyan Kendra (KVK) Saharanpur, Uttar Pradesh. The primary objective of the initiative was to transition rural women from traditional, unpaid agricultural labor into self-sustained agri-entrepreneurship. The assessment focuses on cohorts of rural women who underwent structured, hands-on capacity-building programs at KVK Saharanpur. The training encompassed the complete production cycle of Oyster and Button mushrooms, including substrate preparation, spawning, crop management, harvesting, and post-harvest value addition. To ensure long-term enterprise sustainability, the KVK provided critical inputs, continuous technical backstopping, and facilitated local market linkages.

Post-intervention analysis indicates a significant positive shift in the economic profiles of the beneficiaries. Participants successfully established both household-level and group-based mushroom production units by utilizing locally abundant agricultural residues, such as wheat and paddy straw, thereby integrating circular bioeconomy practices. The adoption of this enterprise resulted in a measurable increase in supplementary monthly household income and enhanced financial independence among the women. Additionally, the integration of harvested mushrooms into their daily diets contributed to improved household nutritional security by providing a rich source of protein and essential micronutrients.

Beyond the direct economic metrics, the study highlights substantial social impacts. Beneficiaries reported an increase in self-confidence, elevated social status, and greater decision-making agency within their households. The intervention also spurred the active formation of women-led Self-Help Groups (SHGs) focused on collective marketing. The findings demonstrate that institutional capacity-building programs, when coupled with sustained technical support from KVKs, effectively bridge the gap between skill acquisition and active income generation. Mushroom cultivation stands out as a highly scalable and replicable model for rural development, providing a sustainable mechanism for both poverty alleviation and gender empowerment in the Saharanpur district.

**Keywords:** Agri-entrepreneurship, Empowerment, Mushroom cultivation, Sustainability

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## Women Empowerment and Entrepreneurship Development through Integrated Farming

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Livestock farming mainly piggery and poultry forms an integral part of agriculture in the tribal population of Nagaland, as majority of the population are non-vegetarian and prefers meat as source of protein. Women play an important role in the management of farming in the region. A successful entrepreneur, Miss. Athini, who is 33 years old youth from Jalukie Town, Peren district, Nagaland, with her agriculture background changed the scenario of farming and adopted integrated farming system for self sustainability, easy management with higher profitability. The technical knowledge and skills for her venture was provided by KVK Peren along with the resources like, piglets, chicks, ducklings, fingerlings and vegetable seeds. With the scientific intervention in piggery farming, practices on scientific breeding methods and health care management, she could expand her piggery unit from 10 pigs to 30 pigs. With the adoption of Integrated Farming System approach (Horticulture+Animal+Fishery) productivity was enhanced, and generated more profit as less input were procure which result in reducing the cost of production. Initially in the year 2019, she started her venture in piggery only however, in due course of time she integrated Piggery with fishery (Composite Fish farming with exotic carps), introduce duckery to manage the fish pond, poultry for short term income to sustain the system before the harvest of main component i.e., Piggery. Fruits and vegetables were also incorporated to enhance and support the system by utilizing the excess pig manure from the piggery unit. In the second year, she could earn ₹ 80 thousand and subsequently ₹ 2.5 lakhs as Net income in the fifth year, with cost-benefit ratio of 1.80 and 2.00, respectively. Her success through determination and hard work empowers her in terms of livelihood improvement and sustainability and project herself as role model entrepreneur for fellow youths and farmers of the region.

**Keywords:** Entrepreneurship, Integration, Piggery, Profitability

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## Synergistic Integration of Farm Enterprises: A Catalyst for Circular Bio-economy Development

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Sustainable agricultural development in the face of climate variability, resource degradation, and shrinking farm sizes demands new approaches. It requires a paradigm shift from isolated enterprise management to holistic and synergistic farming systems to optimize resource use, enhance productivity, and ensure livelihood security. The integration of diverse farm enterprises promotes circular bio-economy principles by enabling internal resource recycling, reduces external input dependency, minimizes production risks, and strengthens ecological balance. Such synergistic linkages improve soil fertility through organic recycling, enhance water-use efficiency, diversify income sources, and generate year-round employment, thereby promoting economic stability and climate resilience in vulnerable agro-ecosystems. An integrated farming approach allows waste from one enterprise to serve as input for another—for instance, livestock manure enriching crop fields, crop residues supporting animal feeding, azolla supplementing livestock nutrition, and biogas slurry improving soil health. Renewable energy components such as solar systems and biogas plants further reduce energy costs and promote sustainability. Through diversification and enterprise complementarity, farmers can achieve higher productivity per unit area while maintaining environmental integrity. The success story of Mrs. Geni Devi from the arid desert region of Barmer district, Rajasthan, stands as empirical evidence of the effectiveness of synergistic enterprise integration. By combining crop cultivation, livestock, sheep and goat rearing, poultry, fodder production, horticulture, agroforestry, organic farming, water harvesting structures, and renewable energy interventions within an Integrated Farming System (IFS), she created a diversified and synergistic farm model. This integration significantly enhanced farm income, resilience, and sustainability despite severe climatic constraints. Her model demonstrates how enterprise diversification can transform smallholder agriculture into a profitable and sustainable system. This case validates that synergistic integration of farm enterprises is not merely a theoretical concept but a practical pathway toward circular bio-economy development and sustainable agriculture development.

**Keywords:** Agroforestry, Bio-economy, Diversification, Smallholder

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## From Training to Income: Impact of KVK-Supported Mushroom Cultivation among Rural Women

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Empirical micro-level evidence on the effectiveness of extension-led interventions in promoting women's agripreneurship remains limited, particularly for low-input enterprises suitable for resource-constrained rural households. The present study evaluates the livelihood and income impacts of a Krishi Vigyan Kendra (KVK) Awagarh-supported oyster mushroom cultivation intervention implemented among rural women in Etah district of Uttar Pradesh, India. The study adopted a frontline demonstration-based evaluation approach. Data were generated through direct field observation, production records, and cost-return analysis. Following participation in a four-days theoretical and 15 days practical skill-oriented training programme on entrepreneurship development through mushroom cultivation, a rural woman beneficiary adopted oyster mushroom production using household space. Under the demonstration, critical inputs including mushroom spawn, polythene bags, and plant protection chemicals were provided, and cultivation was carried out under recommended scientific practices. Production was undertaken using 35 substrate bags prepared with 15 kg of spawn, with continuous technical backstopping from KVK scientists. Impact was assessed using quantitative indicators such as yield performance, cost of cultivation, gross and net returns, and market participation. Results indicated an initial harvest of 44 kg of oyster mushroom, with an estimated seasonal production of approximately 132 kg. The total cost of cultivation was ₹2,750, while gross income amounted to ₹13,200, generating a net return of ₹10,450. Marketing was conducted through local vegetable vendors and urban retail outlets, supplemented by mobile-based orders, indicating improved market access and entrepreneurial engagement. The findings provide robust empirical evidence that oyster mushroom cultivation is a financially viable, low-capital, and scalable micro-enterprise for rural women when supported by structured extension services. The study confirms the effectiveness of KVK-led capacity building in enhancing income generation, market participation, and women's economic empowerment. Expansion of such evidence-based, women-focused extension interventions can contribute meaningfully to livelihood diversification, nutritional security, and inclusive rural development.

**Keywords:** Agripreneurship, Capacity building, Livelihood, Oyster mushroom

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## From Commitment to Action: Mainstreaming Gender Equality and Social Inclusion in Education and Skills Development

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Gender equality and social inclusion (GESI) are central to sustainable development, inclusive economic growth, and effective governance. Globally, women constitute 49.6% of the population but hold only 26.7% of parliamentary seats and earn nearly 20% less than men (UN Women). The World Bank estimates an annual global loss of USD 172 trillion in human capital due to gender gaps in labour force participation and earnings. These disparities disproportionately affect socially marginalized groups by limiting access to education, skills, and economic opportunities.

In India, and particularly in Punjab, gender inequities persist despite relatively high literacy levels. Punjab's female workforce participation rate remains below 20%, while the sex ratio of 895 females per 1000 males (Census 2011) reflects entrenched structural bias. Women's participation in leadership roles, formal employment, and agri-value chains remains limited, especially in rural areas.

**Objective:** The study examines the role of education and vocational training programmes in promoting gender equality and social inclusion among women beneficiaries in Punjab. **Methodology:** A survey-based study was conducted using structured questionnaires, supported by secondary data from vocational training institutions, and analyzed through gender-disaggregated descriptive statistics. **Key Results:** Findings indicate that vocational training improves skill acquisition, self-confidence, and employability potential; however, actual labour market outcomes are constrained by social norms, mobility restrictions, and weak market linkages.

The paper emphasizes the need to mainstream GESI across education and skill-development policies through gender-responsive planning, inclusive curricula, and outcome-based monitoring. It concludes that integrating GESI within skills development is not only a social imperative but a strategic investment in resilient and inclusive development.

**Keywords:** Gender equality, Punjab, Skills development, Social inclusion, Vocational training, Women's empowerment

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## Mainstreaming Millets for Nutritional Security: A Case Study of Gender Inclusion and Empowerment

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Millets were part of traditional food system in Indus valley civilization about 7000 years ago. *Yajurveda* mentions cultivation of positive millets e.g. foxtail, barnyard millet and finger millet during 1200 BCE. Though millets contributed 16.34 percent of food crops, as reported in Agriculture Statistics of British India (1935-36), Industrial Revolution of Europe and Green Revolution of India (1960-70) pushed back millets as food crops of the poor. Wheat rice, maize and sugarcane consumed major share of resources as water, land, human labour and energy despite of the fact that millets are rich in fiber, protein and other micro nutrients, climate resilient, least pest incidence, lower water requirement grown in varied land types and less demanding on cash labour and energy. Nutritional security of vulnerable section of society i.e. women, children and aged population has been observed with inclusion of millets in human diet. Since people are more health conscious now, millets are food of urban elites and these are consumed as super food. Surveys have reported that less than 10-15 % people in India consume millets as routine diet. Middle and lower section of people find millets beyond their reach as these are very costly. Need of the hour is mainstreaming initiatives for inclusion of millets as subsidy in production, availability at ration shops and mid-day meals schemes in Anganwadies besides promotion through manufacturing of value-added millet products as healthy snacks and fast food for meeting needs of public taste and acceptability. This paper highlights success story of rural women entrepreneur, Smt. Vimla Devi of Asnawar village in Jhalawar district of Rajasthan. Her interest in led as promote of millets subsequent to participation in a training program at Krishi Vigyan Kendra, Jhalawar about three years ago. As a master trainer she is training other farm women through Rajeevika scheme of Govt. of Rajasthan. Various value-added millet products as roasted *Bajra-jowar*, biscuits and *ladoos*, Ragi *ladoos*, *namkeen* snacks are produced as common activity of self-help group. Participation in fairs and marketing initiatives in Rajasthan and other states has generated more income and self-confidence in her as a women entrepreneur. She is now empowered in decision making and strategic promotion of millets. Gender inequality has taken backseat in her family and other women members of the village. Economic contribution to family income is visible as her siblings are better educated which has earned prestige in rural community.

**Keywords:** Cultivation, Entrepreneurship, Mainstreaming, Millets

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## Empowering the Seas: The Role of Women in Fisheries and Seafood Processing in Coastal Districts of North Maharashtra, India - Status, Challenges, and Future Strategies

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Women play a vital role in the Indian fisheries sector, especially in coastal regions such as Palghar, Raigad, Thane, Mumbai and Mumbai Suburban districts of Maharashtra. Yet their contributions remain systematically undervalued and under-documented, particularly in marine fisheries value-chains. This study examines the role, status, and working conditions of women engaged in fisheries and seafood processing across the coastal districts of North Maharashtra, namely Palghar, Raigad, Thane, Mumbai, and Mumbai Suburban. This study highlights available literature, government reports, and field-level observations to highlight their roles, socio-economic status, working conditions, and the strategic interventions required to improve their economic security and workplace welfare. The analysis draws on from major fishing harbours and landing centres - Alibaug, Arnala, Uttan, Vasai, Satpati, Versova, Sassoon Dock, New Ferry Wharf, and Dahanu as well as seafood processing clusters located in Taloja MIDC and Vasai. Findings reveal that women dominate post-harvest segments such as fish sorting, grading, pre-processing, processing, drying, packaging, and retail marketing, particularly within industrial seafood units and informal coastal markets. However, their participation in capture fisheries, mechanized operations, and formal fisheries institutions remains minimal. Persistent challenges include informal employment, wage disparities, occupational health risks, lack of social security, limited access to resources, and exclusion from decision-making processes. Despite these constraints, women's labor significantly contributes to household income stability, food and nutritional security, and resilience of coastal fisheries systems. The paper recommends involvement of women in seafood industries in utilization of secondary raw materials for gaining higher economic returns, gender-responsive policies, targeted skill development, cooperative formation and improved social protection mechanisms. By integrating women more effectively into formal value chains and institutional structures, the fisheries sector can advance toward equitable, resilient, and sustainable coastal development. The paper offers an evidence-based, region-specific contribution with strong policy relevance, positioning women not as beneficiaries but as agents of transformation in India's blue economy.

**Keywords:** Blue economy, Coastal livelihoods, Gender inclusion, Seafood processing, Value chain, Women in fisheries

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## Empowering Women through Technical and Vocational Training

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Empowering women through Technical and Vocational Education and Training (TVET) is a crucial strategy for achieving gender equality and sustainable socio-economic development. Technical and vocational training provides women with practical skills, entrepreneurial knowledge, and access to employment opportunities that enhance their economic independence and social status. Despite progress in recent years, women's participation in vocational programs remains limited due to cultural barriers, gender stereotypes, and unequal access to resources. Integrating gender-responsive policies within TVET systems can help address these challenges by promoting inclusive curricula, safe learning environments, and support for women in traditionally male-dominated fields. Furthermore, partnerships between government, private sector, and community organizations can expand training opportunities and link women to labour markets. The study highlights the transformative potential of TVET in empowering women, fostering self-reliance, and contributing to national development goals through inclusive growth and social equity.

**Keywords:** Gender equality, Gender stereotypes, Skill development, Vocational education, Women empowerment

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## Exploring the Research and Technology Gap in the Context of Women in Citrus based Agri-Food Systems

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About 43% of global agricultural workforce is women, yet their contribution remains largely undocumented and unrecognized in several agri-horti based food systems. In perennial fruit crop based food systems, like the citrus based agri-food systems (citriculture), the gap is even more glaring. Though citrus fruits are cultivated commercially in more than 150 countries, significant gender disparities exist in citriculture like women facing drudgery, lack of access to resources, advisories, technical information and opportunities for capacity development. In this study, the quantum of documentation or in other words, “research” done on “women in citriculture” was analyzed through “Macro Analysis” whereby bibliographic assessment of and systematic review of literature of 306 articles ranging from 1929 to 2024 available in “gender and citrus farming” from 35 major citrus producing countries was done using PRISMA guidelines and Rayyan QCRI. The analysis revealed 10 major gender disparities of 3 categories on a longitudinal and cross sectional scale and also highlighted the “Research Gap”. For exploring the “Technology Gap”, a Micro Analysis was conducted by interviewing 300 women citrus growers of Nagpur, India. Only 20% of respondents had high Technology Adoption Score (3-5) Further, respondents with sound technical know-how of citriculture were found to face lesser degrees of socio-personal gender disparities ( $t$ -value=2.02 significant at 0.05 level) than those who lacked technical knowledge. Systematic strategies for women empowerment were outlined based on macro analysis that can lead to enhanced impact of agricultural technologies, improved livelihoods, sustainable citriculture and social development through achievement of Sustainable Development Goals.

**Keywords:** Gender gap, Macro and microanalysis, Research and technology gap, Sustainable citriculture, Women empowerment strategies

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## Gender Equality and Social Inclusion through Natural Farming Bio-Input Training at KVK Bishnupur

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Mainstreaming gender equality and social inclusion (GESI) in agricultural extension is essential for achieving sustainable and inclusive agricultural development. Natural farming practices, which emphasize the use of locally available and low-cost bio-inputs, offer significant opportunities to enhance the participation and empowerment of women and socially marginalized farming communities. The present work describes a GESI-responsive training programme conducted at Krishi Vigyan Kendra (KVK), Bishnupur, focusing on the preparation and application of bio-inputs under natural farming practices.

The training programme emphasized practical, hands-on learning in the preparation of *Beejamrit* for seed treatment; *Jeevamrit* and *Ghanjeevamrit* for improving soil microbial activity and nutrient availability; and *Neemastra* along with other botanical *astras* for eco-friendly pest and disease management. Participatory training methods, including demonstrations, group discussions, and experiential learning, were adopted using locally available materials. Special efforts were made to ensure the active participation of women farmers, self-help group members, small and marginal farmers, and other socially disadvantaged groups through inclusive training design, use of local language, and flexible scheduling.

The training resulted in improved knowledge and skills in bio-input preparation, reduced dependency on chemical fertilizers and pesticides, and increased awareness of environmentally sustainable farming practices. Enhanced confidence and participation of women farmers in farm input management and decision-making were also observed. The approach demonstrates that integrating GESI into natural farming training effectively supports environmental sustainability while promoting social equity in agricultural extension systems.

**Keywords:** *Beejamrit*, Bio-inputs, Gender equality, *Jeevamrit*, Natural farming, Social inclusion, Sustainable agriculture

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## Empowering Tribal Women through Improved Goat Production Technologies in Jaipur District

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Women play a pivotal role in rural development and in the water-scarce regions of Jaipur, women-led goat and livestock rearing offers a viable strategy for enhancing income, nutritional security and economic empowerment through sustainable and scientific management practices. Under the Tribal Sub Plan, Krishi Vigyan Kendra (Chomu), Jaipur-I implemented a tribal goat development intervention from November 2017 to December 2025 to improve productivity and livelihood security among tribal goat-rearing households. A total of 400 families from six villages-Bai ka Bas, Guardi, Kanarpura, Tootoli, Achhojai and Sawaimadhosinghpura-across four blocks of Jaipur district were selected using Participatory Rural Appraisal (PRA), based on villages having over 20% tribal population. Baseline assessment indicated that farmers predominantly reared non-descript goats, with a flock size of 2–3 animals per household, low milk yield (0.6–1.0 L/day), and an annual income of ₹8,000–15,000 per family from goat farming. Targeted capacity-building programs emphasized scientific goat husbandry, with a focus on women's participation. Sixty women beneficiaries were provided goat-based Front-Line Demonstrations (FLDs) to facilitate the adoption of improved technologies. Breed improvement was implemented through the introduction of Sirohi breeding bucks and enhanced access to Sirohi goats in the adopted villages. Post-intervention evaluation demonstrated significant improvements, average milk yield increased to 1.5–1.75 L/day, flock size expanded to 5–6 goats per household and kids' birth weight improved from 2.0–2.60 kg to 2.40–3.10 kg. These gains were attributed to systematic breed upgradation, proper deworming, vaccination, colostrum feeding and improved management practices. One-year-old improved males and females attained body weights of 40–45 kg and 35–40 kg respectively, compared to 30–35 kg and 25–30 kg in non-descript stock. Consequently, annual net income from goat farming increased to ₹35,000–40,000 per family. This long-term intervention demonstrates that integrated interventions combining breed improvement, preventive health care and capacity-building can significantly enhance goat productivity, household income and women's economic participation. Adoption of improved germplasm and scientific management practices provides a sustainable model for strengthening livelihood resilience among tribal households in Jaipur district.

**Keywords:** Animal husbandry, Empowerment, Productivity, Upgradation

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## Farmer Producer Organizations as a Catalyst for Women Empowerment in Rajasthan

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In Rajasthan, where agricultural livelihoods dominate and socio-cultural constraints often impede women's participation in economic decision-making, the emergence of Farmer Producer Organisations (FPOs) presents a transformative institutional framework. This abstract examines how the integration of women into the FPO system in Rajasthan fosters empowerment across economic, social, and political dimensions. The study conceptualises women's empowerment as multidimensional, encompassing economic agency, access to resources, leadership and decision-making, and enhanced social status. Within the FPO model, women's participation in collective decision-making bodies, training programmes, and value-chain activities challenges traditional gender norms. By facilitating access to credit, quality inputs, extension services, and market linkages, FPOs help women overcome structural barriers that have historically limited their productive engagement. Furthermore, through targeted capacity-building initiatives such as financial literacy, enterprise management, and post-harvest technologies, women acquire skills that enable them to negotiate better terms within and outside their communities. Empirical evidence from Rajasthan indicates that women-centric FPO initiatives contribute to increased household incomes, improved food security, and greater control over agricultural resources. Women appointed to leadership roles within FPO governance structures serve as role models, catalysing broader changes in gender relations and community norms. Importantly, the collectivisation process itself enhances peer support networks, fostering solidarity and shared learning among rural women. The abstract concludes that while the FPO system in Rajasthan holds significant potential to advance women's empowerment, its impact is shaped by supportive policy frameworks, gender-sensitive organisational practices, and sustained capacity-building efforts. Strengthening gender mainstreaming within FPO policy and extending targeted interventions can further deepen women's participation and equity in rural agrarian economies. Integrating gender perspectives not only benefits women members but also enhances the overall effectiveness, sustainability, and resilience of FPOs.

**Keywords:** Credit, Extension, FPOs, Market linkages

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## Mainstreaming Gender Equality and Social Inclusion in the Agri-Food System: Imperatives, Practices, and Challenges

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Agriculture continues to be the cornerstone of rural livelihoods and economic progress in India, with women and marginalized communities occupying a crucial but frequently unacknowledged position within the agri-food system. Even though women play a major role in agricultural production, labor, and value-chain activities, ongoing gender inequalities and social exclusion limit their access to resources, services, decision-making processes, and institutional support. This article explores the significance of integrating Gender Equality and Social Inclusion (GESI) into agriculture as a means to achieve sustainable, inclusive, and equitable development outcomes. The article emphasizes the need for GESI to be incorporated into agricultural policies, extension systems, and rural institutions in order to boost productivity, enhance food and nutrition security, and strengthen resilience against climate change. Alongside a GESI theory of change connects empowerment with accountable and responsive governance. The best practices for GESI mainstreaming include inclusive participation, gender-responsive monitoring, capacity building, and community engagement. Nevertheless, there are considerable obstacles to the implementation of GESI, such as deep-rooted socio-cultural norms, limited institutional capacity, data gaps, and the growing burden of work on women. The article concludes that integrating GESI into agriculture is not only a social imperative but also a strategic investment crucial for achieving poverty reduction, gender justice, and the Sustainable Development Goals by 2030.

**Keywords:** Agri-food system, Gender equality, Social inclusion, Sustainable agriculture, Women empowerment

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## Strengthening Women's Involvement in Meghalaya's Commercial Crop Value Chains: A Gender Perspective

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This research study was done in the Ri-Bhoi district of Meghalaya for carrying out a gender analysis on the pineapple and ginger value chain. The objectives of the study were 1) To map the value chain of pineapple and ginger through the gender lens. 2) To assess the gender labour participation and decision-making in production and post-harvest activities at the household and community level. 3) To identify the constraints faced by both men and women in the pineapple and ginger value chain at the household level. Primary data were gathered through Focus Group Discussions (FGD), personal interviews, and observations, and analyzed using descriptive statistics. The study revealed that men predominantly managed production activities in the pineapple value chain, while women handled most post-production tasks except transportation, which was primarily done by men. In the ginger value chain, women were actively involved in both production and post-harvest activities, with transportation being handled mostly by men. Major challenges included household work overload for women and low produce prices for men. However, with proper technical guidance and educating both the men and the women farmers equally through trainings on value addition, they will be able to acquire more profit from selling their own value-added products and to not depend on the middlemen or traders in selling their raw produce at a very less price.

**Keywords:** Gender labour, Household constraints, Social inclusion, Sustainable agriculture, Value addition

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## Feminization of Agriculture in Matrilineal Meghalaya: Concepts and Quantification in Ri-Bhoi, Meghalaya

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The feminization of agriculture traditionally denotes rising female participation driven by male out-migration. Yet in matrilineal Meghalaya, it reflects the intensification and formal recognition of women's longstanding dominance in farming due to customary norms rather than distress factors. This study reconceptualizes the term through a Meghalaya lens. Emphasizing labor continuity, matrilineal asset control, resource gaps and empowerment linkages by quantification in Ri-Bhoi district, Meghalaya. Study pursues two objectives: (1) clarifying "feminization of agriculture" in accordance to Meghalaya and (2) To assess feminization levels among farmers. The Study employs a mixed-method approach, integrating both qualitative and quantitative data collection techniques. Primary data were collected using pre-tested interview schedule with 52 respondents from 4 villages within Ri-Bhoi: Marngar, Mawphrew, Lairkhala and Kdonghulu. For data analysis, MaxQDA based thematic analysis was utilized. Quantitative tools included descriptive statistics, multiple regression analysis and Cronbach's alpha ( $\alpha > 0.80$ ) for confirming reliability among themes were performed. The results highlighted the complex interplay between 8 clusters of coded segments using Network Analysis Visualization in MaxQDA. The reliability for various items related to feminization indicated good internal consistency for the conceptual framework of study. Results reflected high feminization level in Meghalaya with 38.46% in the high feminization category followed by 36.53% medium level. Women exhibit high control over resources (73.08%), predominantly high joint decision-making power (78.85%) and medium labour participation (50%), with strongest involvement in post-harvest work, marketing and harvesting. Regression on Access to resources indicated that total access to resources is significantly explained by credit, technology and extension services, with technology emerging as the strongest predictor. The study concludes that, although matrilineal norms support women's ownership and joint control over assets, limits independent decision-making and uneven access to technology and services restrict feminization's impact. Strengthening women's access to digital market information, online linkages and agroadvisory tools can boost bargaining power and empowerment in Meghalaya.

**Keywords:** Digital market, Feminization, Meghalaya, Matrilineal concept

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## Growing Organic Kitchen Gardens: Ending Hunger?

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Organic kitchen gardening is a small-scale, sustainable backyard production system that relies on locally available organic inputs instead of chemical fertilizers and pesticides. It enhances household food security, nutritional diversity, environmental sustainability, and supplementary income, particularly for rural and marginal farm families in Telangana, where seasonal unemployment and fluctuating market prices often limit food access. Under this initiative, rural households received kitchen garden kits containing 12 varieties of vegetable seeds and saplings for three years, including leafy, fruit, and root vegetables to ensure crop rotation and continuous harvest. This approach reduced dependence on market purchases, lowered household expenditure, improved intake of essential nutrients, and enabled families to share or sell surplus produce for additional income. The model is built on organic inputs such as vermicompost, farmyard manure, green compost, kitchen waste compost, sour buttermilk solutions, and neem-based extracts, which improve soil fertility, water retention, and long-term productivity while ensuring chemical-free, safe food. Women played a central role in managing the gardens, strengthening their decision-making capacity and empowerment. Training programs by Krishi Vigyan Kendras (KVKs) supported skills in seed treatment, nursery raising, organic pest management, crop rotation, mulching, and drip irrigation. Although kitchen gardens alone may not completely eradicate hunger, the study found they significantly reduce nutritional insecurity, particularly micronutrient deficiencies among women and children. Despite challenges such as water scarcity, pest incidence, limited technical knowledge, and seasonal crop failures, solutions like community water harvesting, farmer field schools, and continuous technical support enhance sustainability, making organic kitchen gardens a practical and eco-friendly pathway toward household-level hunger reduction and improved livelihoods.

**Keywords:** Empowerment, Gardening, Livelihoods, Sustainability

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## Exploring Challenges and Opportunities in Farm Women's Enterprise Development

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Perception plays a significant role in influencing the entrepreneurial behaviour of farm women, as it reflects their feelings, beliefs, and understanding of the worth, efficiency and feasibility of engaging in enterprise activities. The present study examined the perception of farm women regarding entrepreneurial development in the Chikkaballapur and Tumkur districts of Karnataka. Results indicated that 46.50 per cent of the respondents had a positive perception of entrepreneurship development, while 25.70 per cent expressed negative perceptions, reflecting both interest and hesitation among rural women. Analysis of the first dimension revealed that lack of confidence was a major barrier, with the statement "I don't have the confidence to start an enterprise" receiving the highest score (671.60 out of 1000), followed by lack of adequate knowledge and insufficient experience. This could be attributed to low literacy levels (29.9%), limited social participation, and inadequate awareness of government schemes. The second dimension highlighted socio-cultural constraints, where fear of disapproval from husbands and restrictions on mobility were ranked highest. These findings suggest strong dependence on male family members for decision-making beyond household responsibilities. In the third dimension, social acceptance emerged as a concern, with women fearing that people might not accept their products or may judge them negatively. The fourth dimension revealed fear of enterprise failure, lack of profitability, and competition as major constraints, indicating apprehension about financial risks. The fifth dimension showed negative perceptions regarding financial institutions, as many women believed they would not be granted loans for being women, lacking eligibility for financial grants or facing pressure for repayment. Overall, the study showed that limited confidence, inadequate knowledge, socio-cultural restrictions, fear of failure and perceived barriers in accessing financial support strongly influence the perception of farm women towards entrepreneurship. Enhancing education, awareness, skill development, family and institutional support is essential to improve perception and promote entrepreneurial participation among rural women.

**Keywords:** Decision making, Entrepreneurship, Perception, Rural livelihoods, Women empowerment

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## Impact of Drudgery-Reducing Tools on Work Efficiency and Occupational Health of Sericulture Farm Women

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Sericulture provides vital livelihoods for rural women in India but remains highly labour-intensive, with repetitive tasks and continued reliance on traditional implements leading to physical strain and occupational health risks. Yet, adoption of ergonomic, drudgery-reducing tools remains low due to inadequate awareness and limited information on available technologies. In this context, the present study aimed to assess existing tool usage, occupational safety awareness and the impact of introducing two ergonomic tools such as machete and a long-headed pruner among sericulture farm women. The findings indicated a strong reliance on traditional tools, particularly the sickle (50%), along with poor safety awareness, as 52 per cent of the women lacked knowledge of basic occupational safety measures. Following the intervention, 66 per cent found the machete easy to use, and 60 per cent reported the same for the long-headed pruner. Women experienced noticeable reductions in physical effort, 40–50 per cent time savings. Physiological assessments supported these observations. When using the sickle, pulse rate increased from 78.29 to 95.50 beats/min, indicating a higher physiological load. In comparison, the rise was moderate with the machete (90.30 beats/min) and minimal with the long-headed pruner (81.40 beats/min), suggesting lower strain. Blood pressure showed a similar pattern. Sickle use increased systolic pressure from 125 mm Hg to 138 mm Hg and slightly reduced diastolic pressure (83 to 82 mm Hg), reflecting greater cardiovascular demand. The machete and long-headed pruner resulted in only moderate or minimal increases (133/83 mm Hg and 129/84 mm Hg, respectively), indicating comparatively lower physiological stress. Health outcomes improved following tool adoption, with reported reductions in pain in the hands and legs (10%) and in back pain (11%). Overall, the study demonstrates that simple ergonomic interventions can substantially reduce drudgery, enhance work efficiency and improve occupational health among sericulture farm women.

**Keywords:** Drudgery-reducing tools, Nutritional status, Occupational health, Sericulture women, Traditional tools

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## Assessment of Nutritional and Health Status of Women Involved in Sericultural Activities

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Sericulture is a major livelihood source for rural women; however, the physically demanding nature of the work heightens their vulnerability to nutritional and health challenges. Nutritional assessment plays a crucial role in evaluating overall health, dietary adequacy, and functional capacity, particularly for individuals involved in labour-intensive occupations like sericulture. Recognizing its importance, the present study aimed to evaluate the nutritional and health status of sericulture farm women. The findings revealed that 12 per cent of the women were underweight, while 16 per cent were obese -I and another 9 per cent were obese-II category. Central obesity was highly prevalent, with 39 and 35 per cent classified under moderate to high WHR risk categories, indicating substantial abdominal fat accumulation. Dietary assessment showed a predominantly cereal-based diet, with all respondents consuming rice and ragi mudde daily. Caloric contribution was heavily skewed towards cereals and millets (60%), oils and fats (22%), and pulses (12%), together accounting for 94 per cent of total energy intake. Frequency of consumption of different food groups indicated limited intake of micronutrient-rich protective foods, with only 13.3 per cent consuming green leafy vegetables daily and 20 per cent consuming fruits. Nutrient adequacy analysis revealed excessive fat intake (169.12% of RDA) but critical deficiencies in vitamin A (26.51%), calcium (35.83%), iron (59.31%), and dietary fibre (60%). Clinical examinations showed visible signs of micronutrient deficiencies, including dental caries (20%), dry and rough hair (23%), cheilosis (12%), pale tongue (15%), and bleeding gums (10%). The morbidity profile highlighted the strenuous nature of sericulture work, with high incidence of musculoskeletal discomfort such as pain in hands and legs (85%), fatigue (70%), weakness (60%), body ache (58%), and eye strain (40%) reflecting inadequate ergonomic support and challenging working conditions. Overall, the findings demonstrate significant nutritional insecurity and health risks among sericulture farm women.

**Keywords:** Anthropometry, Health status, Nutritional status, Occupational health, Sericulture farm women

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## A Journey from Motherhood to Agri-Entrepreneurship through Integrated Farming and Valorization: A Case Study from Karnataka

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Agricultural entrepreneurship among women is emerging as a vital strategy to improve rural livelihoods, promote value addition and support gender-inclusive development. In this context, the entrepreneurial journey of Smt. Latha Yogana, a farm woman from Hassan district, Karnataka, illustrates a successful transition from conventional farming to value-added agri-processing. Owning 12 acres of agricultural land under paddy, ragi, coconut, mango jackfruit and citrus fruits. She gradually adopted integrated farming practices to diversify production and optimize resource use. A personal experience of preparing nutritious homemade malt for her special child became a catalyst for recognizing opportunities in millet-based value addition. Appreciation from hospital staff motivated her to explore product development, processing and market potential. Family support and capacity-building programmes played a crucial role in enhancing her technical and entrepreneurial skills. Training on food processing and IFS demonstration by UASB-GKVK, CFTRI and IIHR enabled her to establish her brand “Yoga Siri,” under which she has licensed millet malt, black rice malt, betel leaf dry pan, herbal preparations and masala items. By integrating production, processing, branding, and marketing she successfully connected farm-level outputs to profitable value-added products. Her products are sold through organic markets such as Mysuru Organic Santhe and Hassan Organic santhe, Krishi santhe, Krishi melas, Trade fairs and exhibitions, and online platforms. She is presently earning a monthly profit between ₹60,000 and ₹2.25 lakhs, depending on market demand. The enterprise has also generated local employment opportunities, particularly for women, contributing to income generation and community-level empowerment. Beyond economic benefits, her efforts to promote indigenous crops, enhance nutritional awareness, and encourage women’s participation in agri-processing is notable. Recognition from ATMA and her role as a resource person in trainings further reflect her leadership in entrepreneurship promotion. Overall, this case study demonstrates that integrated farming, value addition and institutional support can foster women-led rural agri-enterprises, enhance livelihood security, and stimulate agricultural innovation and rural development.

**Keywords:** Agri-entrepreneurship, Integrated farming, Rural livelihoods, Value addition, Women empowerment, Women farmers

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## Entrepreneurship Development through Sorghum Value-Added Products

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Agriculture being an important occupation in India, there is huge wastage of perishable agricultural commodities. Despite India being the largest producer of the largest varieties of cereal grains and pulses, the demand for consumption is just growing owing to a large increase in population. Processing of cereal grains particularly millets have a bright future ahead. Sorghum is main crop of Maharashtra and particularly in Solapur district cultivated more than 4.3 lakh ha area, but fetching very low market price due to glut arrival and no value addition. As per the nutritional value of the crop, it is 12.96%, high source of energy without gluten, rich availability of minerals & vitamins, best food for diabetic persons, decreases cholesterol percentages and blood sugar. Sorghum is the nutritious cereal which makes healthy diet. But only one traditional product (Roti) is prepared from sorghum. The school children also avoid eating sorghum Roti. So, KVK decided to create awareness about new technology i.e. promotion of value-added products of sorghum developed by ICAR-IIMR, Hyderabad and MPKV, Rahuri. Hence the main objective of this study was to strengthen the livelihood security by establishing 32 small scale sorghum processing units under KVK Solapur-I in last five years under ARYA project. The processing of the food commodities at the village level will not only check the post harvest losses but also provides additional employment (both direct and indirect) to the local people. The research on small scale sorghum processing unit was conducted by SKP's Krishi Vigyan Kendra, Solapur-I, under an ICAR sponsored project on Attracting & Retaining Youth in Agriculture (ARYA) for Entrepreneurship development in Solapur district for 165 female youth selected participants for vocational training programme and established 32 individual small scale sorghum processing units developed in village level. In the units' major products like Sorghum Kadak Roti, Rawa, Cookies, Chakali, Cake and Multimillet atta. KVK Solapur has branded the sorghum rawa, sorghum cake, sorghum biscuits, as TM registered by name of *Shabari Fresh*. The project area included 30 selected villages of 5 clusters viz, Barshi, North Solapur, South Solapur, Mangalwedha and Akkalkot in Solapur district of Maharashtra state. The average income of food processing individual was ₹ 2,16,570 per unit/year during season by generating an employment opportunity of 180 man days for 47 members. Thus, helping women to empower themselves through sorghum processing approach.

**Keywords:** Entrepreneurship, Processing, Sorghum, Wastage

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## Nutri-Sensitive Agriculture: Empowering Farm Families through Diversified Nutrition Garden

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A Nutri Garden is an advanced form of kitchen gardening designed to provide farm families with year-round access to fresh, nutrient-dense fruits and vegetables. This approach addresses food security by ensuring constant availability and nutritional security by promoting dietary diversity to combat malnutrition. The present study was conducted in the ICAR-KVK Bengaluru Rural District jurisdiction areas of Northern Bengaluru where nutrition garden intervention was demonstrated by utilizing unused land near the home and implementing seasonal crop rotation (*Kharif* & *Rabi*). Thirty sample households (who adopted nutrition garden) with 131 family members were selected for the study. Results revealed that on an average each household was producing 269 kg vegetables during both *kharif* and *rabi* season out of which 186 kg was utilized for home consumption and rest 83 kg was sold or shared to neighbours. The mean food expenditure was ₹ 5000/month/family. The proportion of expenditure on pulses, dry fruits and meat products increased after the intervention suggesting increased protein intake among the farm families. The percent adequacy of energy, protein, fibre, calcium, iron, vitamin A and vitamin C increased to 10.26, 17.42, 22.43, 9.95, 15.43 and 12.55 per cent, respectively. This indicates increased availability of nutrients to farm families. The study also recorded that while men often focus on field crops, women contribute up to 95% of the labor in nutrition gardens, handling everything from seedling production and organic composting to harvesting and processing. Nutri Gardens allow women to save significant household income (on average ₹2,100 per month) by reducing market purchases. The Nutri Garden initiative by ICAR-KVK Bengaluru Rural District has enhanced local food security, offering a sustainable model for improved household nutrition and increased income. The study highlights that the intervention has empowered women in agricultural decision-making while providing diverse, nutrient-rich produce.

**Keywords:** Dietary diversity, Food security, Nutri garden, Nutritional security

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## Contesting Global Gender Norms: The Case of Morocco's Middle Atlas Silvo-Pastoral Systems

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The prevailing gender norms within Morocco's silvo-pastoral practices have historically marginalized women by denying them access to governance structures and decision-making processes, framing their contributions as informal and unrecognized labor. This paper seeks to understand the process by which international developmental interventions translate global gender norms into localized practices that not only promote the active engagement of women in governance structures and cooperative-led value chains but also involve them as active agents of climate change adaptation.

Examining SOCODEVI (Society for Cooperation in International Development)'s FERMA project in the Middle Atlas, this research investigates women's inclusion across two sites of global gender norms negotiation: formal silvo-pastoral governance structures and 25 cooperatives. Drawing on scholarship on norm diffusion and contestation, the paper explores the negotiation process of the gender norms emanating from the Feminist International Assistance Policy (FIAP) of Canada, through SOCODEVI at the local level. The paper also reveals the way the locally contested norms are fed back into SOCODEVI's program design and operational practices, shaping governance approaches and policy instruments and highlighting the bidirectional nature of norm travel.

**Keywords:** Feminist foreign policy, Gender norms, Morocco, Norm contestation, Silvo-pastoral systems

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## Agroecological Homestead Approaches to Enhance Nutrition, Soil Health, and Livelihood prospects amongst Indigenous Communities in Madhya Pradesh, India

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Tribal communities in Madhya Pradesh, India are characterized by limited interaction with outside world and minimal exposure to developmental initiatives, heavily rely on self-production on subsistence agriculture and collection of Non-Timber Forest Products (NTFP), resulting in nutritionally imbalanced diet and irregular income, exacerbated by monoculture farming practices and diminishing forest resources. Coupled with widespread migration, gender inequality, and social alienation, these challenges perpetuate a cycle of poverty and malnutrition within these indigenous communities. To address these intersecting challenges, an Agroecological Homestead Model (AHM) piloted and promoted for adoption. While tribal households in the region typically possess relatively large but degraded landholdings, the AHM strategically utilizes small plots adjacent to homesteads (less than 0.1 ha), enabling women to manage production close to the home. The model integrates water harvesting and storage systems for irrigation, multi-layer cultivation, crop rotation, applying natural amendments, composting, and backyard poultry rearing that align with women's knowledge systems while enhancing productivity and resilience. Women play a central role in the design, implementation, and management of the AHM. Supported through women-led self-help groups, they lead collective take actions such as resource aggregation, bio-input preparation, planting materials and collective local marketing efforts.

Implemented on less than 0.1 hectares, the AHM accommodates 8 to 10 types of vegetable/crops annually, strengthening household food availability and dietary diversity. Initial support and capacity building, particularly through women led self-help groups, are crucial for adoption. Despite initial challenges such as investment requirements and knowledge gaps, the establishment of community nurseries, training on natural amendment preparation, and dissemination of knowledge on farm management were found instrumental in scaling the model. The AHM has resulted in significant improvements, including a 100% increase in dietary diversity, over 70% rise in green vegetable consumption, and 50% increase in income. Soil health indicators, including organic carbon levels and water retention capacity, have shown promising improvements, validated through citizen science approach.

The experience highlights the value of gender-transformative, agroecological homestead systems supported by multi-stakeholder partnerships involving government agencies, research institutions, and women's collectives. Ongoing efforts focus on linking AHM outcomes with government nutrition and livelihoods schemes, developing women-led micro-enterprises around agroecological inputs and outputs, and informing policy pathways to address malnutrition, climate vulnerability, and gender inequities among marginalized tribal communities at scale.

**Keywords:** Agroecology, Homestead farming, Nutrition security, Soil health, Tribal communities, Women empowerment

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## Scaling Solar Energy through Gender Equality and Social Inclusion: Insights from the SoLAR Project

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Women and marginalized farming communities in South Asia face persistent structural barriers to land ownership, finance, and participation in water–energy governance, limiting their ability to benefit from climate-resilient technologies. This study presents key Gender Equality and Social Inclusion (GESI) insights from the Solar Irrigation for Agricultural Resilience (SoLAR) project (2020–2025), implemented across India, Bangladesh, Nepal, and Pakistan. The project studied how inclusive solar irrigation promotion can simultaneously advance renewable energy transitions, climate adaptation, and gender-equitable livelihoods.

Using a mixed-methods approach combining household surveys, monitoring data, focus group discussions, key informant interviews, and case studies the study generated sex-disaggregated and intersectional evidence on access, adoption, and outcomes of solar irrigation pumps (SIPs). Country-specific GESI frameworks were embedded into project design and monitoring, enabling cross-country synthesis of enabling factors and context-specific barriers. Empirical evidence from India (800-farmer survey in Rajasthan) and Bangladesh (12 SIP sites with gender-balanced FGDs), etc highlights how women's participation in financing, training, and collective ownership models improves adoption, affordability, and sustainability of solar irrigation.

Findings demonstrate that bundled interventions, integrating technology, inclusive finance, and capacity building, significantly enhance women's technical skills, decision-making power, and participation in local water–energy markets. GESI-responsive financing models, including Earn First, Pay Later and First Loss Default Guarantee, reduced entry barriers for women farmers and Self-Help Groups. Policy engagement led to the integration of GESI targets into national programs such as PM-KUSUM (India), IDCOL (Bangladesh), and AEPC (Nepal), strengthening institutional accountability. Women-led solar irrigation systems also contributed to emissions reduction, livelihood diversification, and climate-resilient agrarian practices.

The study argues that embedding GESI across solar and climate programs is not only a matter of equity but a prerequisite for scaling sustainable energy solutions. Institutionalising gender-responsive monitoring, expanding inclusive finance, strengthening women's leadership, and aligning energy–water–agriculture policies are critical for ensuring just and resilient energy transitions.

**Keywords:** Climate resilience, Gender equality, Renewable energy, Social inclusion, Solar irrigation, Women empowerment

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## Income Generation to Enhance Household Food Security through Poshan Vatika

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Poshan Vatika (Nutri-gardens) is planned to provide affordable access to fruits, vegetables, and medicinal plants. In addition, kitchen gardens/nutri garden when properly managed provide a four-in-one solution to the food and nutrition problem by increasing household food availability, enabling greater physical, economic and social access, providing an array of nutrients, and protecting the household against food shortages. Beyond fulfill the household consumption needs, surplus produce from these gardens can be sold in local markets, generating additional income for rural households. Thus, the study was planned keeping in view to improved food security, increased availability of food and better nutrition through food diversity and enhanced rural employment through additional or off-season production in rural areas. The purposive experimental study was planned. The study was conducted in 10 villages under FLDs programme in Narmada District. Total 50 farm families were selected for the study having area around 150 m<sup>2</sup> near the house. Total 10 varieties were provided throughout the year in every Poshan Vatika included fruits and vegetables seeds and saplings were first time introduced in selected area. It was seen that area available for kitchen garden in most of farm families was cultivated area near the house (39.18%) and unused land near the house (30.71%).

**Keywords:** Access, Diversity, Nutri-gardens, Nutrition security

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## Access and Contribution Gender Gap in Dairy Sector: An Analysis from Punjab

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Agriculture forms the backbone of India's rural economy, with allied activities such as dairy, livestock, poultry and horticulture providing important livelihood support, especially for rural women. The present study in Punjab examined the socio-economic profile and gender-wise participation in the dairy sector. Using a descriptive research design, a sample of 777 women farmers were selected from dairy farming. Primary data were collected through a pre-tested structured interview schedule administered face-to-face in the local language, capturing information on demographics, work participation, access to resources and participation in the dairy sector. The study found that most respondents were middle-aged and belonged to the general category. In dairy farming and animal husbandry activities, joint participation of men and women was observed in physical participation, supervision and decision-making. Marketing of dairy products was dominated by men in physical participation and supervision, with joint decision-making. Activities such as milk processing and dung cake making were predominantly performed by women alone, securing the highest mean score (1.63) and rank I, indicating strong female involvement. Milking was largely a joint activity, though women's participation remained substantial, reflected by a high mean score (1.26). Overall, the findings highlight that women are central to daily dairy management, while men contribute more to physically demanding operations.

**Keywords:** Dairy, Gender gap, Marketing, Women empowerment

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## Impact Assessment of Kitchen Garden through Front Line Demonstration (FLD) in Mehsana District of North Gujarat by Krishi Vigyan Kendra (KVK) Mehsana

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This study assesses the impact of Front-Line Demonstrations (FLD) on kitchen gardening conducted by Krishi Vigyan Kendra (KVK), Mehsana, in the North Gujarat region from 2021-22 to 2024-25. The initiative aimed to enhance nutritional security and reduce household expenditure by promoting scientific vegetable cultivation in a standardized area of 70 sq. meters. Over the four-year period, the demonstrations showed a progressive increase in productivity, with average yields rising from 195 kg/demo in 2021-22 to 204 kg/demo in 2024-25. Consequently, the contribution of these gardens to the total vegetable requirements for a family of 5 members increased from 35.6% to 37.2%. The findings indicate that the systematic intervention by KVK Mehsana has successfully improved resource-use efficiency and provided a sustainable model for meeting nearly half of the annual vegetable needs of rural households, ensuring better access to fresh and nutritious produce.

**Keywords:** Cultivation, Efficiency, Food security, Productivity

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## Multi-Dimensional Gender-Based Digital Inequalities in Agri-Food System

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Agri-food systems' digital transformation has the potential to completely change global production, but it also widens the risk of creating a 'third-level digital divide'. Despite rapid expansion, the GSMA Mobile Gender Gap Report (2024) reveals that women in low and middle-income countries are 15% less likely than men to use mobile internet. In India, a significant gap in functional internet use (33.3% for women versus 57.1% for men, 2019-21) persists despite rising mobile phone ownership from 45.9% (2015-16) to 54% (2019-21). This divide restricts women's access to advisory services, financial tools, and market linkages, further marginalizing a demographic that already lacks secure land rights and access to productive resources. Literature suggests that closing these resource gaps could substantially raise farm productivity thus increasing global GDP. However, empowerment is mediated by agency; access alone is insufficient. We propose a penta-axial framework consisting of access (to devices, connectivity, infrastructure), affordability (cost of devices, data, services etc.), digital skills & literacy, usage & appropriation (extent and purpose of use), and control (decision-making, ownership, autonomy). These will enable to analyze digital barriers for women with targeted interventions like device subsidies and women-led platforms to develop an inclusive digital transformation in agri-food systems. The critical intermediary is digital competency and the gender responsive digital devices & platforms that leads to true empowerment. Bridging the gender digital divide is not merely a social objective but a structural necessity, there is need to shift from gender-neutral to gender-transformative strategies, prioritizing gender inclusivity and removal of socio-cultural barriers for unlocking gains in farm productivity, household nutrition, and global climate resilience.

**Keywords:** Affordability, Competency, Inclusion, Productivity

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## Institutionalizing Equity: Embedding Gender Equality and Social Inclusion in Farmer Producer Institutions for Equitable Governance and Resilience

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Despite women contributing significantly to agricultural production and workforce, their participation in agri-food collectives, such as Farmer Producer Organizations (FPOs), often remains tokenistic, confined to production roles, constrained by entrenched gender norms, caste dynamics, labour burden, and limited visibility in household and institutional decision-making spaces, which then continue to restrict women's voice, leadership, and visibility within agri-food institutions.

This study examines a multi-state (Andhra Pradesh, Gujarat, Maharashtra, Odisha) Action Research Project initiative aimed at voice amplification, elevating women's role and gender integration and social inclusion across agri-business value-chains by accelerating through Climate-resilient and Sustainable Agriculture (CSA) adoption, accelerating innovations, and mainstreaming Gender Equality and Social Inclusion (GESI) within FPOs using gender action learning approach.

Empirical evidence is generated on the gendered outcomes of applying participatory action research and qualitative methodology 30 FPOs and 6000 farmers, with a focus on co-creating context-relevant, inclusive, institutionally viable and scalable interventions. It examines how such interventions can be initiated, embedded, and sustained through close engagement with women producers and producer collectives. This action-learning process integrates a pause-reflect-improve rhythm to enable continuous, iterative analysis of structural, institutional, and behavioural factors shaping women's meaningful participation in FPO governance, value chains, and the adoption of CSA practices.

Field observations reveal persistent exclusionary patterns – women are quiet in mixed forums, caste-influenced spatial seating segregation, permission-seeking norms, and discomfort with engaging in administrative, compliance, and market-facing tasks. However, targeted design shifts- such as when provided with women-friendly training timing and locations, women-only spaces, repeated engagement and exposure, visible role recognition, and female facilitators- have led to marked improvements in women's participation, confidence, and leadership emergence.

Findings underscore that gender inclusion cannot be achieved through training alone. Rather, sustainable and equitable outcomes require intentional behavioural design, institutional restructuring, and adaptive learning mechanisms. The study proposes a scalable GESI mainstreaming model that positions women as influential economic and governance actors. Strategies include developing parallel leadership pipelines, strengthening women-led sub-committees, mobilising community change agents (Nari Shakti Precursors - NSPs), bridging the digital divide, promoting CSA and drudgery-reducing technologies, and enabling collaborations with ecosystem actors. Embedding these practices can enable FPOs to enhance women's agency, accelerate CSA adoption, and build resilient, equitable agri-food institutions.

**Keywords:** Climate-resilient agriculture, Farmer Producer Organizations, Gender equality, Governance, Social inclusion, Women empowerment

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## Oyster Mushroom Production: A Women Friendly Venture for Income Generation

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Wild edible mushrooms have traditionally formed an integral part of the diet of tribal communities in Tamenglong district of Manipur, India; however, awareness and adoption of cultivated mushrooms remain limited. Oyster mushroom (*Pleurotus* spp.) cultivation is a low-cost, nutritionally rich, and labour-efficient enterprise that holds significant potential for income generation and nutritional security, particularly among rural women and marginal farmers. To promote this technology, training and demonstration programmes were conducted for two years by ICAR-Krishi Vigyan Kendra, Tamenglong, under the ICAR Research Centre for NEH Region, Manipur Centre, Lamphepat, Imphal.

A total of 80 farm women from five villages namely Tupul, Noney II, Laphok, Namkaolong, and Thanagong—were selected for capacity-building interventions. The training encompassed cultivation techniques, substrate preparation, sterilization, harvesting, marketing, and preservation of oyster mushrooms. Pre- and post-training assessments indicated a substantial improvement in knowledge, skill development, and perception regarding mushroom cultivation. Awareness about the edibility of cultivated mushrooms increased from 13% prior to training to 99% after training. About 65% of the trainees acquired practical skills in mushroom cultivation, while 72% perceived it as a profitable enterprise suitable as an alternative livelihood option. An 88.10% increase in productivity was recorded following the training interventions.

The programme resulted in an increase in the number of mushroom growers from two to eight, with newly adopted growers earning an average additional income of ₹42,000 per annum alongside their conventional agricultural activities. The study demonstrates that structured training and demonstration on oyster mushroom cultivation can effectively enhance livelihood opportunities, nutritional awareness, and socio-economic development among tribal farm women in remote regions.

**Keywords:** Income generation, Livelihood improvement, Nutritional security, Oyster mushroom, Women entrepreneurship

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## Empowering Women through Economic Inclusion: Success Stories of KVK Cachar, AAU, Jorhat

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Empowering women through economic inclusion is a key pathway to sustainable rural development and social transformation. Krishi Vigyan Kendra (KVK), Cachar, has significantly strengthened women's participation in economic activities through structured skill development, enterprise promotion, and institutional support. This study highlights the transformative journeys of Mrs. Sanalembi Devi, Ms. Purnima Debnath, Mrs. Namita Rajkumari Devi, and other budding women entrepreneurs trained by KVK Cachar. Mrs. Sanalembi Devi, a social activist turned progressive farmer from Bantarapur, transitioned into agriculture in 2018 with guidance from KVK. Through training in integrated farming, organic cultivation, vermicomposting, beekeeping, and indigenous seed conservation, she diversified her farm to include 14 indigenous rice varieties and over 30 vegetable and pulse crops. Her cultivated land expanded from 9 to 22 bighas, with growth in livestock, vermicompost units, and 33 bee boxes. She also established the Tareng Community Agro biodiversity Farm and serves as CEO of Bikachsi Agro Producer Company Ltd., mobilizing farmers for sustainable agriculture practices. Ms. Purnima Debnath strengthened her fashion and handicraft enterprise through KVK-supported training and exhibitions. From a home-based tailoring unit, she evolved into a recognized designer and mentor, conducting programs that equip rural women with market-oriented skills and entrepreneurship knowledge. Namita Rajkumari has emerged as a progressive farmer and grassroots leader. Serving as a Board of Director in a Farmer Producer Company (FPC), she cultivates 10 bighas of land with potato, rajma, pea, black gram, and brinjal using scientific practices. She also leads a 150-member block-level organization promoting group vegetable cultivation and market access. As Secretary of the Radha Self-Help Group (SHG), comprising 10 women engaged in sewing, handloom, and pickle production, she has helped generate an annual turnover of ₹70,000–₹80,000 for the SHG. She was awarded the Best Farmer Award in Cachar on Kisan Divas 2025 for her outstanding contributions. Other budding entrepreneurs, including Shibani Paul, Rukiya Khatun, and Nomita Das, have also benefited from KVK's initiatives, establishing income-generating activities in agriculture and allied sectors. These success stories demonstrate that KVK Cachar's integrated approach enhances income, leadership, and decision-making power among women, fostering inclusive and sustainable rural development.

**Keywords:** Diversification, Entrepreneurship, Inclusion, Leadership

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## Development of Ergonomic Protective Garments and Devices for Pesticide Applicators and Device to Reduce Work Pressure Among Farm Women in Chilli Destalking

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Improving and maintaining human health is essential for sustaining energy efficiency and productivity within the Indian food chain. Increasing population pressure has led to intensive cultivation of commercial crops under high-input management systems. Chilli (*Capsicum annuum* L.), one of the most important commercial spice crops of India, is extensively cultivated using improved varieties along with repeated applications of fertilizers, pesticides, and fungicides. India is one of the largest producers, consumers, and exporters of chilli, with a production area of 6.81 lakh hectares and an output of 10.09 lakh tonnes. Andhra Pradesh ranks first in chilli export, cultivating the crop on approximately 1.3 lakh hectares.

The intensive use of plant protection chemicals throughout the crop period exposes farmers and workers to serious occupational health hazards. In addition, farm women engaged in post-harvest chilli processing, particularly de-stalking of dried chillies, experience considerable work pressure and drudgery. Women spend 6–7 hours daily on de-stalking activities, leading to finger injuries, pain, itching, cuts, and burning sensations caused by the prickly stalks and chilli pungency. These conditions adversely affect their ability to perform daily household activities and reduce work efficiency.

The present study aimed to design and develop ergonomic and comfortable protective garments and devices to reduce work pressure and occupational health risks among chilli workers, with special emphasis on farm women de-stalkers. A survey was conducted among 120 pesticide applicators and 50 women chilli de-stalkers in and around Guntur district to assess pesticide usage practices, existing protective measures, health problems, and specific needs. Based on the findings, water-repellent protective garments with hood, water-repellent footwear, nose masks, goggles, and knitted gloves were developed to enhance protection and comfort. The developed protective devices were found to be suitable for minimizing injuries, discomfort, pungency-related irritation, and overall work pressure, thereby contributing to improved occupational safety and drudgery reduction among farm women.

**Keywords:** Chilli de-stalkers, Drudgery reduction, Ergonomic protective clothing, Farm women, Occupational health

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## Empowering Rural Women Through AI for Sustainable Agriculture

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Climate-induced rainfall variability and frequent dry spells pose an existential threat to smallholder farmers in India. Traditional yield-maximization strategies are increasingly being replaced by "protective irrigation" frameworks, which prioritize risk mitigation through timely, precision-based water application. Central to this strategy is effective soil moisture management. However, existing monitoring solutions suffer from a scalability-resolution paradox: physical sensors are too expensive for field-scale deployment, while current satellite-based remote sensing (e.g., SMAP) provides data at resolutions too coarse (1 km+) for individual farm plots.

This is a collaborative initiative by WELL Labs and Stanford University in Chintamani, Karnataka, that bridges the data gap using Artificial Intelligence. Across three villages and 50 individual farm plots, the project integrates satellite radar data (Sentinel-1) with real-time ground-truth measurements to train machine learning models. By leveraging this localized data, the initiative is capable of downscaling soil moisture predictions to a 10m field level, providing precision that coarse satellite data (like SMAP) cannot achieve. Uniquely, this technical intervention is spearheaded by rural women acting as "citizen scientists" and data collectors, who ensure the accuracy of the AI models through rigorous on-farm observations. The research highlights a dual-impact model:

**Technical Accuracy:** The selected women from the community collect soil moisture readings using TEROS12 soil moisture sensors, following a simple 9-point sampling protocol and recording each measurement in the KoboCollect app. These on-farm, instrument-based observations serve as locally verified ground truth that helps validate and refine AI models, improving the accuracy of satellite-derived insights at the farm level. **Gender-Transformative Change:** Beyond data collection, the initiative dismantles systemic barriers to technology. Participation has led to a measurable surge in self-efficacy, with women transitioning from technology consumers to leaders who troubleshoot hardware and co-design sampling protocols. Economic incentives tied to data quality further enhance their social capital and decision-making power within the community. The study concludes that the precision of AI-driven climate tools depends on the integration of local human intelligence to bridge the gap between satellite data and ground reality. By placing women at the center of the agritech pipeline, we improve the accuracy of drought detection and water-saving interventions while building a model of rural development that can be replicated elsewhere. This work contributes to the development of a public, open benchmark dataset for smallholder soil moisture in India, providing a foundation for future-proof, inclusive agricultural policies.

**Keywords:** Artificial intelligence, Citizen science, Climate resilience, Precision agriculture, Soil moisture, Women empowerment

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## Skill to Self-Reliance: A Study of Women Entrepreneurs in Pathankot

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Women play an important role in farm and allied activities, yet their participation in entrepreneurship has traditionally remained limited due to lack of exposure, skills, and institutional support. The present study highlights the outcomes of women-oriented trainings conducted by Krishi Vigyan Kendra (KVK), Pathankot since its inception in 2017, with special emphasis on food and agri-based enterprises. Prior to these interventions, rural women in district Pathankot had very limited awareness and involvement in entrepreneurial activities. KVK Pathankot organized several capacity-building trainings in food processing, mushroom cultivation, and beekeeping to enhance skills and encourage enterprise development among farm women. The findings reveal a positive impact of these trainings on adoption and enterprise creation. Out of 20 food processing trainings attended by 295 farm women, 33.89 per cent adopted the activity at the household level, while 11.86 per cent started enterprises at a commercial level. In mushroom cultivation, 16 trainings were attended by 48 women, resulting in 16.66 per cent household-level adoption and 4 per cent commercial enterprise establishment. Similarly, in beekeeping, 9 trainings with 35 participants led to 5.71 per cent household-level adoption and 2.86 per cent women starting commercial ventures. The study clearly indicates that structured training and technical support provided by KVK Pathankot has significantly improved entrepreneurial exposure, confidence, and income-generating opportunities for rural women, contributing to their economic empowerment in the district.

**Keywords:** Agri-entrepreneurship, Capacity building, Food processing, KVK, Women empowerment

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## Mealworm-Based Formulated Fish Feed for Nursery Rearing of *Labeo rohita* Spawn

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Nursery rearing of carp spawn in freshwater aquaculture is often constrained by high mortality, suboptimal growth performance, and inefficient feed utilization, leading to reduced profitability among small-scale farmers. The nutritional inadequacy of conventionally available commercial spawn feeds contributes significantly to these limitations. In pursuit of a sustainable and nutritionally balanced alternative, the present field investigation evaluated the efficacy of mealworm (*Tenebrio molitor*) meal-based formulated feed in improving survival, growth, and economic returns of *Labeo rohita* under practical farming conditions. The experiment was conducted in nursery ponds across Churachandpur district, Manipur, at a stocking density of  $1.2 \times 10^5$  spawn per 100 m<sup>2</sup>. Three dietary treatments were compared: T<sub>1</sub>: mealworm-based formulated feed at 5% body weight per day; T<sub>2</sub>: conventional commercial spawn feed; and T<sub>3</sub>: control (no supplemental feeding). The results indicated a significantly higher survival rate in T<sub>1</sub> (55%) compared to T<sub>2</sub> (30%) and T<sub>3</sub> (8%). Correspondingly, spawn yield improved from 35,000 (T<sub>2</sub>) to 62,000 (T<sub>1</sub>) per 100 m<sup>2</sup>. Feed conversion ratio (FCR) was markedly lower in T<sub>1</sub> (1.2) relative to T<sub>2</sub> (2.3), indicating superior feed efficiency. Economic analysis revealed a net profit of ₹39,600 per production unit for T<sub>1</sub>, compared with ₹24,200 for T<sub>2</sub>, resulting in a benefit-cost ratio of 1.86. These findings suggest that mealworm meal-based feeds can serve as a viable and sustainable alternative to commercial feeds, enhancing both biological performance and economic viability in carp spawn rearing systems.

**Keywords:** Aquaculture, Feeds, Profitability, Sustainability

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## Chickpea Breeding for Mechanically Harvestable and Herbicide-Tolerant Varieties: A Gender-Sensitive Perspective

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Chickpea (*Cicer arietinum* L.) is a major pulse crop contributing significantly to nutritional security. Its low input requirement, drought tolerance, short duration, and nitrogen fixation ability make it a climate-resilient profitable crop. However, chickpea cultivation remains highly labour-intensive, with sowing, weeding, and harvesting performed manually, by women. Rising labour costs, seasonal labour shortages, and rural out-migration have increased production costs and delayed farm operations, leading to substantial yield losses.

Mechanization can lead to productivity gain of 10-15% in pulses by timely operations, optimizing plant population and improved labour efficiency. Breeding efforts for mechanization are focused on developing mechanically harvestable chickpea varieties characterized by erect plant type, higher first pod height, synchronous maturity, robust stem girth, optimal branching angle, and enhanced lodging tolerance. During the 2023–25 crop seasons, 36 machine-harvestable chickpea genotypes were evaluated in alpha-lattice design with two replications. FLIP-12-72C (14.65%), S190488 (9.53%), and S190599 (4.23%) recorded significantly higher yield over checks 'Dheera' and RVG204. Mechanical harvesting and threshing in Kabuli chickpea breeding lines resulted in minimal grain loss (2–5%), confirming the economic feasibility of mechanization.

Weed infestation remains a major production constraint, causing up to 40% yield loss whereas weed control can lead to 19.6% yield boost. Therefore, post-emergence herbicide-tolerance screening was pursued to reduce dependence on manual weeding. In herbicide screening of 36 genotypes, metribuzin (@210 g a.i. ha<sup>-1</sup>) and imazethapyr (@100 g a.i. ha<sup>-1</sup>) significantly delayed flowering, maturity, reduced plant height and grain yield. However, under imazethapyr, RVG121 (–9%), S190280 (–12%), and S190584 (–13%) exhibited the least yield reduction, while under metribuzin, S190325 (–1%), FLIP12-37C-S2 (–4%), XIITH77-S2 (–6%), and FLIP12-72C (–14.5%) performed relatively better than other entries. These selected genotypes can serve as donor parents in breeding programs combining mechanization-friendly architecture, herbicide tolerance, and high yield, enabling gender-sensitive chickpea production with improved adoption and productivity. Combining these two traits in breeding pipeline will help reduce the drudgery of women who are employed for these manual operations in chickpea value chain.

**Keywords:** Chickpea breeding, Farm operations, Gender-sensitive, Herbicide tolerance, Mechanization

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## Shelf-Life Enhancement of Green Leafy Vegetables Using a Domestic Solar Dryer

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Green leafy vegetables are highly perishable because of their high moisture content and rapid physiological activity; domestic solar dryers can substantially reduce moisture and microbial risk while preserving acceptable quality. In this study, leaves were dried in a domestic solar dryer to a target moisture content of  $\leq 10\text{--}13\%$  (wet basis) — a range shown in literature to be adequate for safe ambient storage for 4–6 months or longer when packed airtight. Drying reduced water activity rapidly (thin-layer drying times for leafy greens in solar/convective dryers are typically 8–24 h depending on dryer design and weather), producing final moisture contents comparable to those reported for spinach and other greens (examples: spinach dried to  $\sim 2\text{--}5\%$  in pilot studies and many solar-dried leafy samples stabilized  $< 13\%$ ). Rehydration ratios observed in comparable studies range from about 4.0 (sun-dried) to  $> 6.0$  (microwave/controlled hot-air) with greenhouse/solar-tunnel dryers typically giving better rehydration and texture recovery than open sun drying. Nutrient and sensory retention depend strongly on dryer type and pretreatment: enclosed/indirect or shaded solar dryers retain substantially more ascorbic acid and carotenoids than direct open sun drying. Reported vitamin C retention after enclosed/solar-tunnel drying varies widely by crop and conditions — from low single-digit percentages for some crude dehydration methods up to  $\sim 80\text{--}85\%$  retention in optimized solar-tunnel or indirect dryers for certain leafy species — while carotenoid retention typically remains higher (often  $50\text{--}75\%$  of fresh levels). Microbial counts and enzymatic activity drop markedly after drying; when moisture is reduced below  $\sim 13\%$  and the product is stored in barrier packaging (HDPE/laminates), shelf life of 4–6 months at ambient temperature is commonly achievable and good sensory acceptability can persist much of that period. These data indicate that domestic solar dryers, when correctly designed (enclosed shading, forced/controlled airflow, moderate temperatures  $\leq 50\text{--}52^\circ\text{C}$ , and good hygiene/packaging), offer an affordable, low-energy option to extend availability of green leafy vegetables while retaining a useful portion of nutrients and rehydration quality.

**Keywords:** Moisture, Preservation, Retention, Solar dehydration

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## Performance of Biofortified Pearl Millet through Front Line Demonstrations for Yield and Nutritional Security in South West District of Delhi

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Front Line Demonstrations (FLDs) were conducted during *kharif* season 2020-21 to 2024-25 in Nazafgarh block of South west district of Delhi to evaluate the performance of biofortified pearl millet variety AHB1200 Fe in comparison with farmers' practice (Pioneer). The variety AHB1200 Fe has been developed by Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani, Maharashtra, in collaboration with ICRISAT, Patancheru, Hyderabad, Telangana, under ICAR-All India Coordinated Research Project on Pearl Millet, Jodhpur. This biofortified pearl millet is a hybrid and rich in iron (73-77 mg/kg) and Zinc (39-41 mg/kg). A total of (No.50) demonstrations covering 20 ha areas were organized under real farm conditions. The results indicated that the biofortified pearl millet recorded an average grain yield of (29.67q/ha), which was (9.20%) higher over local checks (27.67 q/ha). The improved practice also fetched higher net returns (₹48762/ha) with a better benefit-cost ratio (2.47) as compared to farmers' practice. Laboratory analysis showed significantly higher iron (70.43 ppm) and zinc (51.94 ppm) content in the biofortified variety compared to the local check. Farmers reported good acceptance in terms of taste, cooking quality, and fodder value as well. Thus, biofortified pearl millet proved to be superior not only in terms of yield and profitability but also for addressing hidden hunger through nutritional security.

**Keywords:** Biofortification, Hybrid, Profitability, Yield

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## Ergonomic Challenges and Occupational Health Hazards Faced by the Women in Mushroom Production

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Mushroom production is a labour-intensive allied agricultural activity in which women perform most of the routine and time-consuming operations such as harvesting and post-harvest handling of mushrooms. A review of available literature clearly shows that these tasks are largely manual, repetitive and require women to work for long hours in bending, twisting, squatting or awkward postures. Such working conditions create serious ergonomic problems and expose women to a high level of occupational health risks. In various studies, ergonomic assessment tools like OWAS, RULA, REBA, and Human Physical Drudgery Index consistently reported moderate to high postural risk in mushroom production activities, indicating a strong likelihood of work-related musculoskeletal disorders. The literature highlights that women involved in mushroom production commonly suffer from pain and discomfort in the lower back, neck, shoulders, knees, wrists and fingers due to continuous bending, static postures, and repetitive hand movements for long duration. In addition to physical strain, poor work environment such as inadequate workspace layout, poor lighting and ventilation, high humidity and exposure to fungal spores, dust and chemical disinfectants further increase health problems including fatigue, respiratory irritation, allergies and skin problems. The mismatch between women's body dimensions and traditional tools or workstation also adds to drudgery and reduces work efficiency. Findings from ergonomic intervention studies demonstrate that the adoption of improved tool designs, adjustable workstations, low-cost mechanical aids, and better work methods significantly lowers drudgery and musculoskeletal discomfort, reduces health risks and improves overall productivity. However, the adoption of such ergonomic solutions in mushroom production remains limited, especially among women workers. This review emphasizes the need for women-specific ergonomic assessment and practical, low-cost interventions to improve occupational health, work comfort, and sustainability of women's participation in mushroom production system.

**Keywords:** Drudgery, Ergonomic intervention, Ergonomic risk assessment, Musculoskeletal disorders, Mushroom production

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## Mechanization in Indian Agriculture: A Pathway to Women's Inclusion or a Driver of Exclusion

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The mechanization of the Indian agrarian landscape presents a profound socio-economic paradox for the female workforce. This study investigates the dual-edged nature of farm mechanization, examining whether technological advancement serves as a bridge toward gender inclusion or as a catalyst for female labour displacement, mapping the extent of mechanical shift across different agricultural operations. Through an operation-specific analysis of wage disparities and farm machinery density, the study reveals how mechanization alters the physical strength premium and reshapes the rural labour market. Ultimately, the findings highlight the importance of gender-sensitive agricultural policies, making inclusive mechanization an imperative for sustainable agricultural growth in India.

**Keywords:** Agricultural policy, Farm mechanization, Gender inclusion, Labour displacement

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## Gender Dimensions in Climate Change Coping Mechanisms among Dairy Farmers: A Bibliometric Analysis

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Climate change has emerged as a critical challenge to the sustainability of dairy farming systems, influencing livestock productivity, resource availability, and rural livelihoods. Dairy farmers adopt diverse coping mechanisms to manage climate-induced risks. However, existing research remains dispersed across disciplines and regions. This study employs a bibliometric analysis to systematically examine the global scientific literature on coping mechanisms adopted by dairy men and women farmers in response to climate change. Drawing on publications retrieved from major bibliographic databases, the study applies quantitative bibliometric techniques to analyse publication growth, citation structures, authorship patterns, institutional affiliations, and international research collaborations. Social science perspectives are emphasized to explore the integration of gender dimensions, behavioural responses, and livelihood adaptation frameworks within climate change research. Science mapping methods, including co-authorship, co-citation, and keyword co-occurrence analyses, are used to identify dominant knowledge domains and the conceptual structure of the field. The study further examines evolution to understand shifts in research focus over time. By providing a structured overview of the knowledge landscape, this bibliometric assessment contributes to a deeper understanding of research trends and gaps, supporting evidence-based policymaking and the design of gender-responsive coping mechanisms for climate-resilient dairy development.

**Keywords:** Bibliometric analysis, Climate resilience, Coping mechanisms, Dairy farming

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## Determinants of Factors Influencing Millet Value Chain Adoption among Tribal Societies in Tamil Nadu

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The present study was undertaken to examine the determinants influencing the adoption of millet machinery and value-addition technologies among tribal communities across different hilly zones of Tamil Nadu. Hill agriculture offers several functional advantages, including efficient utilization of natural resources and opportunities for higher market prices. However, farm mechanization in these regions demands substantial initial investment, advanced technical knowledge, and reliable support services.

In May 2024, the Directorate of Tribal Welfare sponsored a mega project focused on establishing tribal farmer-based agricultural machinery banks and custom hiring business models in village clusters across ten districts of Tamil Nadu. In this context, a purposive research design was adopted to select the study areas, as these regions are characterized by extensive hilly terrain and a high concentration of tribal farming activities. From the selected cluster villages, four well-established tribal societies were chosen for research intervention. A total of 3,400 beneficiary respondents were included in the study.

The study emphasized the adoption of women-friendly farm machinery, including tractors and their attachments, tractor-operated seed drills, power weeders, Minivator, Arecanut harvesters, power tillers, Arecanut Dehusker mulchers, coconut de-thrashers, agricultural spray drones, millet planters, dehullers, destoner-cum-graders, and multi-crop threshers. A large-scale baseline and adoption survey was also conducted across ten tribal belts located in millet-growing districts.

Primary data were collected through personal interviews using a structured interview schedule. The data were analyzed using multiple logistic regression, with adoption of women-friendly farm machinery as the dependent variable and selected social, economic, and technical factors as independent variables. The results revealed that education level was significant at the 1% level, while farming experience, extension contact, and savings and income were significant at the 5% level in influencing machinery adoption at the project sites. Mean adoption scores related to machinery hiring patterns and sources of machinery knowledge were computed using the coefficient of variation and ranking methods. The overall mean adoption score was found to be 2.43.

**Keywords:** Farm mechanization, Logistic regression, Millet value chain, Technology adoption, Tribal communities

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## Embedded Technologies for Gender-Transformative Sustainable Agriculture

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In India, women contribute significantly to agricultural work, yet their access to technology and markets remains limited. Gender inequality remains a key challenge in agriculture. This paper examines how embedded systems and sensor technologies can drive gender-transformative change by addressing the specific needs of women farmers.

Affordable IoT-based embedded solutions, such as soil moisture sensors, automated drip irrigation controllers, portable soil pH and nutrient sensors and other technological innovations can enable women to take smarter and sustainable farm decisions, easing their workload and addressing challenges of limited time and physical effort. Integration with mobile-based platforms, and voice-assisted advisories enhances digital inclusion, particularly for women farmers. AI-driven analytics further support climate-smart agriculture by providing local advisories, pest alerts, and weather-based risk management. Women farmers are being trained to use UAVs or drone technology for pest management and spraying insecticides and nutrients covering larger farmlands. Thus, bridging digital divides and addressing gender parity issues are important concerns.

The study emphasizes that technological interventions translate into empowerment, income enhancement, and leadership opportunities for women farmers. Gender-sensitive embedded technologies are thus positioned as critical enablers of inclusive, resilient, and sustainable agricultural development in India.

**Keywords:** AI-driven advisories, Digital inclusion, Embedded systems, Gender-transformative technologies, IoT in agriculture, Sustainable agriculture, Women farmers

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## Climate Vulnerability and the Role of Women Pastoralists in Transhumant Communities of the North-Western Himalayas, India

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Pastoral communities that depend heavily on natural resources are increasingly exposed to climate risks as global climate change intensifies the frequency and unpredictability of weather events. Within this context, women pastoralists play a critical yet under-recognized role in sustaining livelihoods and facilitating climate adaptation in transhumant systems. This study assesses climate vulnerability among pastoral communities particularly Gaddis, Kinnauras, and Lahaulas practicing transhumance in the high-altitude regions of the north-western Himalayas in India, with a specific focus on women's contributions to adaptation and livelihood resilience. Primary data were collected from 275 pastoral households across 11 development blocks in four districts—Chamba, Kangra, Kinnaur, and Lahaul & Spiti. A composite climate vulnerability index was constructed using indicators of exposure, sensitivity, and adaptive capacity, with weights derived through principal component analysis. Inter-district comparisons reveal that overall vulnerability is shaped not only by climatic exposure but is strongly influenced by household sensitivity and adaptive capacity. Kinnaur emerged as the most vulnerable district (0.54), followed by Kangra (0.44), Chamba (0.41), and Lahaul & Spiti (0.40). Exposure was highest in Kangra, sensitivity peaked in Kinnaur, and adaptive capacity was lowest in Kangra. Household-level analysis further indicates that poorer households with limited adaptive capacity where women bear a disproportionate share of productive and reproductive responsibilities remain highly vulnerable irrespective of location. Demographic findings show an average household size of 7.62 members, with women constituting nearly one-third of the workforce. Women are predominantly engaged in agriculture and livestock-related activities, contributing substantially to household income through flock management and traditional wool weaving. As key adaptation strategies, women pastoralists support changes in migration timing, herd diversification, income diversification through weaving, and household health management. The study underscores that strengthening women's access to physical, human, and social capital is essential for reducing climate vulnerability and enhancing the resilience of transhumant pastoral systems under climate change.

**Keywords:** Climate vulnerability index, Livelihood resilience, Transhumant pastoralism, Women pastoralists

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## Harnessing Indigenous *Acacia nilotica* Gum for Antioxidant-Rich Functional Foods and Women Empowerment

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Indigenous bio-resources present valuable opportunities for improving nutrition security, promoting sustainable food systems, and strengthening women's economic participation. *Acacia nilotica* (Kikkar), a multipurpose indigenous tree, remains underutilized for food applications despite its functional and health-promoting potential. The present study evaluated the nutritional, bioactive, and antioxidant properties of *Acacia nilotica* gum and its application in the development of value-added food products, with a focus on women-led agri-food innovations.

Food-grade *Acacia nilotica* gum was locally procured, processed, and incorporated into cookies, muffins, bread, and extruded snacks at supplementation levels of 2.5, 5, 7.5, and 10 percent. Proximate composition, phenolic and flavonoid content, antioxidant activity, sensory acceptability, and retention of bioactive compounds during storage were assessed. Results indicated that gum supplemented products significantly enhanced the nutritional value of products. Cookies supplemented with 10% gum exhibited higher protein (6.14 g%), fat (11.83 g%), ash (1.73 g%), phenolic content (48.88 mg GAE/100 g), and antioxidant activity (FRAP- 20.58%) as compared to control cookies. Muffins with 10% supplementation showed marked improvement in crude protein (7.01 g%), ash (1.36 g%), phenols (105.10 mg GAE/100 g) and flavonoids (104.51 mg QE/g), with a corresponding rise in antioxidant activity (FRAP: 22.37%). Similarly, bread incorporated with 10% gum demonstrated significant increase in protein (11.41 g%), ash (1.60 g%), phenols (47.09 mg GAE/100 g), and flavonoids (75.98 mg QE/g). Extruded snacks, although fortified at acceptable level of 5%, exhibited relatively lower values of proximate composition and antioxidant retention compared to baked products.

The study demonstrated the potential of *Acacia nilotica* gum as a low-cost, locally available functional ingredient suitable for decentralized food processing. Its application offers promising avenues for women's engagement in value addition, entrepreneurship, and nutrition-sensitive livelihoods. From a policy perspective, promoting indigenous resource-based functional foods can support women-centric livelihood programs, enhance dietary diversity, and contribute to inclusive and resilient agri-food systems.

**Keywords:** *Acacia nilotica* gum, Antioxidant, Functional foods, Agri-food systems, Women empowerment

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## An Ergonomic Assessment of Improved Agricultural Tools for Reducing Drudgery in Farm Women

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Rural women play a major role in shaping the country's economy through their active participation in agriculture. In Meghalaya, more than 60% of the agricultural operations like transplanting, weeding, harvesting, storage of food grains are handled exclusively by women. These farm women however, work continuously in awkward and difficult postures which results in pain and discomfort in different parts of their body which ultimately lead to drudgery. Although various drudgery reducing tools and equipment are available but, most of them are designed according to requirement of men. Therefore, the study aims to identify which of the farming activities causes highest drudgery to the farm women and to suggest a location-specific women friendly tool or equipment for the activity. For this study, 60 farm women from West Jaintia Hills, Meghalaya were selected. 81.7% of the farm women responded that manual post-harvesting was the most drudgery farming activity, followed by 63.3% on pest & disease management and 58.3% on land preparation and other interculture operations. Based on these results and location specific farming activity, the chaff cutter, turmeric grinder and buckwheat dehulling machine was introduced to farm women to reduce post-harvest drudgery, the power sprayer for managing pest and disease and brush cutter for land preparation. On comparing the traditional methods of performing the farming activities with the improved machines, the working heart rate, the energy expenditure, the total cardiac cost of work and the overall discomfort rate of the farm women was much lesser in the in case of the latter. Moreover, the farm women highlighted that using the improved equipment, there was reduction in musculo-skeletal pain like pain in upper back, shoulders, hands and fingers and drudgery reduction percentage above 70% was observed for all the improved technologies. Therefore, by using these drudgery reducing tools, their physiological stress can be reduced to a great extent. It is thus essential that the tools and implements for farm women are developed to suit their body posture.

**Keywords:** Discomfort, Drudgery, Ergonomics, Posture

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## Work-Life Balance for Women Farmers

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Work-life balance is an essential aspect of overall well-being. Still there remains a significant challenge for women farmers who juggle among agricultural responsibilities, household work and socio-cultural duties. Women play a vital role in agriculture, contributing to crop cultivation, livestock management, and post-harvest processing, often alongside managing family care and domestic obligations. The dual burden of productive and reproductive work can lead to physical exhaustion, psychological and mental stress, which limits the opportunities for personal growth and development. This study explores the factors influencing work-life balance among women farmers, including socio-economic conditions, access to technology, family support, and community resources. It also examines coping strategies employed by these women to manage their multiple roles effectively and efficiently. The study suggest that promoting equitable labour distribution, providing access to agricultural extension services, facilitating social support networks, and most importantly, including in every decision making choices both by family members and society, significantly enhance the ability of women farmers to achieve a sustainable work-life balance. Strengthening policies that address gender-specific challenges in rural agricultural contexts is essential for empowering women and improving productivity, health, and quality of one's own life and people around her.

**Keywords:** Balance, Burden, Decision-making, Women empowerment

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## An Innovative Flaxseed-Enriched Low-Fat Spread Targeting Nutritional Prevention of Osteopenia: Validation in Female Mice Model

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Osteopenia, characterized by reduced bone mineral density (BMD) and increased fracture risk, is a growing public health concern, particularly among postmenopausal women. These problems are mainly caused by estrogen or calcium deficiency. Flaxseed (*Linum usitatissimum* L.) is rich in phytoestrogen (Secoisolariciresinol diglucoside; SDG lignan) which structurally mimics mammalian estrogens and therefore it may be considered to play a vital role in preventing such conditions. Nutritional interventions using flaxseed also offer anti-inflammatory and antioxidant properties due to presence of alpha-linolenic acid (ALA), dietary fiber, and essential minerals. The present study focused on development of a flaxseed-enriched low-fat spread formulated to deliver bone-beneficial outcomes, while maintaining sensory acceptability reduced fat content. The efficacy against glucocorticoid (dexamethasone; DEX) induced osteopenia was studied in-vivo study using 48 Swiss Albino female mice divided into six groups. Group 1 (G1) was not given any DEX and was fed on standard diet, whereas, remaining five groups (G2-G6) were administered DEX for a period of 21 days. The other groups were also fed water along with standard diet (G2); product containing milk fat as fat source (G3); product containing milk fat and flaxseed oil as a fat source (G4); product containing optimized table spread (G5); and estradiol (G6) along with basal diet. The body weight of all DEX treated groups fed with different diets increased non-significantly ( $p > 0.05$ ), except for DEX alone treated group, wherein weight decreased non-significantly ( $p > 0.05$ ). The body weight of control group increased throughout the study. The organ indices of developed spread fed group found no significant ( $p > 0.05$ ) changes with other DEX groups. Further, G5 showed significant ( $p < 0.05$ ) increase over DEX group for bone ash and bone calcium content. The serum osteocalcin content, serum phosphorus and calcium levels of G5 showed significantly ( $p < 0.05$ ) higher levels than DEX group. Further, trabecular microarchitecture of femoral bone showed bone loss in DEX groups, while improvement in alteration of bone microarchitecture was noticed in G5 and positive control group. The BMD, bone volume/total volume, trabecular thickness and trabecular number of developed spread fed group showed ( $p < 0.05$ ) significant elevation. The other parameters such as trabecular separation/spacing showed no significant ( $p > 0.05$ ) difference when compared with DEX group and developed product group. The developed spread contained 22.50 g ALA/100 g of fat and 0.36 mg SDG lignan/g defatted sample. The result suggests that consumption of developed spread may showcase bone health.

**Keywords:** Flaxseed, Glucocorticoid, Low-fat spread, Osteopenia, Phytoestrogen

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## Women-Led Export-Oriented Agricultural Entrepreneurship: A Gender-Transformative Model of Krishi Vigyan Kendra, Baramati for Inclusive Agri-Value Chain Integration

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Women's integration into high-value agricultural value chains is essential for promoting gender equity and inclusive rural growth. This study documents a women-centric, export-oriented green chilli production model implemented in Baramati, Pune district, Maharashtra, under the technical leadership of Krishi Vigyan Kendra, Baramati. The initiative was supported by Mahila Arthik Vikas Mahamandal under the Navtejaswini Maharashtra Gramin Mahila Udyam Vikas Prakalp, with assured procurement facilitated by AADI Nature Foods Pvt. Ltd. A cluster-based approach mobilized 30 women farmers across 22 acres for export-compliant cultivation. KVK Baramati implemented a comprehensive "technology-to-market" extension framework integrating structured training, standardized input supply, climate-smart agronomic practices, and continuous field supervision. Capacity building covered nursery management, nutrient scheduling, drip irrigation, mulching, integrated pest and disease management, and export-grade harvesting and grading protocols. High-quality seedlings produced through KVK's high-tech nursery enhanced crop uniformity and reduced mortality. Adoption of drip irrigation and mulching improved water-use efficiency and weed control, contributing to higher productivity under semi-arid conditions. Regular monitoring ensured adherence to Good Agricultural Practices and export standards. The intervention achieved an average productivity of approximately 4.0 tonnes per farmer and enabled export of 40 metric tonnes of green chilies to Dubai. Although climatic adversities and quality-related rejections posed challenges, assured buy-back arrangements minimized market risk and enhanced income stability. The findings indicate that convergence of technical guidance, institutional support, climate-resilient technologies, and market linkage can transform women farmers from subsistence producers into export-oriented agri-entrepreneurs. The KVK Baramati model demonstrates strong scalability and offers a replicable framework for gender-responsive, market-led agricultural development.

**Keywords:** Convergence, Export, Resilience, Scalability, Value chain

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## A Case Study on Women Empowerment through Entrepreneurship Development in Secondary Agriculture in Northern Part of Sikkim

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Empowering women have been a priority agenda in development of nation as women make crucial contributions to society and significantly in agriculture. She plays a vital role in carrying out all agricultural activities, and they are the major food producers. In North East India the business scenario is changing day by day due to development of technology, modernization and increase in literacy and development programme initiated by Central and State Government specially for Women Entrepreneurs. Secondary agriculture supports primary agriculture by adding value to the basic produce, creating facilities for primary processing and stress management in agriculture as well as adds value to basic agro commodities. The present case study is carried out in the Chaday and Passingdang village of North Sikkim covering women entrepreneur and SHGs. The objective of the study is to assess the economic empowerment of women through value addition and marketing of products by women entrepreneur under the brand name Sikkim Seasoning and Rongyoung Kyoung SHG. The KVK North Sikkim provided technical support like trainings, raw material source, packing materials, FSSAI licensing. The value-added products being marketed are Quinoa, Turmeric Powder, Ginger Powder, Dried Dalle Chilli, Large Cardamom, Buckwheat Powder and organic Gift box as Souvenir by Sikkim Seasoning and Yacon syrup, Red Cherry Pepper Paste, Pickles, Meat Pickles, traditional snacks etc. by Rongyoung Kyoung SHG. It was observed that after the intervention of KVK North Sikkim, the annual turnover recorded is ₹ 5,59,750 per annum by Sikkim Seasoning and ₹ 1,53,200 per annum by Rongyoung Kyoung SHG, respectively.

**Keywords:** Modernization, Secondary, Turnover, Women empowerment

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## Assessment Identification of Need-Based Technologies for Skill Enhancement of Farm Women in Agri-Food System

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Developing occupational skill among farm women is very crucial and important which should be taken as a part of Developmental programmes to make the government schemes successful and to meet Sustainable Development Goals. The best way is to provide rural farm women in agri-food system with gender friendly technological intervention improving their knowledge, skill, competency to meet challenges of the safety and technology. The data were collected from Muzaffarpur district for identification of need based technologies in agriculture and allied sectors. A total of 400 respondents from four villages of two blocks were selected randomly. 51.50% farm women were illiterate, 44.12% were having agriculture as their main occupation and 98.25% of women involved in agriculture were having land up to 0-1 ha, 66.62% women of Bihar centre had goat/sheep and only 26.37% had milch animals. 62% had small tools and 38% had manual operated farm implements. Smart phone was available with 99.25% women, decision was taken jointly by 96%, 62% of women seek information from television, 98.62% from mobile, 64% by internet, only 4.25% through agricultural exhibition/fairs. Mobile and newspaper was ranked first regarding information seeking behavior, followed by family members, internet, agriculture scientist were ranked 2<sup>nd</sup> in information seeking behaviour. 96.25% of women of Bihar member of SHG, 94.25% of women are member of village panchayat. Problem identified in agriculture were less access of farm women to govt. schemes, financial aid 90.30% lack of marketing, less exploitation of available resources 94.12%, low nutritional status and less income 87.62%, poor status of rural women in farm & nonfarm sector 84% women, pronounced drudgery of farm women 80.87%, lack of timely availability of women friendly farm tools 50.12%. Need based technologies identified for skill enhancement in Bihar were water conservation 75.62%, utilization of solar energy for home and farm activities 81.62%, fruits and vegetables processing technologies 85.50%, recycling of industrial and household waste 83.25%.

**Keywords:** Agri-food system, Farm women, Rural development, Skill enhancement, Technology adoption

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## Income Enhancement through Women-Led Ecofriendly Enterprises; Self-Help Group: Case Study from Punjab

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Women's participation in agri-food and allied rural livelihood systems is essential for inclusive and sustainable growth. Despite the potential of women Self-Help Groups (SHGs), many remain inactive due to limited skills, low confidence, and inadequate access to markets. Revitalizing such SHGs through capacity building and institutional support can significantly enhance women's economic empowerment and livelihood security. This paper presents the success story of Mamta Rani, a 45-year-old rural woman entrepreneur from village Kankwal Bhanguan, district Sangrur, Punjab, who successfully transformed an inactive SHG into a sustainable women-led enterprise. Mamta Rani, along with ten other women, formed the Baba Kapoor Dass Self-Help Group five years ago, but the group initially struggled to sustain activities. The revival began in 2024 after the group received one-week hands-on training from Krishi Vigyan Kendra (KVK) Kheri, Sangrur, with technical support from Punjab Agricultural University, Ludhiana. Following the training, the group diversified into the production of eco-friendly household cleaning agents such as soaps, detergents, dishwash liquid, phenyl, and floor cleaner, with emphasis on safe formulations, low-cost production, proper packaging, and branding. Year-wise income analysis from 2023 to 2025 reveals a steady and significant increase in both gross and net income. In 2023, the enterprise recorded a gross income of ₹35,000 and a net income of ₹20,000. With improved production efficiency and better market access, gross income increased to ₹1,30,000 and net income to ₹95,000 in 2024. The most remarkable growth was observed in 2025, when gross income reached ₹2,95,000 and net income rose to ₹2,10,000, indicating enhanced profitability and improved cost management. Participation in platforms such as Saras Mela, Punjab Sakhi Shakti Mela, and weekly local markets provided visibility, direct consumer interaction, and improved sales. The initiative strengthened women's confidence, collective decision-making, and social recognition. She further inspired other rural women to adopt similar enterprises. The case demonstrates that women-led eco-friendly enterprises can successfully revive inactive SHGs, generate sustainable livelihoods, and contribute to gender empowerment and resilient agri-food systems.

**Keywords:** Capacity building, Economic empowerment, SHGs, Women entrepreneurship

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## From Forest Forage to Festival Fame: Nagaland Woman Entrepreneur is Brewing Prosperity from Wild Fruits

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In the tribal landscape of Zunheboto District, Nagaland, where traditional agriculture often dictates the rhythm of life, one woman's innovative spirit has cultivated a new path to prosperity. Mrs. Ghukali Awomi, a resident of Naghutomi village and a woman entrepreneur, has masterfully diversified her family's livelihood by recognizing the untapped potential of the region's wild, natural bounty. While continuing to cultivate staple crops like kiwi and paddy, Mrs. Awomi looked beyond the conventional fields to the forests, which are seasonally abundant with indigenous fruits such as *Baccaurea ramiflora* (locally known as Burmese grape) and *Elaeagnus latifolia* (silverberry). Rather than letting this natural wealth go to waste, she initiated a household-scale value-addition enterprise. Through traditional knowledge and acquired skills, she transforms these foraged wild fruits into high-quality squashes and wines. This initiative yields an impressive annual output of approximately 1,000 bottles. The products quickly distinguished themselves in the market, garnering an overwhelming positive response from consumers for their unique, authentic flavors. The venture achieved a significant milestone when it was marketed under the brand name "AKSA" at the prestigious and highly-trafficked State Hornbill Festival, providing a massive boost in visibility and validation. The financial impact has been substantial, generating an estimated annual income of ₹1,50,000 for Mrs. Awomi, which serves as a powerful supplement to her traditional agricultural income. More importantly, her micro-enterprise has evolved into a beacon of rural entrepreneurship. By successfully demonstrating that sustainable utilization of wild forest resources can lead to significant economic empowerment, she has become a role model. Her initiative has not only enhanced her own household's socio-economic standing but has also ignited a spark of inspiration among other women in neighboring villages, fostering a movement of self-reliance and promoting women-led livelihoods in the region.

**Keywords:** Diversification, Entrepreneurship, Sustainability, Women empowerment

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## Development and Nutritional Evaluation of Barnprash: A Sustainable Functional Food Prepared From Barnyard Millet

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The present study aimed to develop and nutritionally evaluate Barnprash, a value-added functional food formulated using Barnyard millet as a sustainable alternative to conventional cereal-based products. In view of the rising prevalence of lifestyle-related metabolic disorders and reduced dietary diversity, Barnyard millet was selected owing to its rich nutrient profile, low glycemic potential, and adaptability to sustainable food systems. Barnprash was prepared as a traditional health formulation by incorporating 12% Barnyard millet flour, 28% amla along with functional ingredients to enhance its nutritional quality and consumer acceptability. The developed Barnprash was tested for its nutritional composition and overall acceptability using standard protocols. The developed product was compared with its traditional counterpart which was made using the traditional recipe. Results-The developed experimental product had an overall acceptability score of 8.56. The nutritional analysis revealed that it had higher content of protein (2.73 g/100 g), calcium, (42.41 mg/100 g), iron (10.26 mg/100 g), total dietary fibre (5.87 g/100 g), resistant starch (14.44 g/100 g), in vitro iron bioavailability (9.91 %) in vitro protein digestibility (72.53 %), and showed lower digestion rate (33.97 %) as compared to control counterparts. Additionally, Barnprash exhibited reduced levels of anti-nutritional factors and a lower predicted glycemic index compared to its conventional counterpart, indicating its potential role in glycemic regulation and metabolic health. The presence of resistant starch and dietary fibre further supports its functionality in promoting gut health and sustained energy release. Overall, this study highlights the importance of incorporating underutilised millets into innovative food formulations to enhance nutritional security while promoting sustainable food systems. Such initiatives can inspire youth to bridge traditional knowledge with modern nutritional science, contributing to resilient, health-oriented agri-food ecosystems.

**Keywords:** Acceptability, Bioavailability, Formulation, Millets

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## Impact of Institutional Support by Krishi Vigyan Kendra and Department of Agriculture on Youth-Oriented Food Processing and Agri-Allied Enterprises under PMFME and ARYA (2022–2025)

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In agri-based entrepreneurship, especially in the food processing sector, institutional support plays a vital role in increasing youth participation. The Prime Minister's Formalization of Micro Food Processing Enterprises (PMFME) Scheme and the Attracting and Retaining Youth in Agriculture (ARYA) project are implemented with the objective of providing structured training and handholding support to enhance skills, enterprise establishment, and income generation among rural youth. In the present study, the outcomes of institutional support provided by Krishi Vigyan Kendra, Washim (KVK) and the Department of Agriculture during 2022–2025 under PMFME and ARYA were evaluated. Under PMFME, a total of 55 training programmes were conducted through which 1,255 beneficiaries were trained, and among them 345 trainees have started food processing enterprises. While Under ARYA, 6 training programmes were conducted covering 150 rural youth out of which 43 youths have started agri-allied enterprises. The findings reveals that institutional training combined with seed capital assistance significantly contributed to the establishment of food processing enterprises, resulting in improved monthly income and livelihood security. The study confirms that well-designed institutional support mechanisms can effectively promote sustainable rural entrepreneurship and youth employment.

**Keywords:** Assistance, Entrepreneurship, Formalization, Livelihood

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## From Waste to Wealth: Transforming Oil Extraction Byproducts into Nutritious Value-Added Foods

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The global agri-food system must ensure food and nutritional security while minimizing post-processing losses and environmental waste. Oilseeds such as coconut, groundnut, and almond generate nutrient-rich residues after oil extraction (oil cakes), which are often underutilized and diverted to animal feed. These byproducts are rich in plant protein, dietary fiber, residual lipids, and essential minerals, offering considerable potential for value addition in human nutrition. This study demonstrates the conversion of oilseed residues into nutritionally enriched, shelf-stable traditional foods such as chikkis and chaklis through standardized formulations and basic food safety practices. The initiative integrates research, skill development, and field-level implementation to promote sustainable utilization of these byproducts. A scalable model is proposed based on three pillars: (i) technological empowerment through training in processing, hygiene, and packaging; (ii) economic resilience via diversified income generation from low-cost raw materials; and (iii) institutional strengthening through women-led self-help groups and cooperatives to improve market access and value retention. By transforming oilseed byproducts from “waste” to “resource,” this approach advances circular bio-economy principles, enhances nutritional utilization, and supports sustainable livelihoods, providing a practical pathway toward women’s economic independence and resilient agri-food systems.

**Keywords:** Bio-economy, Byproducts, Waste, Women empowerment

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## Women-Led Nutrition Garden as a Strategy for Strengthening Household and Nutritional Security

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Women play a crucial role in ensuring household food and nutritional security, particularly in rural households where access to diverse and nutritious foods is often limited. Women-led nutrition gardens have emerged as an effective approach for improving household food and nutritional security. The present study assessed the contribution of women-managed nutrition gardens as a strategy for strengthening household food and nutritional security through an intervention-based approach. A comparative pre and post-intervention assessment revealed a substantial improvement in household availability of vegetables. The average per capita availability of vegetables increased from 153.62 g/day before the intervention to 330.60 g/day after successful establishment of women-led nutrition gardens. Crops such as cabbage, cauliflower, knolkhol, brinjal, spinach and French bean were produced at levels higher than their expected yields, indicating effective crop management and timely operations carried out by women participants. Per-capita availability of nutrients per day also increased significantly following the intervention. The availability of protein, iron, calcium, beta-carotene, vitamin C and folic acid was enhanced to 8.45%, 73.15%, 41.52%, 311.88%, 118.44% and 56.71% of the recommended dietary allowance (RDA), respectively. These results clearly demonstrate improved household access to both macro and micronutrients through diversification of homestead production systems. Another important outcome of the study was that, after the intervention, household-level availability of vegetables reached 82.65% of the recommendation level prescribed by the Indian Council of Medical Research (ICMR), New Delhi. The findings confirm that women-managed nutrition gardens constitute a practical and sustainable strategy for strengthening household food availability, dietary diversity and nutritional adequacy, and underscore the critical role of women as key drivers of nutrition-sensitive agriculture and household well-being.

**Keywords:** Dietary diversity, Household food security, Nutrition-sensitive agriculture, Women-led nutrition gardens

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## Transforming Coastal Livelihoods through Bivalve Aquaculture: Evidence of Women's Empowerment from Kerala, India

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Global fisheries and aquaculture production increased to 223.2 million tonnes, marking a significant milestone wherein aquaculture surpassed capture fisheries in the production of aquatic animal species for the first time. Aquaculture contributed 51 per cent of total animal production, reaching an all-time high of 130.9 million tonnes (FAO, 2024). While capture fisheries production has remained largely stagnant over recent decades, aquaculture production has grown by 6.6 per cent since 2020 and now accounts for more than 57 per cent of aquatic animal products used for direct human consumption. Molluscs, predominantly bivalves, contribute approximately 15.6 per cent of total aquaculture production. Bivalve mariculture plays a crucial role in meeting the growing global demand for protein. Bivalves, particularly mussels, oysters, and clams, are widely recognized as nutritionally rich and healthy food sources and represent key candidate species for sustainable aquaculture worldwide. In India, bivalves have traditionally served as a subsistence food for coastal communities along the west coast maritime states for centuries. Technologies for mussel and oyster farming developed by the ICAR-Central Marine Fisheries Research Institute (CMFRI) have been successfully transformed into income-generating activities for coastal fishers, with a particular emphasis on women's self-help groups (SHGs). Through a concerted institutional approach combined with innovative extension strategies, commercial mussel and oyster farming has become well established in several Indian states, especially in Kerala. The commercialization of bivalve farming has resulted in the development of multiple value chains within Kerala. One of the most significant outcomes of bivalve farming expansion in the state has been the empowerment of women, with approximately 87 per cent of SHG-operated farms owned by women. Given that women constitute nearly 70 per cent of the world's poor and continue to face pronounced gender inequalities, bivalve farming has emerged as a women-friendly aquaculture technology in Kerala. The adoption of this technology by women's SHGs has contributed not only to poverty alleviation but also to enhanced access to resources and increased participation in household decision-making.

**Keywords:** Aquaculture, Bivalve mariculture, SHGs, Women empowerment

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## Integrated Approach: Kitchen Gardening to Value-Added Products for Empowering Farm Women

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In rural regions, kitchen gardening to value added products has become effective approach for enhancing household nutrition, livelihood security and women's empowerment. These study focuses on integrated approach adopted farm women's through KVK's (Krishi Vigyan Kendra) promotion of kitchen gardening and value-added trainings to enhance farm women-led enterprises and promote nutrition-sensitive food system. The intervention focuses on production of vegetables, fruits, etc. all around year along with training on value added products preparation such as pickles, milk products, dehydrated vegetables, chutneys, jam and preserves. Through small-scale enterprises, this integrated approach not only in consumption of micronutrient-rich food in household but also gave rural women the opportunities to generate income. Farmer women's ability to make decision, their financial independence and their confidence as entrepreneurs all increase as outcome of strategy. The study conducts among 100 farm women household selected from treatment villages under KVK Ambala, with aim of improving year-round availability of nutrition food and sources of income. These household reduced their dependency on outside vegetable purchased by over 70-80% after implementing KVK Ambala's recommended kitchen gardening practices, which result in significant saving in household food expenditure and due to continuously availability of seasonal vegetables, fruits and improved their household's dietary diversity. KVK Ambala's skill development program hasal so beneficial to their household families for produce different type of value-added products. As per ground level feedback data collected by KVK Ambala of their treatment household families has able to generate additional sustainable monthly income either individually and SHG base group enterprise. Additionally, this study also cover farmer women face different challenges related to communication skills, packaging, internet market linkage, etc. in their rural enterprise to overcome these challenges need to gender-sensitive extension support and convergence government scheme are crucial. In conclusion, the KVK Ambala recommended practice has beneficial for empowering farmer women and rural enterprises, strengthening nutrition-sensitive food system and encourage sustainable rural enterprises.

**Keywords:** Household nutrition, Kitchen gardening, Value-added products, Women empowerment

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## Empowering Women Entrepreneurs through Standardized Food Safety and Hygienic Practices in the Food Business

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Food safety and hygienic practices are essential to prevent the spread of foodborne illnesses and ensure the safety of the food we consume. By following proper hygiene and safety practices, we can prevent the contamination of food by harmful bacteria, viruses, and pathogens that cause illnesses like salmonella and *E. coli*. Awareness about importance of food safety and hygiene in food business has to be increased through effective skill trainings. Empowering women in the food industry through, training in food safety and hygienic practices is a crucial strategy for promoting entrepreneurship, enhancing economic independence, and ensuring public health. By equipping women with knowledge of food sanitation, contamination prevention, and regulatory compliance (such as FSSAI standards), they can successfully transition from home-based, informal setups to recognized, scalable food businesses. Thus, the three days' capacity building training entitled "Food safety and hygienic practices in food business" was conducted from 6<sup>th</sup> to 8<sup>th</sup> January 2025 at College of Agriculture, Karekere, Hassan, organised under ICAR SC-SP Scheme and Department of Food Science and Technology, College of Agriculture (UAS Bengaluru), Hassan for 20 Scheduled Caste women entrepreneur/Food business operators in Hassan. The training programme focused on food borne illness and food spoilage due to unhygienic practices during food preparation, methods of safe food handling and hygiene practices, food contaminants and prevention methods, safe food storage practices, GHP, GMP and food allergens, food safety standards, food adulteration and detection techniques, role of packaging in food safety, personal hygiene and safety, food safety practices for rural women. The main objectives of the training were to educate women/ SHG Women/Food business operators of Hassan rural and urban areas with food safety and hygienic practices, to protect consumers of food products from foodborne illnesses or injuries related to food consumption. This training allowed women to move from informal, unorganized, or kitchen-based operations to formalized, profitable enterprises. For instance, training in food processing has helped women start successful ventures in making pickles, jams, and other products. The training enhanced knowledge on basic hygiene awareness for food handlers, covering essential practices like hand washing, cleanliness, and safe food storage. The training empowered them for food entrepreneurship and income generation. The training improved capacity building by individually or by SHG members, which has contributed to the livelihood security of family through additional income and improved health and nutrition.

**Keywords:** Adulteration, Contamination, Formalized, Sanitation

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## Plant Protease-Generated Chickpea Peptides as Candidates for Next-Generation Nutraceuticals

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Due to the rapid growth in the global population, the consumption of animal-based food products has been associated with negative implications for food sustainability. As a result, there is an increasing demand for the development of plant-based food and compounds as alternatives. Chickpeas are rich in nutrients and naturally occurring bioactive peptides that can support cardiovascular health. In this study, we explored how peptides derived from chickpea proteins can help manage high blood pressure and improve gut health. Chickpea globulin hydrolysates (CGHs) were produced using enzyme-based processing and purified for maximum effectiveness. These peptides showed strong ability to inhibit angiotensin-converting enzyme (ACE), a key factor involved in hypertension. Advanced molecular analysis confirmed that specific peptide sequences bind effectively to ACE, explaining their blood-pressure-lowering action. Animal studies demonstrated that oral intake of CGHs led to a meaningful reduction in blood pressure, along with improved gut health. The treatment also increased beneficial short-chain fatty acids and helped restore balance in gut microbiota—an emerging factor in overall wellness. Overall, this work presents chickpea-derived peptides as a promising, natural, and sustainable functional ingredient for managing hypertension. The findings open opportunities for women entrepreneurs to develop plant-based nutraceuticals, functional foods, or wellness products that combine scientific innovation with social impact, supporting both health and economic empowerment.

**Keywords:** ACE inhibition, Chickpea peptides, Hypertension, Nutraceuticals, Plant-based foods

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## Farmwomen's Empowerment and Household Food Security in Hill Agriculture: A Gendered Regional Analysis

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A study was conducted to analyse the linkages between household food security and women's empowerment in agriculture across hill regions, highlighting regional and gender-based disparities in Household Food Security (HFS). While high hills demonstrated relatively better food security outcomes, mid hills emerged as the most vulnerable zone, with nearly half of households experiencing relatively less food security. Overall, 61% of women were found disempowered in agriculture. Time use (32.54%) and input in productive decisions (23.08%) were top contributors followed by leadership (16.57%) and control over income (15.38%) and asset ownership (0.73%) was least, highlighting a critical gap in resource control among women. The analysis presses that women's empowerment is not peripheral but central to household food security. Domains such as control over income (strongest impact), production decision-making, asset ownership, financial autonomy, and women's dietary diversity showed a direct and significant association with improved household food security outcomes. Access to irrigation and cultivation of vegetables and fruits especially in High Hills were positively associated with food security, indicating that women's access to irrigation should be recognized as an empowerment and food security outcome; and high-value, nutrition-rich cropping systems should be promoted to enhance household food security vis-a-vis women's empowerment in agriculture in hills. Women-headed households as scoring significantly less in household food security and women's empowerment domains should be explicitly recognized as a priority category within agricultural and rural development programmes, rather than being subsumed under general women beneficiaries.

**Keywords:** Household nutrition, Kitchen gardening, Value-added products, Women empowerment

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## Youth as Catalysts of Change in Agri-Food Systems: Knowledge Networks, Policy, and Leadership Pathways

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Young people are increasingly positioned at the center of transformation in agri-food systems while simultaneously bearing the social, economic, and environmental burdens of global crises such as climate change. These overlapping challenges are expected to intensify over their lifetimes, reshaping livelihoods, food security, and rural futures. Despite these pressures, youth across diverse global contexts are emerging as dynamic agents of change, actively shaping agri-food systems through innovation, entrepreneurship, and knowledge-sharing networks. Understanding youth engagement in agri-food systems is particularly important given the size of the current global youth population, especially in the majority world, and the significant influence young people will have on future food system trajectories. Although youth is often framed as a fixed age category for policy and administrative purposes, such simplifications obscure the relational nature of youth as a transitional life phase. This transition is typically associated with expanding autonomy and increasing involvement in food production, distribution, procurement, preparation, and consumption. However, young people's engagement with food systems is not uniform and is shaped by intersecting factors such as gender, class, wealth, health, location, and intergenerational relationships, with young women often facing additional structural constraints. This review examines youth as key actors in agri-food systems, with a particular focus on their participation in food systems knowledge networks. These networks ranging from formal education and research institutions to informal, grassroots, and community-based initiatives enable young people to generate, exchange, and apply knowledge for sustainable food system transformation. Strengthening youth participation requires supportive policy and institutional environments that recognize young people not merely as beneficiaries, but as co-creators of solutions. Two critical pathways emerge for nurturing youth leadership in agri-food systems. First, formal education systems must be democratized to become more inclusive, flexible, and responsive to diverse youth realities. Second, horizontal networks of grassroots research and innovation should be strengthened, including the recognition and integration of traditional, ecological, local, and community knowledge. Empowering young people as partners in agri-food policy design and decision-making is essential for building inclusive, resilient, and sustainable food systems and for nurturing the next generation of agri-food leaders.

**Keywords:** Agri-food systems, Climate change, Knowledge networks, Youth engagement

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## Developing Value Added Products from Pumpkin

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Pumpkin is a vegetable that is extremely low in calories, making it a popular choice in any weight loss program. It contains only 25 kcal per 100 grams of its edible portion. Additionally, pumpkin is rich in an essential antioxidant known as beta-carotene, which the body converts into vitamin A. This study aimed to enhance the basic formulations and processing of various pumpkin products, including candy, jam, and fruit bars. The products were made from mature pumpkins. Jam was created using a combination of pumpkin and apple in the following ratios: 100:0 ( $T_0$ ), 90:10 ( $T_1$ ), 80:20 ( $T_2$ ), and 70:30 ( $T_3$ ), and was evaluated organoleptically. The findings indicated that the  $T_3$  sample received the highest sensory score of 8.5. Two methods were employed for the preparation of pumpkin candy: i) candy made without any added color ( $T_1$ ), and ii) candy made with the addition of artificial color (raspberry red color) ( $T_2$ ). Overall acceptability showed that the pumpkin candy made without added color ( $T_1$ ) achieved a higher score of 8 compared to the other variant, which scored 7.6. The pumpkin fruit bar was made using 100 percent pumpkin pulp and was also highly accepted by consumers, receiving a score of 8.2. The proximate compositions of the developed products were analyzed using standard methods. The moisture content of raw pumpkin was recorded at 89.27%, while the moisture content of pumpkin candy ( $T_1$ ) was 26%, and the pumpkin fruit bar was 23%. The total soluble solids (TSS) were highest in pumpkin candy at 70° Brix compared to the other products. Acidity levels were higher in pumpkin jam (0.3) when compared to pumpkin candy (0.1) and pumpkin fruit bar (0.1). The beta-carotene content was greater in raw pumpkin than in the other products, with values of 2998  $\mu\text{g}/100\text{ g}$  for raw pumpkin, 2978  $\mu\text{g}/100\text{ g}$  for jam  $T_3$ , 2987  $\mu\text{g}/100\text{ g}$  for candy, and 2898  $\mu\text{g}/100\text{ g}$  for the fruit bar. The unit cost for pumpkin jam was ₹ 15 per 100 g, pumpkin candy was ₹ 14.50 per 100 g, and pumpkin fruit bar was ₹ 14 per 100 g.

**Keywords:** Food processing, Nutritional analysis, Pumpkin products, Sensory evaluation, Value addition

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## Gender Mainstreaming in Dairy Farm Sector through Empowering Rural Women with Recommended Value-Added Dairy Product Technologies

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Women's participation in the dairy farming sector plays a pivotal role; however, they are often regarded as a hidden workforce, as their contributions are largely ignored at both state and national scenarios. Dairy entrepreneurship that focuses on the skill development of dairy workers can serve as a significant source of employment and income generation in rural areas of Punjab. Evidence from previous studies on women dairy farmers in Punjab revealed a medium level of participation in dairy farming, with nearly 70 per cent of the respondents involved. In contrast, border-belt districts particularly Tarn Taran in Punjab possess a huge potential for the adoption of dairy technologies, being a major hub of dairy farming. Furthermore, recent studies have indicated that when skill-development training on recommended dairy and livestock technologies is provided to both male and female farmers, the adoption rate of improved practices is higher among women than men. Various investigations have concluded that women are engaged in a wide range of dairy farming activities; however, their roles need to be scientifically strengthened through hands-on training. Despite their significant involvement, women dairy farmers often face livelihood insecurity due to limited income generation from household-based dairy enterprises. Considering these factors, the gender mainstreaming in dairy farming sectors is inevitable for its sustainability. Therefore, organization of skill-oriented vocational training programs focusing on women dairy farmers, with emphasis on hands-on training in recommended scientific technologies on value-added dairy products is essential. Conclusively, the self-sufficiency of disadvantaged populations can be enhanced at Indo-Pak border-belt of Punjab through the adoption of recommended dairy product technologies.

**Keywords:** Dairy entrepreneurship, Gender mainstreaming, Skill development, Value-added dairy products

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## Influence of Intrapersonal Intelligence and Technical Awareness among Farm Women in Choosing an Entrepreneurial Career in Tamil Nadu

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Well perceived self-competence and self-awareness have always been the key factors behind many successful entrepreneurs. Entrepreneurship careers involve a robust risk bearing capacity to develop a successful enterprise. Basic awareness about the entrepreneurship environment coupled to a strong personality with a deep intrapersonal understanding are the optimum qualities, to take on the path of entrepreneurship. Intrapersonal intelligence is a core component of emotional intelligence. Enhanced intrapersonal intelligence help in steering through complex decision making processes with greater ease. Several studies have shown that emotional intelligence can improve entrepreneurial performance and potential. This study attempts to quantify the level of self-awareness and technical awareness and the effect it has on entrepreneurial decisions among 1000 farm women of Tamil Nadu and recommendations were given based on the results. A set of statements were included in the survey to assess the level of intrapersonal intelligence and basic awareness among the farm women relating to involvement in business aspects such as education & training, finance, legal, marketing and business practices. Ranks were given based on the score obtained with rank - I indicating a very low level of awareness and so on. From the responses, it was found that the level of self-awareness & initiative to start a business was at rank- II (score - 4.32), representing a low level of intrapersonal intelligence. Maximum score (5.0) was obtained in the aspects such as financial awareness, legal or procedural awareness and market and marketing awareness, bringing the level of awareness to rank - I, demanding immediate interventions to increase the awareness. The aspects, awareness regarding education & training awareness regarding business practices have comparatively scored low (4.8 & 4.72 respectively). Nevertheless, they need serious interventions as well. The results showed that the selected farm women's overall awareness level on different aspects were very poor, which was scored as rank - I, indicating a very low level of awareness about enterprise qualification. Although around 45% level of awareness about the NGOs and SHGs, reveal an intertwined connection between SHGs and rural women community. While it is evident that the technicalities can be taught through experts of the respective fields, it is recommended that conducting sessions to farm women under study, that involves lectures from the successful entrepreneurs and sharing the success story articles in local language will help to boost the self-esteem and the level of self-awareness of the individuals involved.

**Keywords:** Decision making, Entrepreneurship, Farm women, Intrapersonal intelligence, Technical awareness

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## Enhancing Rural Economies: Food Processing and Value Addition by Women Entrepreneur in Uttara Kannada District

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Entrepreneurship in food processing and value addition plays a vital role in enhancing rural livelihoods and income generation. The present case study highlights the entrepreneurial journey of a small-scale food processing enterprise established by Smt. Mamatha Bhat Shamemane, a resident of Shamemane village in Uttara Kannada district. Coming from a middle-class family, she faced financial challenges in managing household responsibilities, which motivated her to pursue self-employment. With a strong desire to become economically independent, she established a small-scale processing unit for jackfruit, banana powder and kashaya powder during 2021–22.

Prior to starting the enterprise, Smt. Mamatha Bhat underwent skill-oriented training on food processing and value addition at Krishi Vigyan Kendra (KVK), Uttara Kannada. Post training, with institutional support from KVK and other departments, she was provided with essential processing equipment including a dryer, pulverizer, microwave oven and sealing machine, which enabled her to establish her own processing unit. The enterprise produces a range of value-added products such as jackfruit seed powder, raw banana powder, banana chips and kashaya powder, marketed under the brand name “Deeksha Home Made Products.” The skill-based training significantly enhanced her technological adoption in processing, nutrient analysis and marketing. the adoption of improved processing technologies resulted in enhanced product quality and marketability. Consequently, the enterprise generated higher net returns, with an annual income of approximately ₹ 9–10 lakh during the year 2022–23. Now, she runs a successful enterprise, her products cater to both national and international customers and her annual income continues to increase steadily year after year. The study clearly demonstrates that skill development training and institutional support play a crucial role in transforming rural women into successful food processing entrepreneurs and contribute significantly to income enhancement.

**Keywords:** Food processing, Income generation, Rural livelihoods, Value addition, Women entrepreneurship

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## Empowering Livelihood of Women Farmers through Agriculture: A case Study in Sikkim

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A case study on empowering women farmers in Sikkim, India's first fully organic state through targeted agricultural interventions was conducted. Despite women's significant role in agriculture comprising around 80% of the economically active workforce in India and performing over 70% of livestock related work, women face persistent barriers such as limited land ownership, lack of decision-making power, restricted access to credit and markets, and heavy unpaid care responsibilities. The study, conducted in East and South Sikkim districts, began with a baseline survey of 40 farm women, revealing of active age groups ranges (20–50 years), low education levels, small landholdings (<2.47 acres for 92.5%), annual incomes of ₹ 50,000–1 lakh (85%), reliance on traditional methods of farming. The Women showed strong interest in agriculture and allied sector including livestock rearing, capacity building, and leadership development. The intervention identified four potential women leaders via Focus Group Discussions and selected 16 SC/ST beneficiary farm women. Four Farming models were implemented using local seeds/inputs viz., (1) Crop base: Millets + turmeric + seasonal vegetables with processing/value addition; (2) Climate-smart practices + livestock; (3) Integrated farming system (crops + livestock); and (4) crop base: Ginger + buckwheat + Dalle chilli. Support included farmer-scientist-extension interface meetings, skill training in scientific livestock rearing (piggery, poultry, beekeeping), organic cultivation practices, input distribution, and a WhatsApp group created for coordination. The project aims to enhance income, build self-sustainability over three years, promote local resources, and foster leadership for economic independence and decision-making power. By addressing structural constraints through collective action, knowledge sharing, and gender-responsive approaches, it seeks to boost women's socio-economic and psychological empowerment, aligning with broader goals of gender equality and sustainable rural development in Sikkim.

**Keywords:** Agriculture, Empowerment, Livelihood, Potential women leader, Women farmers

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## Seeds of Change: Women-Led Climate-Resilient Agriculture as a Pathway to Rural Transformation in Karnataka

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People increasingly recognize women's empowerment as a key driver of inclusive economic growth and sustainable development, especially in rural and agriculture-based economies. Women play a critical role in food production, household nutrition, natural resource management, and community wellbeing, yet their contributions are often undervalued and constrained by limited access to resources, skills, and decision-making spaces. This summary uses two examples from Mandalggudda village in Raichur district and Malakasamudra village in Koppal district, Karnataka, to show how helping women use climate-friendly farming methods, like growing different crops, mixed farming, and using local seeds, through community-led projects, can boost economic growth and overall rural development.

In Mandalggudda village, WELL Labs and Prarambha have supported the rejuvenation of degraded agricultural lands over the past three years by improving land and water productivity through low-cost ecological practices, including green manuring, multicropping, and crop diversification. The region had experienced declining soil fertility, rising cultivation costs, monocropping, and frequent crop failures, leading to poverty and food insecurity. Women were particularly affected due to the dual burden of farm labour and household responsibilities. Through targeted group trainings and collective platforms, women actively participated in seed selection, preservation, and the management of community seed banks. This strengthened their technical knowledge, confidence, and leadership while reducing dependence on costly external inputs and improving household food security through diversified intercropping systems.

The second case study highlights a woman-led integrated farming model in Malakasamudra village. Initially, poor soil health and low productivity led the family toward distress migration. With the adoption of sustainable practices, soil health improved significantly, enabling the cultivation of seventeen crops on a small plot, including groundnut, pulses, vegetables, and fruit crops, alongside fish farming. Women played a central role in preparing organic inputs, managing crops, preserving seeds, handling post-harvest activities, and contributing to household financial decisions. As their economic contributions became more visible, women's status within the household improved, leading to greater participation in decision-making and enhanced household stability. Together, these experiences demonstrate that women-led sustainable agriculture generates multidimensional benefits. At the household level, it enhances food security, income stability, and nutrition. At the community level, women-led initiatives such as seed banks strengthen collective knowledge, biodiversity conservation, and climate resilience. The case studies reaffirm that empowering women as farmers, leaders, and decision-makers is not only a matter of social equity but a strategic pathway for economic inclusion and rural transformation.

**Keywords:** Climate-resilient agriculture, Rural transformation, Seed banks, Sustainable farming, Women empowerment

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## Transformation of Agri-Horticultural Waste into Dry Flowers and Value-Added Products for Livelihood Generation by Women of Himachal Pradesh

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Dry flowers have emerged as a promising and income-generating sector within the floriculture industry of India. Over the past 25 years, dry flower products have contributed to more than 70 per cent of the country's total floricultural exports, highlighting their growing economic significance. The production of dry flowers is not restricted only to ornamental crops; but a wide range of agri-horticultural wastes can also be effectively utilised. Crop residues and unseeded parts of agricultural crops such as maize and wheat, along with various millets including *Sorghum bicolor*, *Pennisetum vulgare*, *Setaria italica*, *Echinochloa* spp., and *Eleusine coracana*, can be efficiently processed and used for the preparation of dry flower arrangements, bouquets, and other decorative value-added products. These materials, which are otherwise underutilised or discarded, possess considerable potential for value addition. Dried calyces of *Gossypium* spp. and *Sesamum indicum* are widely used in the dry flower industry for the preparation of pot-pourries which have great demand at the national and international level. In addition, the fruits of *Aegle marmelos* are marketed as bell-caps in the dry flower trade, while the fruits of *Linum usitatissimum* are commonly used in various floral arrangements. Such plant parts enhance the aesthetic appeal and diversity of dry floral products.

Besides agricultural crops, substantial quantities of floral waste and surplus flowers generated during cultivation, harvesting, and marketing can be utilised for the production of high-value products such as herbal gulal, incense sticks, and natural bio-colours. The utilisation of these resources not only reduces waste but also promotes sustainable and eco-friendly practices. The dry flower industry offers significant opportunities for livelihood generation, particularly for rural women, through small-scale enterprises and self-employment. More than 30 trainings have been conducted in the Department of Floriculture and Landscape Architecture on dry flowers and value added products. Four commercial start ups are also worth mentioning in this context. The success stories of women entrepreneurs engaged in the production and marketing of dry flower-based products demonstrate the potential of this sector as a viable means of income generation, which will be discussed in the present paper.

**Keywords:** Agri-horticultural waste, Dry flowers, Livelihood generation, Value addition, Women entrepreneurship

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## Linking Science and Society: Empowering Island Women through Marine Ornamental Aquaculture in Lakshadweep

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Marine ornamental organisms are closely associated with reef ecosystems and are highly valued for their vibrant colours, unique shapes, behaviours, and aesthetic appeal. With the growing global demand for marine ornamentals, the aquarium trade supports the livelihoods of millions of coastal and island communities. However, destructive collection practices involving explosives and toxic substances severely damage coral reefs and result in significant biodiversity loss. Therefore, the aquaculture of marine ornamentals is strongly encouraged as a sustainable alternative. In this context, the initiative of the ICAR-National Bureau of Fish Genetic Resources (NBFGFR) in Lakshadweep focuses on disseminating technologies for sustainable livelihoods through marine ornamental rearing. To achieve this, ICAR-NBFGFR has established a marine ornamental facility at Agatti Island, supporting community aquaculture units maintained by local women to raise captive-bred marine ornamentals to marketable size as an alternative income source. This unique initiative integrates science and societal development using native organisms and serves as a working model for harmonising biodiversity conservation with livelihood promotion. Marine ornamental organisms were collected from the wild for captive propagation, acclimatised, and developed as broodstock. Larval rearing and juvenile production technologies were standardised, followed by hands-on technology transfer to women beneficiaries. The women rear the animals for an additional two months before marketing. Captive-raised ornamental shrimps (*Ancyllocaris brevicarpalis* and *Thor hainanensis*) and clownfish (*Amphiprion clarkii* and *A. nigripes*) are currently being provided for further rearing and sale. At present, 45 women islanders are engaged in this programme and are earning a regular income. An MoU has been signed between the beneficiaries and an ornamental fish trader in Kochi, Kerala, with the institute monitoring the supply chain and transactions. The NBFGFR model is built on two major pillars—exploration and captive propagation—with active community participation, ensuring that native species are cultured by local people in an environmentally responsible manner while complying with biodiversity laws. The entire process is eco-friendly, produces no harmful emissions, and is powered by solar energy. Looking ahead, this model has the potential to establish Lakshadweep as a hub for native marine ornamentals, benefiting local islanders and creating a successful case history of access and benefit sharing. Key outcomes include capacity building, improved local incomes, and gender mainstreaming. The programme aligns with national and international goals, including the Aichi Biodiversity Targets, the Nagoya Protocol, and the Sustainable Development Goals.

**Keywords:** Biodiversity conservation, Lakshadweep, Livelihood generation, Marine ornamental aquaculture, Women empowerment

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## Ama Foods: Women-Led Agri-Food Enterprise in West Garo Hills, North East India

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Women entrepreneurs, as exemplified by ‘Ama’ Foods in West Garo Hills, Meghalaya, drive economic inclusion and rural empowerment within agri-food systems. An examination of the strategies Ama Foods employs to enhance women participation in value chains demonstrates that women-led entrepreneurship yields significant economic and social benefits. Data collected from 2016 to 2025, including interviews, sales records, and field observations, document the transformation of the enterprise founded by Smt. Baldilla T. Sangma from a small-scale pickle producer to a diversified agri-food business. Capacity-building support from ICAR-Krishi Vigyan Kendra was instrumental in this growth. Consequently, gross returns increased by ₹3,21,800, rising from ₹73,000 in 2016 to ₹3,94,800 in 2024–25. The benefit-cost ratio more than doubled, rising from 1.46 to 3.26, indicating strong economic viability. Diversification into high-value products, such as fruit juices and wines, further enhanced profitability and improved household nutrition. In addition to financial success, Ama Foods generated local employment, primarily for women, promoted sustainable utilization of indigenous bio-resources, and strengthened community resilience to market and environmental uncertainties. As one local women employee remarked, “Working at Ama Foods has not only improved my family’s livelihood but has also boosted my confidence and skills, opening new opportunities for community development.” This case highlights the importance of women-focused extension services, technology adoption, and supportive policies such as subsidies, grants, and regional market access in empowering women entrepreneurs in Meghalaya. Although challenges like limited credit access and difficult terrain persist, targeted institutional support, inclusive policies, and community engagement help overcome these barriers. The transformative journey of Ama Foods clearly indicates that empowering women entrepreneurs is not only vital for economic progress but essential for building resilient, equitable, and sustainable agri-food systems in India. This model of localized, women-led agricultural enterprise illustrates a replicable and scalable strategy for sustainable development that simultaneously advances food security and gender equality. The central argument is that such initiatives are essential for transforming traditional agriculture into dynamic economic opportunities, especially where women are the backbone of agri-food systems yet face systemic obstacles to participation (Piras *et al.*, 2023; Velmurugan *et al.*, 2024). Specifically, interventions targeting post-harvest loss reduction and comprehensive value-addition training can substantially strengthen women’s economic returns and entrepreneurial capabilities within agri-food systems (Medhi, 2018; Nordhagen, 2021).

**Keywords:** Agri-food enterprise, Meghalaya, Rural livelihoods, Value addition, Women entrepreneurship

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## Weaving Livelihoods: Empowering Rural Women through Indigenous Handloom Enterprises

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Women-led entrepreneurship in agriculture and allied sectors is a key driver of inclusive rural development, livelihood diversification, and socio-economic empowerment. A successful case of indigenous handloom-based entrepreneurship led by Ms. Bimla Devi, a progressive woman farmer from Dehradun district, Uttarakhand, and critically examines the role of institutional support—particularly Krishi Vigyan Kendra (KVK), in strengthening farm-based enterprises. The enterprise was initiated on the innovative utilization of locally available and underutilized resources such as nettle fiber (*bichchhu ghas*) and wool from local sheep, processed through traditional spinning and handloom weaving techniques. A diverse range of eco-friendly and culturally rich products, including shawls, stoles, blankets, garments, caps and wall hangings, were prepared without chemical inputs, ensuring environmental sustainability and preservation of traditional knowledge. KVK, Dehradun played a pivotal role by providing technical guidance, exposure visits, skill development in intricate designing and improved packaging, along with market linkages through institutional convergence. This model underscores the critical role of KVKs in accelerating women farmer progress, empowerment, and fostering sustainable and resilient rural livelihoods. During the period 2022–2025, the enterprise showed remarkable economic growth, with gross income increasing from ₹1.36 lakh to ₹4.72 lakh and net income rising from ₹0.87 lakh to ₹4.22 lakh per annum. In addition to income enhancement, the initiative generated substantial social impact by directly engaging five rural women in production activities and imparting skill-based training to 157 women, enabling home-based employment, financial independence, and improved social status. Thus, the case of Ms. Bimla Devi clearly demonstrates the effective integration of indigenous knowledge with scientific extension services that can transform smallholder farmers into successful rural entrepreneurs.

**Keywords:** Empowerment, Entrepreneurship, Handloom, Rural livelihoods, Women empowerment

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## Transforming Pineapple Waste into Sustainable Revenue Streams: A Circular Bio-economy

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Improper disposal of pineapple leaves, a major by-product of pineapple production, can result in waste management problems and environmental contamination. After gathering the fruits, pineapple by products (leaves) were typically discarded. Despite being biodegradable, inappropriate disposal of pineapple leaves might result in serious issues. This waste can be used as a raw material to make high-quality fiber if the right extraction technique is applied. An essential component of sustainable agriculture and environmental preservation is the handling of pineapple leaf waste. Microorganisms are crucial in the Pineapple Leaf Fiber (PLF) extract process because they break down the gummy material that envelops the pineapple leaves, making it easier to separate the fiber from the raw material or waste. Dresses and accessories are among the many weaving fabric products made with PLF. The leaves of the pineapple plant are used to make PLF, a sustainable and natural textile material. PLF Fiber yield/kg: 15 g (Kew) and 11 g (Queen) after drying can be extracted manually by retting with NINFET Sathi Retting Accelerator @ 0.5% and scrapping. Pineapple fiber has been reported to have fineness (tex) of 2.5, color (%) of 58.4, and bundle strength (g/tex) of 18.0. By using eco-friendly and sustainable methods, we can cut waste and advance rural development.

**Keywords:** Environmental sustainability, Pineapple leaf fiber, Retting process, Waste valorization

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## Small Herds, Big Dreams: Success Tales of Women Prosperity through Livestock in Eastern India

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Livestock farming plays a critical role in enhancing women's livelihoods in eastern India by providing income security, employment, and socio-economic empowerment. The present study quantitatively assesses the impact of Krishi Vigyan Kendra (KVK) interventions on women farmers engaged in livestock enterprises in Bihar and Jharkhand. The study was based on an ex post facto research design, analyzing ten purposively selected success cases representing dairy, backyard poultry, goatery, piggery, and fish farming enterprises. Primary data were collected using structured interview schedules focusing on production parameters, income levels, employment generation, and empowerment indicators before and after KVK interventions. KVK support included awareness programmes, capacity-building trainings, frontline demonstrations, input facilitation, value addition, and market linkage support. Results revealed a substantial increase in livestock productivity and annual income of women beneficiaries following KVK interventions, along with enhanced employment opportunities at the household level. Women reported improved technical knowledge in animal husbandry, disease management, feeding practices, and enterprise management, leading to better production efficiency and reduced mortality losses. Backyard poultry and goatery provided frequent income, while dairy and fish farming ensured comparatively higher annual earnings. Income generated from the sale of eggs, milk, meat, and live animals provided regular cash flow, which was predominantly reinvested in children's education, healthcare, household assets, and savings. Quantitative assessment of empowerment indicators showed significant improvement in women's decision-making ability, financial autonomy, and participation in community-based institutions. Participation in Self-Help Groups (SHGs) and Farmer Producer Organizations (FPOs) further strengthened collective marketing, bargaining power, and access to input and output markets, facilitating a transition from subsistence-oriented activities to semi-commercial enterprises. The documented success cases also demonstrated strong diffusion effects, motivating neighboring women to adopt similar livestock-based enterprises and promoting community-level livelihood enhancement. The study concludes that KVK-led integrated livestock interventions significantly contribute to sustainable livelihood development and women empowerment in eastern India, underscoring the need for scaling up gender-responsive livestock extension strategies.

**Keywords:** Eastern India, KVK interventions, Livestock farming, Rural livelihoods, Women empowerment

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## Successful Model of Women Entrepreneurship Service Centre for the Empowerment of Tribal Farm Women in Palghar District

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Empowering tribal farm women through entrepreneurship is a vital pathway toward gender equity, economic independence, and sustainable rural development. This paper presents a successful and community-driven model of Women Entrepreneurship Service Centres (WESCs) established in the tribal regions of Palghar district, Maharashtra, with the objective of strengthening the economic and social empowerment of tribal farm women. The WESC is a model designed by the Krishi Vigyan Kendra (KVK) to provide handholding support to farm women and entrepreneurs. The centre extends mentoring support to budding entrepreneurs to sustain their enterprises with appropriate services via collective action. The KVK trains and handholds interested farm women in their endeavour at becoming entrepreneurs, and they in turn will serve as mentors of KVK to train other budding entrepreneurs. The WESC model providing localized agricultural and allied services, including input supply, nursery management, vermicompost production, value addition, bee keeping, mushroom production, custom hiring of farm tools, and advisory support. Capacity building, leadership development, and collective decision-making formed the core of the intervention. The study employed participatory research methods, including beneficiary interviews, group discussions, and outcome based assessment of empowerment indicators. Results demonstrate notable improvements in women's income, self-confidence, entrepreneurial skills, leadership roles, and participation in household and community-level decision-making. The model also reduced drudgery, enhanced access to timely farm services, and created sustainable livelihood opportunities within tribal communities. The paper highlights WESCs as a scalable, women-centric and replicable model that can be integrated with existing women empowerment and livelihood missions. The experience from Palghar district offers valuable insights for policymakers, development practitioners, and women-led institutions working toward inclusive and gender-responsive rural development.

**Keywords:** KVK model, Livelihood generation, Rural development, Tribal women, Women entrepreneurship

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## From Skills to Sustainability: Capacity Building of Rural Women in Quality-Preserves and Super Grain Products

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Nutripreneurship refers to the establishment, management, and expansion of enterprises that generate profit while simultaneously enhancing food and nutrition security. It serves as a significant catalyst for economic development, offering a viable alternative to traditional employment by promoting self-employment, income generation, and poverty alleviation. Additionally, nutripreneurship contributes to improved nutritional status, better health outcomes, and strengthened overall food and nutrition security. This study was conducted among 120 rural women to improve their skills in developing quality preserved foods and supergrain products. A five-day training in batches was organised to train the women on fruits and vegetables preserved products such as jam, candy, pickles, ketchup, chutneys, squashes, and bottling of products. Similarly, a separate five-day training in batches was organised to train the women on supergrain bakery products such as muffins, cakes, biscuits, cookies, pizza, pav, buns, icing of cake, and packaging. These trainings were consisted of demonstrations, lectures, hands on practices sessions, and an exposure visit to a small-scale unit. Results indicated that post knowledge score of women on various preserved and baked products at baseline ranged from  $0.32 \pm 0.18$  to  $0.49 \pm 0.27$ , which increased significantly ( $p \leq 0.05$ ) after exposure of training programme and ranged from  $1.42 \pm 0.33$  to  $1.91 \pm 0.45$ . Consequently, the five-day training program led to a substantial improvement in trainees' awareness and knowledge of food processing, preservation, baking techniques, cost estimation, packaging, and marketing of the developed products. It also enhanced their understanding of the nutritional and health benefits, as well as the entrepreneurial potential, of these products.

**Keywords:** Bakery, Entrepreneurship, Food preservation, Sustainable development, Supergrain, Training

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## A Case Study on Self Employment of Women Farmers through Mushroom Cultivation in Tinsukia District of Assam

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Mushroom cultivation has emerged as an important agri-based enterprise due to its significant potential for livelihood improvement, income generation, entrepreneurship development, and nutritional security, particularly in rural areas. Mushroom farming is being practiced in more than 100 countries and its production is increasing at an annual rate of 6-7%. In Assam, mushroom cultivation is gradually gaining popularity as an alternative and supplementary source of income. In Tinsukia district, demand for mushrooms and their consumption is steadily increasing due to rising health consciousness among consumers. The climatic condition of Tinsukia is highly congenial for oyster mushroom cultivation, which can be grown almost round the year. Keeping these aspects in view, Krishi Vigyan Kendra (KVK), Tinsukia undertook systematic interventions to promote mushroom cultivation as a means of income generation and employment creation. KVK conducted Frontline demonstrations as well as skill trainings in about 25 villages, targeting especially women farmers to create awareness about scientific mushroom cultivation during last 5 years; 2020-21 to 2024-25. These interventions aimed not only at skill development and technology dissemination but also at motivating beneficiaries towards self-employment and entrepreneurship development. Moreover, in order to create a cluster-based approach and ensure sustainability, one Mushroom Village was established during 2020-21 with financial support from NABARD. In last 5 years, near about 1100 women farmers were benefited by the interventions of KVK, and more than 20 women entrepreneurs with annual turn over of about 7.0 – 8.0 lakh per annum were developed in the field of mushroom cultivation and processing.

**Keywords:** Cluster-based, Congenial, Interventions, Livelihood

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## Impact Assessment of Skill-Based Training on Entrepreneurship Development through Bamboo Craft Article Making

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Skill-based training plays a vital role in promoting entrepreneurship, especially among rural populations by enhancing their employability and income-generating capacities. Bamboo craft making is a traditional skill with high potential for self-employment and sustainable livelihoods.

The present study was conducted to assess the status of knowledge gain and skill development through pre and post training evaluation of Bamboo craft making training on the basis of a structured questionnaire conducted by MGM Krishi Vigyan Kendra, Gandheli, Chhatrapati Sambhajinagar. The study evaluated changes in knowledge, skill level, entrepreneurial traits, and income generation among the trainees. A total of 100 rural women who underwent bamboo craft training were selected for the study. Data were collected using a structured interview schedule before and after the training programme.

The results revealed a significant improvement in knowledge, skill acquisition, confidence, and entrepreneurial motivation among the trainees. Apart from knowledge and skill developments were motivated to develop entrepreneurship by showing the future prospects and profitability of the Bamboo enterprise. The mean knowledge score increased from 8.25 to 12.20, showing a 48 per cent increase, while skill competency improved by 52 per cent after the training. A marked improvement was also observed in entrepreneurial traits such as self-confidence, decision-making ability, and willingness to take up self-employment. About 65 per cent of the trainees expressed readiness to start bamboo-based enterprises, either individually or through self-help groups, after understanding the future prospects and profitability of bamboo enterprises.

The study concludes that skill-based bamboo craft training is an effective tool for entrepreneurship development and rural livelihood enhancement among rural women.

**Keywords:** Bamboo craft, Entrepreneurship development, Impact assessment, Rural livelihood, Skill-based training

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## Value Addition of Tamarind (Chigli) Through Women Entrepreneurship: A Case Study from Northern Karnataka

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Women in India often face significant barriers to entrepreneurship, including limited access to capital, inadequate technical knowledge, and restrictive social norms. Despite these challenges, women are increasingly contributing to economic growth through micro-enterprises. This study examines the entrepreneurial journey of Mrs. Asha Girish Halasangi, a resident of Bailhongal in the Belagavi district of Karnataka, who successfully established a sustainable tamarind (chigli) processing enterprise by adding value to locally grown tamarind through an analysis of its medicinal importance and product innovation. A qualitative case study approach was adopted using in-depth interviews with the entrepreneur, her employees, and community members. The data were analyzed to identify her motivations, operational challenges, marketing strategies, and the impact of institutional and intervention support. The findings reveal that with minimal initial capital and basic training in traditional food processing, Mrs. Asha Girish Halasangi transitioned from a homemaker to a confident entrepreneur. Key success factors included the effective use of local resources and traditional knowledge, adoption of digital tools for marketing, and support from rural development programs. Her enterprise, Asha Gruh Udyog, has received a patent from the Government of India for their Tamarind Chigli product and has generated employment for twelve local women, fostering financial independence and empowerment within the community. The success story highlights that women are capable of overcoming financial and social constraints through resilience and the strategic support of family members, particularly husband. The study emphasizes that women's entrepreneurship is a powerful instrument for achieving economic self-reliance, community empowerment, and local economic development in northern Karnataka.

**Keywords:** Gruh udyog, Micro-enterprise, Socio-economic empowerment, Sustainable livelihood, Women entrepreneurship

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## Turning Trash into Treasure: Waste Picker Women Leading Agri-Food Transformation

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This paper presents the transformative success story of Mrs. Ruthu from Ippatam village, Mangalagiri Mandal, Guntur district, Andhra Pradesh, who transitioned from informal waste picking to sustainable agri-entrepreneurship through institutional support and skill development. Belonging to a marginalized community, Ruthu's livelihood was once confined to physically demanding and socially stigmatized waste collection, generating minimal and unstable income. Entrapped in persistent poverty, she lacked access to formal employment and viable economic opportunities. Her turning point came through the Skill Training for Rural Youth (STRY) Programme implemented by Krishi Vigyan Kendra, Guntur. Recognizing mushroom cultivation as a low-investment, high-return enterprise, she underwent a 7-day intensive hands-on training covering the complete value chain composting, spawning, casing, cropping, harvesting, cost optimization, and marketing strategies. Equipped with technical skills, entrepreneurial orientation, and continuous mentorship, Ruthu established a backyard mushroom unit utilizing locally available agricultural and kitchen waste. By adopting low-cost climate management practices such as thatched roofing and wet gunny bags, she minimized capital investment while promoting circular economy principles. Starting with a few beds, she gradually expanded to 120 beds, producing approximately 20 kg of milky mushrooms daily and earning around ₹45,000 per month. Her enterprise demonstrates a scalable, women-led livelihood model directly contributing to Sustainable Development Goal (No Poverty). Ruthu's journey exemplifies how targeted skill development, institutional support, and sustainable agri-based enterprises can enable marginalized women to transition from informal labor to dignified, income-generating entrepreneurship within resilient agri-food systems.

**Keywords:** Backyard, Marginalized, Stigmatized, Transformative

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## Community-Based Mud Crab Aquaculture for Mainstreaming Gender Equality in Coastal Agri-Food Systems: A Women-Centric Model from Odisha, India

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Women play a crucial yet under-recognized role in small-scale fisheries and aquaculture-based agri-food systems, particularly in coastal and lagoon-dependent regions of India. Structural inequalities in access to resources, technologies, finance, and institutional support often constrain their economic participation and leadership. In this context, ICAR-Central Marine Fisheries Research Institute (CMFRI) implemented women-centric aquaculture interventions in coastal Odisha under Scheduled Caste Sub-Plan (SCSP) and Tribal Sub-Plan (TSP) programmes, aimed at mainstreaming gender equality and social inclusion through sustainable livelihood enhancement. The present study documents and analyses two complementary, gender-sensitive interventions: HDPE box-based individual mud crab (*Scylla serrata*) fattening in brackishwater ponds and Indoor vertical culture of mud crab using recirculating aquaculture systems (RAS). Both interventions were implemented through women Self-Help Groups (SHGs) drawn from socially and economically marginalized fishing communities around Chilika lagoon. Scientific training, access to inputs, and continuous technical handholding formed the core strategy for strengthening women's agency in aquaculture enterprises. The women-led mud crab aquaculture interventions demonstrated strong biological and economic performance across both production systems. In the HDPE box-based pond system, 1,000 individual crab boxes were used to reduce cannibalism and enhance survival during moulting. Crabs stocked at an average weight of ~50 g attained marketable sizes of 400–600 g, yielding a total harvest of approximately 480 kg. This generated a gross revenue of ₹4.08 lakh and a net income of about ₹1.10 lakh per cycle, equitably shared among women SHG members. Complementarily, the indoor vertical culture system enabled climate-resilient, year-round production under controlled conditions. Using undersized crabs (80–160 g), harvestable sizes of 450–550 g were achieved within 50–60 days, resulting in net returns of ~₹1.00 lakh from a 400-box unit over six months. Beyond economic gains, the women-centric aquaculture interventions enhanced technical skills, decision-making capacity, collective bargaining power, and entrepreneurial confidence among participants. The SHG-based approach fostered social inclusion, reduced livelihood vulnerability to climate risks, and strengthened women's engagement in local agri-food value chains. The study underscores that integrating gender-sensitive technologies with institutional support and participatory approaches can effectively mainstream gender equality and social inclusion in aquaculture systems. These CMFRI-led interventions offer scalable best-practice models to inform gender-responsive agri-food policies and institutional frameworks for more equitable and resilient food systems.

**Keywords:** Gender mainstreaming, Mud crab aquaculture, Recirculating aquaculture systems, SHGs

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## A Gendered Value Chain Analysis of Women Engaged in Palmyra Handicrafts in Tamil Nadu

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Palmyra (*Borassus flabellifer*) handicrafts are an important traditional livelihood in rural Tamil Nadu, with women playing a key role in production and adding value. This study applies a gendered value chain analysis to analyse women's engagement, skill formation, and market-related restrictions in Palmyra handicraft enterprises in Ramanathapuram. The analysis maps women's involvement across input procurement, processing, production, value addition, and marketing stages, and identifies gender-specific constraints affecting value capture. The findings revealed that women are predominantly concentrated in production and value addition activities, whereas their participation rapidly drops in marketing, pricing, and negotiating stages, where power over income realisation is the highest. Skill acquisition is mostly conventional and family-based, with limited access to training that addresses market needs such as design innovation, branding, and digital marketing. The key challenges are low prices, dependency on middlemen, lack of market access, limited training possibilities, and financial constraints. Despite these issues, income from Palmyra handicrafts plays an important role in the household income and boosts women's self-confidence and decision-making skills. The study highlights the need for gender-responsive value chain interventions that focus on targeted skill development, strengthening self-help groups and cooperative marketing, and improving institutional support to enhance women's economic empowerment and support sustainable livelihoods in the Palmyra handicrafts sector.

**Keywords:** Gendered value chain analysis, Palmyra handicrafts, Skill development, Women's economic empowerment

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## Mrs Beena Devi from Kedarnath Valley of Rudraprayag, Uttarakhand: A Journey from a Simple Farm Woman to a Successful Entrepreneur

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Mrs. Beena Devi (40) is from village Jamu of district Rudraprayag, Uttarakhand. She has studied up to the junior highschool and she owns 0.8 acre of land and hires approximately one acre of land annually for growing crops like Finger millet, barnyard millet, soybean and other pulses in addition to off Season vegetables, wheat and barley. She came in contact with the Krishi Vigyan Kendra, Rudraprayag during training programme in her village in the year 2019. Getting inspired with the skill development trainings at KVK on development of value-added products and off season vegetable cultivation, she started her own enterprise from the 2021 from locally grown fruits and vegetables for value added product development viz; squashes and pickles and earned ₹1.10 lakhs for her livelihood. The KVK also imparted regular trainings on off season vegetable cultivation and in the year 2024-2025 she cultivated off season vegetables like tomato, brinjal, capsicum, radish, leafy vegetables, cabbage, cauliflower and broccoli and made a profit of about ₹60,000. She also has two cows which have lactation of about 2,400 litre per annum and this enterprise generated a revenue of ₹1.44 lakhs combining with cow milk and ghee. Mrs Beena Devi is a certified natural farming farmer of KVK, Rudraprayag and undertakes all the agricultural farming activities through natural farming.

Mrs. Beena Devi has been awarded as Best farmer from Rudraprayag district in Kisan Mela of GBPUA&T, Pantnagar in the year 2024 and is a member of NRLM group. She also won the Millionaire farmer of the year award from Rudraprayag, Uttarakhand organized by Krishi Jagran in the year 2025. She is also working as a master trainer in many villages of Rudraprayag district and inspired other farm women for becoming self reliant and successful entrepreneur. She prepared not only value-added products from fruits and vegetables but also started work on finger millet cookies which enhances the overall economic value of locally grown underutilized plants. Beena Devi generated a revenue of ₹3.15 lakhs in the year 2025. Now she is a successful entrepreneur and has become a role model to other women in Rudraprayag district.

**Keywords:** Natural farming, Rural livelihood, Success story, Value addition, Women entrepreneurship

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## Reflections of Rural Women to Start Up Entrepreneurship Based on Trainings

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Rural women are backbone for food security and rural economics. Women role in the society is farmers, housewives, caregivers, manage livestock, farming from sowing to harvesting in agricultural field. Beyond farms, they also work for daily wages, handicrafts, artisans and manage community resources such as water, fuel, etc. for her household needs. Some are leaders as sarpanch, key leaders, communicators, business women, influencers, cooks, ayas in local schools, vegetable vendors for their own farm produce and many more. Skill trainings related to food processing, tailoring, preparation of value added products, latest food business trainings, preservation of local produce etc. were given to motivate women to start micro-enterprises. After intensive motivation through several activities related to agricultural farming, promoting growing nutritional gardens, raising backyard poultry, local produce value addition women though are talented to do multi works successfully, interest to implement trained skill as an entrepreneurship is heavily dependent on immediate economic growth, family support, financial support and guidance. Dependency on decision making by men, low confidence, low level of education leads to low level of involvement in entrepreneurship was observed.

**Keywords:** Entrepreneurship, Livelihood development, Micro-enterprises, Rural women, Skill training

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## Promotion of Agri-Women Entrepreneurship and Rural Enterprises for Sustainable Livelihood in Theni District, Tamil Nadu

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The Cumbum Valley of Theni district, Tamil Nadu—popularly known as the “*Grapes City of South India*”—is renowned for the GI-tagged Panneer Thiratchai (*Muscat Hamburg*) grape variety cultivated in 1,890 ha. Banana, cultivated in 6,000 ha, is recognized as the district’s One District One Product (ODOP) for Banana based products by Ministry of Food Processing Industries (MOFPI). A large number of small and marginal farmers, farm women, and Farmer Interest Groups (FIGs) depend on these crops for their livelihoods. Despite high production, both grapes and bananas face severe price crashes during peak harvest due to their high perishability, forcing farmers to sell at distress prices (₹10–15/kg for grapes and ₹5–10/kg for bananas). Post-harvest losses were estimated at 23% in grapes and 31% in bananas during peak seasons. Participatory Rural Appraisal (PRA) and farmer–scientist interactions revealed limited awareness of post-harvest management, value addition, branding, and market linkages, leading to over-dependence on middlemen and reduced profitability. To address these challenges, Krishi Vigyan Kendra (KVK), Theni implemented comprehensive value chain management interventions and innovative extension strategies during 2023–25. The initiatives focused on skill enhancement, enterprise development, and market diversification to empower farmers and farm women as agri-entrepreneurs, aiming to enhance income, reduce post-harvest losses, and promote sustainable livelihoods. KVK Theni organized a three-day Micro Enterprise Development Programme (MEDP) on *Value Chain Management in Grapes based on the Zero Waste Concept* for 125 farm women and rural youth, emphasizing product diversification and waste utilization. Additionally, a five-day Livelihood and Enterprise Development Programme (LEDP) on *Value Chain Management in Banana* was conducted for 130 farm women, FIG members and rural youth. KVK’s Food Processing Incubation Centre provided training, mentoring, Lavoisier outlet support, and e-marketing facilities. Continuous handholding through scientist visits and monthly entrepreneur meetings ensured need-based technical and business support. These embedded interventions promoted long-term sustainability, community-led enterprise development, and a resilient ecosystem for grape and banana value addition. The interventions demonstrated strong continuity, with entrepreneurs sustaining and expanding their enterprises and earning monthly incomes ranging from ₹5,000 to ₹1,25,000. The study highlights that 55 successful rural women entrepreneurship hinges on clarity of vision, systematic planning, adaptability, financial discipline, gained knowledge (59%), wastage reduced (23%), continuous learning and effective collaboration among stakeholders.

**Keywords:** Agri-entrepreneurship, One District One Product (ODOP), Post-harvest management, Value chain management

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## Impact of Vocational Training on the Socio-economic Status of Rural Women in District Kaushambi, Uttar Pradesh

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Vocational training plays a significant role in empowering rural women by enhancing their skills, income-generating capacity and socio-economic status. The present study examined the impact of vocational training programmes in stitching and embroidery on the socio-economic status of rural women in Kaushambi district of Uttar Pradesh. The study analyses changes in income, women empowerment, decision-making power, self-reliance and social participation after participation in vocational training. Random sampling technique was selected for skill & un-skill rural women purposive. Data were collected through self-structured personal interviews and analyzed using frequency, percentage, descriptive statistics and comparative methods. The data were analyzed using SPSS software for appropriate statistical tools. The findings revealed that vocational training has a positive and significant impact on increase in knowledge levels among participants. Results show that majority of participants fully benefited from the vocational training programme, while 41.25% adopted, rest were facing barriers such as social hindrance, time constraints, lack of skills, familial responsibility and financial limitations. Training impact shown on the additional income generation, along with reduction in stitching as household clothing expenditure of own & family members. The additional income was used in children education, health and nutrition enhancement for family. All the indicators indicated a significant socio-economic impact of training on the life of deprived women. The study highlights the need for strengthening vocational training programmes with market-oriented skills to achieve sustainable rural development.

**Keywords:** Rural women, Skill development, Socio-economic status, Vocational training, Women empowerment

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## Gender-Responsive Rural Agribusiness Model: Economic Empowerment of Vulnerable Women through Sustainable Grape Production and Value Addition in Chashmasor Village

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The project of Agricultural Enterprise "Dekhkan Farm" is a transformative initiative designed to empower women and girls from vulnerable rural communities in Chashmasor village, Kulyab city, Tajikistan through agri-entrepreneurship, sustainable agriculture, and inclusive economic development. On a regular basis, 8–10 women actively participate in core project operations, while over 45–50 women contribute to seasonal agricultural activities, including vineyard management and cultivation of arable crops such as wheat, maize, and alfalfa across 3.5 ha of vineyards and 20.5 ha of arable land.

The project provides participants with comprehensive training in modern agricultural practices, sustainable crop production, business management, and entrepreneurial skills. By creating pathways to financial independence and leadership, it strengthens women's capacity to participate meaningfully in their communities' economic and social life. Products, including fresh grapes and raisins, are grown without chemical additives or artificial colorants and are sold domestically and exported, ensuring sustainable income and demonstrating scalable models of market-oriented agri-businesses for rural women.

Implemented in collaboration with O.O. "NISOCHON", a local social organization dedicated to gender equality and community development, the initiative integrates gender-transformative strategies at every level of the agricultural value chain. Women are not only participants but are actively involved in decision-making processes, fostering empowerment, social inclusion, and leadership development. The project strengthens community resilience, food security, and sustainable livelihoods, while advancing international best practices in gender-responsive agricultural development.

Through systematic documentation and evaluation, the project demonstrates practical pathways for scaling positive impacts, bridging local challenges with global lessons, and offering actionable insights for policymakers, researchers, and development practitioners. Lessons from Agricultural Enterprise "Dekhkan Farm" highlight how integrated gender-focused interventions in agri-food systems enhance women's economic participation, leadership, access to resources, and market integration.

This initiative represents a replicable and scalable model for rural women's empowerment aligned with global priorities for gender equality, social inclusion, and sustainable development. By combining technical training, entrepreneurship, and leadership development, it provides a comprehensive approach to advancing women's roles in agri-food systems. The project's experience offers evidence-based strategies for fostering women's economic inclusion, creating replicable frameworks for community empowerment, and promoting innovation in rural economies, making it a high-impact contribution to the Global Conference on Women in Agri-Food Systems (GCWAS-2026).

**Keywords:** Agribusiness, Gender-responsive agriculture, Rural development, Sustainable agriculture, Women empowerment

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## Solar Didis: Women-led Micro-Enterprises for Equitable Irrigation Access

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In India's eastern Gangetic plains, solar pumps can provide clean energy for irrigation, replacing highly polluting and costly diesel-powered pumping systems. However, despite aggressive promotion, uptake remains limited due to fragmented landholdings, high upfront costs, and institutional designs that lean toward elite capture and exclusion of smallholders and women. This paper presents results from an action research project implemented in Lohsari village, in north Bihar, that tests the idea of solar pumps as women-led micro enterprises, embedded within existing Self Help Group institutions and informal groundwater markets.

Implemented by the Aga Khan Rural Support Programme, India (AKRSP-I), with support from the IWMI-Tata Water Policy Program (ITP), Sustain Plus Energy Foundation (SPEF), and the GIZ-supported Solar Energy for Rural Livelihoods (SE4RL) initiative, the innovative model positions women SHG members as solar entrepreneurs, gaining popularity as "Solar Didis" for delivering affordable and reliable irrigation service through solar pumps coupled with a network of buried water distribution pipes. The paper examines the performance of this model in establishing solar pumps as viable and lucrative micro-enterprises for women; and its overall effectiveness vis-a-vis alternative models of solar irrigation expansion.

Using mixed methods, including household surveys and qualitative interviews, the paper assesses impact on cost of irrigation, irrigation and cropping intensity, as well as non-irrigation services and additional revenues generated through agricultural intensification and diversification. It also explores how women's role as solar entrepreneurs impacts their economic agency, decision-making power, and access to irrigation. Through this evidence, the paper makes a case for state-wide replication of this model through the Government of Bihar's rural livelihood initiative, Jeevika and inclusion under Government of India's ambitious PM-KUSUM initiative at the national level.

**Keywords:** Irrigation access, Micro-enterprises, Rural livelihoods, Solar irrigation, Women entrepreneurship

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## Feeding Complete Pelleted Feed Improved Productive Performance of Black Bengal Goats: A Women Centric Approach for Sustainable Livelihoods

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Feed availability and management remain the most critical constraints in smallholder goat farming system. Feed alone accounts about 60% of the total cost of livestock production. Feeding of concentrate mixture is expensive and good quality perennial fodder of hybrid napier may replace partially the rising cost of concentrate. Since goats are selective feeder, total mixed ration (TMR) in pelleted form of feeding enhances the nutritive value of perennial fodder reducing 20–30% feed wastage than mash farm under smallholder and women-led farming conditions. Therefore, a study was undertaken on feeding pelleted feed of concentrate, hybrid napier (IGFRI-6) and Azolla to assess its efficacy on growth performance, feed efficiency in Black Bengal Goats and enhancing income of farm women. An *in vivo* study of 3 months was conducted to assess the effect of feeding pelleted total mixed ration in Black Bengal Goats. Ten kids (live weight  $7.15 \pm 0.48$  kg) of average 3 months days old were randomly divided into two groups. Two types of feed (conc.: fodder = 60:40) were fed to control ( $T_1$ ) and TMR pelleted feed ( $T_2$ ) was provided to kids @ 4% of the body weight (on DM basis) on daily basis satisfying the nutrient requirement of ICAR standard (2013). Body weight of the kids was recorded at fortnight intervals. Data were analyzed by using SPSS (17.0). Feed intake in terms of concentrate, roughage and total DM intake (385–405 g/day) was similar in both the group of animals. The body weight gain and average daily gain (ADG) was higher ( $P < 0.05$ ) in  $T_2$  showing better growth performance in animals reared in pelleted TMR feeding. Total body weight gain (kg) (5.08 Vs 5.87) and average daily gain (g/day) was higher ( $P < 0.05$ ) in  $T_1$  (56.47) than  $T_2$  (65.23) with better feed gain ratio (6.83 Vs 6.21) showing better growth performance. Nutrient digestibility of CP, fibre, fat and starch increased in pelleted TMR feeding. Blood biochemicals (TP, Alb, Glb, blood urea N, enzymes) were not altered showing better immunity in goats fed pelleted feed. The feed efficiency and economics showed improved growth, feed efficiency and economics in goats fed pelleted feed. It was concluded that feeding hybrid napier fodder based pelleted TMR improved growth performance and feed efficiency with higher cost efficacy reducing drudgery with enhanced income of farm women involved in semi-intensive goat rearing system.

**Keywords:** Digestibility, Fortnight, Napier, Pelleted

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## Gender-Inclusive Livestock Development in Odisha: Policy and Programme Perspectives

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A study was undertaken to evaluate government programmes and schemes in Animal husbandry sector in gender perspectives. The schemes implemented in livestock sector, Govt. of Odisha were analysed in gender perspectives which revealed that semi-intensive poultry layer farming by WSHG, distribution of input for improvement of livelihood through goat farming, distribution of goats among SHGs, semi-intensive poultry layer farming by SHG having ready sheds for rearing of chicks/ducklings, livelihood development in rural area through distribution of goats/sheep among SHG) are women specific. Database of last 5 years about various schemes implemented by Govt. of Odisha under MKUY showed that involvement of women in MKUY schemes was 57% being prioritized in poultry and goatery sector. The feedback collected from beneficiaries availing schemes in livestock sector in Odisha through a structured questionnaire revealed that female headed family, 9.63%; female ownership on house, 4.12 %; female ownership/scheme holder on Livestock resources/scheme, 60.1%; and majority of beneficiaries access information mainly from officials of veterinary department, 46.78 %. Various schemes in Animal husbandry sector, Govt. of Odisha were analysed in gender perspectives. It was revealed that enrolment of women beneficiaries in Gopalan Scheme (61.28%) was higher than buffalo entrepreneurship development (46.19%) followed by broiler farming (30.92%) and fodder entrepreneurship (26.39%). The schemes analysed in gender perspectives revealed that relaxation in availing policy benefits for women livestock keeper, livestock insurance scheme and provision of additional incentives in terms of subsidies on interest rates and insurance premium, special programmes for developing women entrepreneurship in livestock value chain, kisan credit card facility may be prioritized for empowering women farmers. Efforts to develop appropriate technologies suited to women's needs as well as to reduce their drudgery needs to be emphasized. Institutional mechanisms to promote the advancement of women needs to be strengthened through appropriate interventions, training and advocacy skills with follow up action which influence macro-policies, legislation, programmes etc. Women need to organize and strengthen into SHGs/FPOs at grass root level establishing a close interface with the Panchayats/Municipalities to bring about synergistic implementation of schemes with active support of Govt. and NGOs agencies for mainstreaming gender equity in livestock sector in Odisha.

**Keywords:** Animal husbandry, Gender perspectives, Government schemes, Women entrepreneurship

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## Empowering Farm Women as Agi-Entrepreneurs through Value Addition and Market Linkages: Evidence from KVK Interventions

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Farm women contribute significantly to agricultural production, yet their participation in profitable agri-enterprises remains limited due to constraints in skills, market access, financial literacy, and institutional support. Value addition combined with structured market linkages offers a strategic pathway to enhance their economic empowerment and livelihood resilience. This review paper examines the role of Krishi Vigyan Kendras (KVKs), under the Indian Council of Agricultural Research, in strengthening farm women's entrepreneurial capacities. The paper synthesizes extension experiences related to skill development in food processing, product standardization, packaging, branding, labelling compliance, and basic enterprise management. It highlights the importance of collective approaches such as Self-Help Groups (SHGs), access to local and digital markets, and convergence with government schemes to improve competitiveness and sustainability. Opportunities in millet-based products, mushroom cultivation, honey processing, and region-specific value-added commodities are discussed within the broader framework of gender-responsive extension systems. The review underscores the need for integrated policy support, infrastructure development, and market-oriented training to scale women-led agri-enterprises. Strengthening value chains through capacity building and institutional linkages can serve as a transformative strategy for advancing women's entrepreneurship and inclusive rural development globally.

**Keywords:** Competitiveness, Convergence, Inclusion, Resilience

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## Women's Empowerment towards Sustainable Livelihood through Farmer-Producer Organisation (FPO)

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Women constitute a significant share of India's agricultural workforce but face constraints, including limited access to land, credit, markets, and decision-making. Farmer-Producer Organisations (FPOs) address these structural barriers by enabling collective action and institutional support. Skill and capacity enhancement is the core pathway through which FPOs convert women farmers from informal agricultural workers into confident producers, managers, and entrepreneurs. With this approach, Murshidabad Krishi Vigyan Kendra, West Bengal, began working in 2007 in Digha, Milebasa, a resource-poor area with women who had limited formal education. The initial step was forming a Self-Help Group (SHG) of 10 farm women. The Kendra focused on engaging women from nearby villages in need-based vocational training, exposing them to institutions and technologies, facilitating microfinance, strengthening market connections, and developing branding. This empowerment journey led to the creation of "Bhagwangola Digha Krishishakti Women Producer Company Ltd", which has grown into an FPO with 1,000 members from 15–20 villages, all actively participating in agriculture and allied sectors. They are dealing with seasonal supply of seeds of jute, wheat, maize, and groundnut to the farmers, procuring rice with Minimum Support Price (MSP), organising long-term training on tailoring, jute and wheat product-based handicraft training, production and supply of vermicompost, onion procurement, storage and marketing of onion during off-season with their brand names in most of the cases. By the development of good linkages with the different institutes, like JCI, the Agriculture Department of West Bengal, ICAR-CRIJAF, ICAR-NINFET, Coconut Development Board and Institute of Sericulture, etc., the FPO now becomes an example of women led, financially independent organisation with an annual turnover of ₹75 lakh to ₹1 crore in every financial year and proves that Empowerment is not only the moral thing – it's a smart investment for the future. Skill and capacity enhancement is the core pathway through which FPOs convert women farmers from informal agricultural workers into confident producers, managers and entrepreneurs.

**Keywords:** Collective, Procurement, Women entrepreneur

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## Role of Rural Women in Dairy Farming in Mansa District of Punjab

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The study was conducted in district Mansa of Punjab to assess the level of involvement of rural women in dairy enterprise. A total of 120 rural women were interviewed using a structured schedule to gather data. The analysis revealed that the majority of rural women play a vital role in dairy farming undertaking various activities such as they are the primary caretaker of the dairy animals, milk production and household management. However, their involvement in decision-making processes is limited. Despite their significant contributions, women's participation in dairy-related decisions, including animal feeding, management and milk sales was often restricted to either consultation or no role at all. On the other hand, majority of them (93.70%) were not responsible for taking animal for grazing while around 96% were not engaged in purchasing animals and animal feed or fodder. Nevertheless, approximately 55% of the rural women did participate in health-related activities. This study also reveals that independent decision-making by rural women in dairy-related activities was negligible. The factors affecting the income of female dairy farmers were education, operated area and herd size. The main challenges faced by these women included limited decision-making power and illiteracy. To enhance the income of rural women from dairy farming, it is essential to educate and empower them through extension facilities provided by the government. By promoting women's empowerment and providing them with necessary resources, we can enhance their participation in decision-making processes and improve their overall well-being.

**Keywords:** Dairy farming, Decision-making, Livelihood, Rural women, Women empowerment

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## Oyster Mushroom Cultivation in Enhancing Income and Nutritional Security of Household Women in Dhemaji District of Assam

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Oyster mushroom (*Pleurotus* spp.) cultivation has emerged as a low-cost, short-duration enterprise with significant potential for enhancing livelihood security among rural women, particularly during the agricultural lean period. The present study was conducted to assess the role of oyster mushroom cultivation as an income-generating opportunity for household women in Dhemaji district of Assam. The study was conducted with a sample size of 60 women beneficiaries, focusing on income generation during the lean agricultural period from January to April. On an average, each respondent cultivated 68 oyster mushroom bed per month on an average. The findings revealed that the income from the enterprise ranged the highest of ₹26,588.00 per month to minimum of ₹2800.00 per month, with a total annual income of ₹53,176.00 per woman against the net return of ₹43,570.00. The availability of paddy straw in abundance after paddy harvest significantly contributed to the adoption of this enterprise by reducing input costs and enabling the production technology affordable and locally sustainable. In addition to augmenting household income, oyster mushroom cultivation facilitated generation of additional man-days during the lean period. The study concludes that oyster mushroom cultivation serves as a viable alternative livelihood option, fostering self-sufficiency, financial independence and enhanced self-worth among rural women in Dhemaji district.

**Keywords:** Income generation, Lean agricultural period, Oyster mushroom cultivation, Rural women empowerment

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## Nutritional Security through Women-Centric Extension Approaches through KVK Interventions in Agri-Food Systems

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Women play a critical role in ensuring household nutrition and food security, yet their potential remains underutilized due to limited access to nutrition-sensitive technologies and extension services. This paper presents quantitative evidence from Krishi Vigyan Kendra (KVK)-led interventions under ICAR-ATARI, Patna aimed at strengthening nutrition outcomes through women-centric agri-food system approaches. The study draws on field-level data generated through on-farm trials, frontline demonstrations, capacity-building programmes, and nutrition awareness campaigns conducted among farm women across KVK operational areas. Nutrition-sensitive interventions included promotion of nutri gardens, biofortified and nutri-cereal crops, pulse-based cropping systems, mushroom cultivation, small-scale poultry units, and value addition of nutrient-rich foods. Results indicated a high adoption rate, with 68–82% of participating women adopting at least one nutrition-sensitive practice within one year of intervention. Household dietary diversity scores (HDDS) improved by 25–35%, with significant increases in consumption of vegetables, pulses, millets, and animal-source foods. Anaemia awareness and nutrition knowledge levels among women increased by over 40%, while regular intake of iron- and micronutrient-rich foods rose by 30%. Income analysis revealed that women engaged in nutrition-linked enterprises such as vegetable seedling production, millet processing, and food product preparation recorded an average annual income increase of 18–28%, contributing to improved household food expenditure. KVK-facilitated extension strategies—participatory learning, women self-help groups, convergence with health and nutrition departments, and ICT-enabled advisories—played a pivotal role in scaling adoption and sustaining behavioural change. The findings demonstrate that integrating nutrition objectives within agricultural extension significantly enhances both nutritional and economic outcomes for women. The study concludes that women-centric, nutrition-sensitive extension models are effective pathways for transforming agri-food systems, and recommends scaling such KVK-led approaches to achieve sustainable nutrition security and gender equity in line with national priorities and the Sustainable Development Goals.

**Keywords:** Agri-food systems, Dietary diversity, KVK interventions, Nutritional security, Women empowerment

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## ARYA (Attracting and Retaining Rural Youth)-Led Agri-preneurship Hubs as a Catalyst for Economic Empowerment and Livelihood Security of Rural Women in East Champaran District of Bihar

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“When women earn, control resources, and participate in economic activities, they gain power, security, and a stronger voice in society.” In this context, the Attracting and Retaining Youth in Agriculture (ARYA) programme of ICAR has emerged as an effective driver of women-led agri-preneurship and secondary agriculture in East Champaran district of Bihar. The programme is implemented by ICAR-ATARI Zone-IV (Patna) through Krishi Vigyan Kendra's (KVKs), which function as capacity-building and enterprise incubation hubs. In East Champaran, KVK Piprakothi has played a pivotal role in empowering rural women through structured training, continuous handholding, access to financial resources, and facilitation of market linkages. The programme emphasizes the promotion of women-led enterprises in secondary agriculture, enabling women to shift from subsistence activities to sustainable, market-oriented agri-enterprises. Through ARYA interventions, women-led enterprises have been established in food processing, mushroom cultivation, poultry farming, goat rearing, beekeeping, fisheries, and value-added agri-products, resulting in enhanced income, employment generation, and entrepreneurial confidence. A key strength of the initiative has been its convergence with JEEViKA (Bihar Rural Livelihoods Promotion Society), which enabled mobilization of women through Self Help Groups (SHGs) and women-centric Farmer Producer Organizations (FPOs). This convergence ensured access to institutional credit, collective marketing, and organized supply chains, while ARYA provided technical backstopping for enterprise sustainability. Since the inception of ARYA, more than 550 rural women have been trained under various agri-enterprises, and over 365 women have established their own enterprises in the district. These enterprise incubation units have generated employment for more than 1,500 individuals. The average annual net income from key enterprises includes ₹1,23,400 from mushroom production, ₹1,33,000 from poultry, ₹2,12,500 from food processing, ₹1,05,780 from goat farming, and ₹1,43,360 from beekeeping, highlighting the economic viability of women-led enterprises. Beyond income enhancement, the programme has strengthened women's decision-making power, leadership roles, and participation in agri-value chains. Overall, ARYA interventions implemented through KVK Piprakothi, in convergence with JEEViKA, SHGs, and FPOs, have created a robust ecosystem for women empowerment, livelihood security, and sustainable agricultural transformation in East Champaran district of Bihar.

**Keywords:** ARYA, Economic empowerment, Enterprise incubation, Institutional convergence, Secondary agriculture, Women-led agri-preneurship

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## Empowering Women Entrepreneurs and Enhancing Nutritional Security through Horticulture-Based KVK Interventions in the Agri-Food Systems of Sheohar District, Bihar

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Nutritional security within agri-food systems is closely intertwined with women's entrepreneurship, as women play a pivotal role in food production, processing, marketing and household nutrition decisions. In this context, Krishi Vigyan Kendra (KVK) Sheohar, Bihar, under the technical guidance of Dr. Rajendra Prasad Central Agricultural University, Pusa, Bihar and ICAR-Agricultural Technology Application Research Institute (ATARI), Patna, implemented women-centric entrepreneurship-driven horticulture interventions over the last four years (2021-2025) to strengthen nutrition-sensitive livelihoods and resilient agri-food systems. A mixed-method research design was adopted, combining quantitative analysis of KVK secondary data including training records, frontline demonstration results, enterprise adoption statistics and income estimates with qualitative insights obtained through focus group discussions, beneficiary interviews, and documented success stories. The interventions focused on developing women-led enterprises in nutrition gardens, vegetable and fruit production, nursery raising, mushroom cultivation, protected cultivation and value addition of horticultural produce. Pre- and post-intervention assessments were conducted to measure changes in knowledge, adoption, income, and dietary diversity. Quantitative findings revealed that women constituted 45-50% of total beneficiaries, with over 800 rural women trained through skill-oriented programs and demonstrations. Approximately 38-42% of trained women adopted at least one horticulture-based enterprise, resulting in an average annual income enhancement of ₹18,000–₹35,000 per household. Coverage of kitchen and nutrition gardens increased from 30% to 65%, while household crop diversity expanded from 2-3 to 6-8 horticultural crops, improving year-round access to nutrient-rich foods. Frontline demonstrations recorded 20-30% yield advantages over farmers' practices. Qualitative outcomes highlighted improved nutrition awareness, enhanced dietary diversity, reduced food expenditure, and greater decision-making autonomy among women entrepreneurs. Strengthened women-led self-help groups facilitated collective marketing and value-chain participation. The study concludes that women-centric horticulture-based entrepreneurship promoted through KVK Sheohar effectively enhances nutritional security and agri-food system resilience, offering a scalable model for gender-responsive agricultural extension.

**Keywords:** Agri-food systems, Horticulture interventions, KVK, Nutritional security, Women entrepreneurship

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## Empowering Rural Women through Entrepreneurship: A Case Study of Kushi Millet Products in Chikkaballapura District, Karnataka

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Women's economic inclusion through entrepreneurship remains a priority for sustainable development in India, where rural women are increasingly creating market oriented enterprises. As of 2025, there are over 2.86 crore women led micro, small and medium enterprises (MSMEs) registered on the Udyam platform, reflecting a significant rise in formal women entrepreneurship across sectors nationwide. Women now make up 20% of all small business owners in India and digital tools have enabled a 282% surge in women entrepreneurs from Tier 2–4 towns over the last year with approximately 96% of digitally enabled women entrepreneurs. In this context, the case of a woman entrepreneur from Chikkaballapura district who owns and operates Kushi Millet Products illustrates grassroots economic inclusion. Founded in 2023 with an initial investment of ₹50,000, the enterprise processes locally sourced millets: finger millet, foxtail millet and little millet into value added products such as millet flours, ready to cook mixes, snacks (murukku, chakli, chocolates, mixture, rings, nachos and laddu) and health foods. Approximately 300–350 kg of millets per month are procured from 10–15 local farmers, fostering backward linkages with the agricultural economy. Marketing channels include 4–5 weekly markets per month, tie ups with 5–7 retail outlets and digital sales through WhatsApp, generating 50–60 orders monthly. The business achieves an average turnover of ₹75,000 per month, yielding a net income of around ₹50,000 after accounting for ₹20,000 in raw materials, ₹8,000 in labor, ₹5,000 each in packaging and marketing costs. This income has enhanced the entrepreneur's financial autonomy and decision making power within her household. The enterprise also provides part time work to 2–3 local women, promoting employment and skill development while advancing millet consumption for improved local nutrition. Despite barriers such as limited access to formal credit and market expansion, this case demonstrates how women led enterprises can advance economic inclusion, rural employment and value addition for traditional food systems.

**Keywords:** Economic empowerment, Micro-enterprise, Millet-based products, Nutritional security, Rural livelihoods, Women entrepreneurship

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## Women Farmers Forum: From Bihar's Fields to Global Voices

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Women form the backbone of agricultural production in Bihar, India, yet their work often remains unseen and undervalued. Despite their extensive involvement in farming and allied activities, women continue to face structural and social barriers such as insecure land tenure, limited access to credit, agricultural technologies, and extension services, along with deeply rooted socio-cultural norms that restrict their decision-making power. This case study explores the role of Women Farmers' Forums as collective spaces where women farmers are able to voice their everyday field-level challenges, build skills, and gradually strengthen their participation in agricultural decision-making.

This study was undertaken to analyze the various challenges faced by women farmers in the Sheikhpura district of Bihar. The study area comprised two blocks, namely Ariyari and Chewara, along with the Sheikhpura town area, which were selected using purposive sampling techniques. A total of 120 respondents were selected for the study. Primary data were collected through personal interviews and telephonic interactions using a well-structured questionnaire. The collected data were analyzed using appropriate statistical tools, including frequency, percentage, and correlation coefficient, to draw meaningful inferences.

The study draws on experiences from women-led self-help groups, producer collectives, Community Resource Persons associated with the National Mission on Natural Farming implemented by the Government of Bihar, and technology-based initiatives facilitated by Krishi Vigyan Kendras (KVKs), Bihar Agricultural University, and development organizations across selected districts of the state. These initiatives include climate-resilient agricultural practices, malnutrition eradication programmes, and interventions under the Scheduled Caste Sub Plan. The analysis highlights how collective platforms help women gain better access to resources, knowledge, and markets, while also fostering leadership, confidence, and agency. The findings suggest that participation in Women Farmers' Forums contributes to improved livelihoods, greater resilience to climate and market uncertainties, and increased visibility of women in local agricultural governance. By linking these grassroots experiences with wider policy and global agri-food system discussions, the study demonstrates how women farmers' collective voices from Bihar can meaningfully inform gender-responsive agricultural policies beyond the regional context. The paper argues that strengthening and scaling Women Farmers' Forums is essential for promoting inclusive and sustainable agricultural transformation.

**Keywords:** Agri-food systems, Agricultural livelihoods, Bihar, Climate resilience, Collective action, Farmer organizations, Gender inequality, Rural development, Women farmers, Women's empowerment

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## Women Empowerment and Geographical Indication: A Conceptual Model based on *Judima*, a Traditional Brew of the Dimasa Tribe of North East India

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*Judima*, the traditional rice-based brew of the Dimasa tribe, is the first Geographical Indication (GI)-registered traditional brew from Northeast India. It represents a legally protected form of community-owned intellectual property. The preparation of *Judima* is exclusively preserved and practiced by Dimasa women. This makes it a gender-specific knowledge system embedded within the GI framework. The specialized skills related preparation of *Judima*, have been transmitted from one generation to the next from time immemorial. With its strong ritualistic and social value, *Judima* possesses significant commercial potential as a GI-branded product capable of generating sustained revenue for indigenous Dimasa women producers. The present work proposes a *Judima*-based conceptual model that positions GI as a revenue-oriented intellectual property instrument for women's economic empowerment. The model conceptualizes GI as a mechanism for legal recognition of origin-specific knowledge, product differentiation in competitive markets and premium price realization through GI based branding. It also highlights the role of women in integrating *Judima* into GI-driven ethnic food markets, GI-based branding initiatives and tourism-linked outlets. The study states that *Judima* provides a gender-sensitive GI framework in which a culturally embedded traditional brew can be transformed into a marketable intellectual asset and a sustainable source of income for women.

**Keywords:** Branding, Differentiation, Empowerment, Intellectual property

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## Gender-Responsive Policy and Institutional Convergence for Women's Technology and Market Access: Evidence from a Banana Value Chain in North East India

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Women significantly contribute to agri-food systems but face persistent barriers to accessing formal markets and value chains, especially in tribal and hill areas. This study demonstrates that aligning gender-responsive policies and coordinated institutional actions enables women to enter and benefit from the banana value chain in Wokha district, Nagaland. Despite being a key crop for livelihoods, bananas in this region are typically sold fresh with little value addition, resulting in low profits and high post-harvest losses, even though women provide much of the labour. By centering on the “One District One Product” initiative, which established bananas as the district’s main commodity, government and research institutions collaborated to open processing, regulatory, and marketing opportunities for women.

ICAR-KVK, Wokha, as the central extension agency, arranged training, inter-institutional coordination, and regulatory agreements, and delivered ongoing technical and business support. These efforts decreased post-harvest losses and supported women’s advancement into higher-value processing and marketing roles. Critically, this approach enabled the establishment of a women-led group business, with eight tribal women launching ten banana value-added products under the “Yuthi Delight” brand. The main argument of this study is that strong gender-responsive policy and institutional convergence transform subsistence farming into profitable, women-led businesses, advancing gender equality in agri-food value chains.

The Nagaland State Banana Festival-2025, jointly organized by the District Administration and ICAR-KVK Wokha, illustrated this model by bringing together diverse actors, including policymakers, technocrats, administrators, and producer organizations, to enhance market access, increase visibility, and build business partnerships. This case illustrates the need to combine policy, institutional teamwork, and targeted interventions to overcome gender challenges in value chains. The study provides evidence that such micro-level policies, when enacted through frontline extension systems like KVKs, produce measurable business outcomes such as benefit–cost ratios of 1.30 to 3.33, an initial net return of ₹0.74 million, and significant gains in women’s income, confidence, and decision-making, offering a scalable model for supporting women-led value chains in remote settings.

**Keywords:** Agri-food systems, Banana value chain, Gender-responsive policy, Institutional convergence, Market access, Nagaland, Tribal women, Value addition, Women entrepreneurship, Women-led enterprises

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## Gender Mainstreaming in Tribal Fisherfolks of Jharkhand for Scampi Fisheries Enhancement in Reservoirs

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Blue Revolution 2.0, implemented under the Pradhan Mantri Matsya Sampada Yojana (PMMSY) since 2020, represents a major transformation in India's fisheries and aquaculture sector, emphasizing sustainability, livelihood enhancement, and inclusive growth. The mission targets an increase in fish production from 19.20 million metric tons (mmt) (2024-25) to 22 mmt by 2030, with production already striding towards achieving goal at moderate pace. The current phase prioritizes technology-driven interventions, community participation, and gender-sensitive development of overall fisheries sector of India. India has about 34.47 lakh ha of reservoir resources, nearly half of which are small reservoirs that remain underutilized, particularly in tribal-dominated regions. These reservoirs offer strong potential for freshwater prawn (scampi) fisheries as a high-value, low-input livelihood option. Tribal women play an important but often under-recognized role in inland fisheries through feeding, seed nursing, post-harvest handling, net mending, and local marketing, yet their participation is constrained by limited access to training and decision-making. Jharkhand, with over 1.33 lakh ha of reservoir area along with numerous tanks and ponds, holds substantial untapped fisheries potential. Under the guidance of ICAR-Central Inland Fisheries Research Institute (CIFRI), Barrackpore, and in collaboration with the Department of Fisheries, Jharkhand, a scampi fisheries enhancement program was implemented in three tribal-dominated reservoirs- Kelaghagh (162 ha), Ghaghra (110 ha), and Masaria (100 ha) spread over 3 districts. Following a Memorandum of Understanding signed on May 23, 2023, a participatory model emphasizing capacity building, cooperative engagement, and active involvement of tribal women was adopted. The giant freshwater prawn (*Macrobrachium rosenbergii*) was selected due to its fast growth, high market value, and suitability for reservoir enhancement. Phased stocking during 2023-24 and 2024-25 was supported by scientific management practices such as predator control, liming, habitat enhancement, and regulated feeding. Women beneficiaries were trained in feeding protocols, mineral supplementation during moulting, record keeping, and collective marketing, strengthening both technical competence and financial autonomy. The first production cycle yields had encouraging results, producing 43 t from Kelaghagh reservoir, followed by 20 t from Masaria and 19.9 t from Ghaghra over 29 months, including a winter spell of 10 months. The second stocking also showed promising growth trends. A major technological innovation was the introduction of India's first "Round Floating Pen" system at Masaria reservoir in 2024, which enabled safe nursery rearing of scampi juveniles and significantly reduced predation losses. Women played a central role in pen maintenance, feeding, and seed release. Overall, the intervention improved household incomes, enhanced women's participation in fisheries governance, and strengthened recognition of tribal women as key stakeholders in reservoir fisheries management. The study demonstrates that integrating gender-responsive approaches with fisheries enhancement technologies can convert underutilized reservoirs into sustainable livelihood assets. Scaling such women-centric scampi fisheries models can contribute significantly to food security, economic resilience, and women empowerment within India's agri-food systems.

**Keywords:** Blue Revolution 2.0, Freshwater prawn fisheries, Tribal women empowerment, Underutilized reservoirs

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## Evaluation of Entrepreneurial Competencies among Farm Women of Southern Karnataka

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Women entrepreneurs play a vital role in rural development, particularly in the context of globalization and economic liberalization. Entrepreneurship provides rural women with new livelihood opportunities, enhances family income, and contributes to poverty reduction. The present study was conducted to assess the proficiency of farm women regarding entrepreneurial development in the Chikballapur and Tumkur districts of Karnataka. A total of 1,000 farm women were surveyed to understand their interest, motivation, and readiness for entrepreneurship.

More than half of the respondents expressed willingness to start an enterprise, mainly to support their families financially, while 42.60 % were not interested due to lack of self-confidence, inadequate skills, knowledge, and fear of failure or economic loss. In contrast, the actual business avenues available in their localities were predominantly dairy farming, poultry, agro-based value-added products, and tailoring. Family members and neighbours were identified as major sources of motivation for initiating an enterprise. About 41.40 % of the respondents believed that starting an enterprise could generate employment for up to five people. Furthermore, 68.30 % felt that rural women should be encouraged to take up self-employment and entrepreneurship, whereas nearly half of them believed that entrepreneurship contributes to long-term family welfare. The study also revealed that 65.77 % expected income generation from enterprises, while 23.73 % viewed entrepreneurship as a pathway to self-independence. Overall, the findings highlight the potential and challenges of fostering entrepreneurial development among farm women in rural districts of Karnataka.

**Keywords:** Entrepreneurial competencies, Entrepreneurship, Farm women, Income generation, Rural development, Self-employment, Women empowerment

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## Sensory Evaluation and Nutritional Composition of Mushroom Papad and Badi

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Mushrooms are highly valued as nutritious and functional foods owing to their rich nutrient profile and health-promoting properties. They are naturally low in fat, sodium, and calories, contain no cholesterol, and serve as an excellent source of dietary fibre, vitamin C, folic acid, potassium, selenium, copper, and vitamin B-complex. Mushrooms are also recognized as one of the few natural dietary sources of vitamin D. With more than 90 % moisture content and minimal fat composition, mushrooms contribute significantly to healthy diets and nutritional security. Furthermore, the bioactive compounds present in mushrooms possess antioxidant properties that help protect the human body against oxidative stress and degenerative diseases. A study was conducted at Krishi Vigyan Kendra, Bilaspur during 2023–24 to evaluate the sensory quality and nutritional significance of two mushroom-based value-added products, namely mushroom papad and mushroom badi. Sensory evaluation of the prepared products was carried out by a panel of ten judges using the hedonic rating scale method. The products were assessed based on appearance, colour, aroma, taste, texture, and overall acceptability. The results revealed that both products were moderately acceptable to consumers, with an equal moderate acceptability score of 66.66 %. However, under the category of high acceptability, mushroom papad received greater preference (40.00%) compared to mushroom badi (26.66%). The study highlights the potential of mushroom-based value-added products in enhancing nutritional intake, consumer acceptability, and income-generation opportunities through value addition and processing.

**Keywords:** Acceptability, Mushrooms, Nutritional composition, Value-added products

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## Empowering Marginal Farmwomen through Nutri Cereals-Based Value Chain Enterprises: Evidence from a DSIR-Funded Intervention in Western Uttar Pradesh

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This study presents outcomes from an ongoing government-funded intervention aimed at strengthening the socio-economic empowerment of marginal and economically vulnerable farmwomen in Saharanpur district, Uttar Pradesh, through millet-centric agri-enterprise development. The project focuses on capacity building, promotion of high-value nutri-cereals, and establishment of women-led value-added enterprises as sustainable livelihood pathways. Priority crops—including finger millet (*Eleusine coracana*), black wheat (*Triticum aestivum*), and great millet (*Sorghum vulgare*)—were selected based on local agro-climatic suitability, women's preferences, and emerging market demand. A structured training and demonstration program is being implemented to enhance technical competencies in millet agro-technology, encourage crop diversification, and reduce dependency on conventional cereal systems. Parallel awareness initiatives emphasized the nutritional and health benefits of millets, aligned with the Government of India's Eat Right Campaign and the National Mission on Millets, thereby linking production with nutrition-sensitive food systems. Farmwomen are being trained in the preparation of a diverse portfolio of value-added millet products, including ragi laddoo, namkeen, black wheat nachos, namakpare, cakes, cookies, vermicelli, dalia, nankhatai, and multigrain flours using drudgery reducing agriculture and food processing equipment. Special emphasis is being placed on identifying and mentoring 10–15 women with entrepreneurial potential to transition from skill acquisition to enterprise ownership. To date, two Self-Help Groups (SHGs) have been formed, over 1,000 farmwomen from five blocks of Saharanpur district have participated in 20 training and demonstration programs, and two women-led enterprises have been formally registered. Millet cultivation was strategically introduced on underutilized backyard spaces, kitchen gardens, and community plots, ensuring income generation without disrupting existing cropping systems. The project further will facilitate market linkages for millet-based products, strengthen value chains and will ensure long-term sustainability.

**Keywords:** Capacity building, Millet-centric agri-enterprise, Socio-economic empowerment, Women-led enterprises

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## Women's Participation in Viksit Krishi Sankalp Abhiyan (VKSA) and Implications for Empowerment

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The Viksit Krishi Sankalp Abhiyan (VKSA), a nationwide agricultural extension initiative conducted in 2025, aimed to strengthen inclusive farmer outreach through farmer–scientist interaction and technology awareness programmes. The campaign reached more than 1.35 crore farmers across 728 districts, including 39.7 lakh women farmers, representing 29.3% of total participation. This reflects the growing recognition of women as active stakeholders in agricultural extension systems. Analysis of gender-disaggregated participation data shows stronger engagement of women in socially and geographically vulnerable regions. In aspirational districts, women accounted for about 35.6% of total participants on average, with particularly high participation in Meghalaya (63.9%), Arunachal Pradesh (63.5%), Jharkhand (54.32%), and Tamil Nadu (54.27%). Similarly, in tribal districts, women's participation averaged about 38.94 %, exceeding male participation in states such as Meghalaya (63.19%), Ladakh (58.30%) and Arunachal Pradesh (56.32%), highlighting the central role of women in tribal and hill agricultural systems. Focused Group Discussions (FGDs) organized during VKSA to document farmers' problems and field-level constraints also witnessed notable participation of women, who constituted about 33.8% of the 2,18,902 total participants. Their involvement in problem-identification exercises highlights women's active role in articulating farming constraints and contributing to need-based extension planning, which is an important dimension of empowerment in agricultural development programmes. Women's engagement in VKSA activities- including awareness programmes, technology demonstrations, and interactions with scientists- enhanced their access to agricultural knowledge, institutional support, and innovation networks. The increasing participation of women in VKSA indicates a gradual shift toward gender-inclusive agricultural extension, contributing to knowledge enhancement, confidence building, and greater involvement of women in farm decision-making processes. Strengthening such gender-responsive extension initiatives can serve as a key pathway for women's empowerment and inclusive agricultural development in India.

**Keywords:** Disaggregated, Empowerment, Inclusion, Stakeholders

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# **GLOBAL CONFERENCE ON WOMEN IN AGRI-FOOD SYSTEMS (GCWAS-2026)**

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## **Global Conference on Women in Agri-Food Systems (GCWAS-2026)**

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