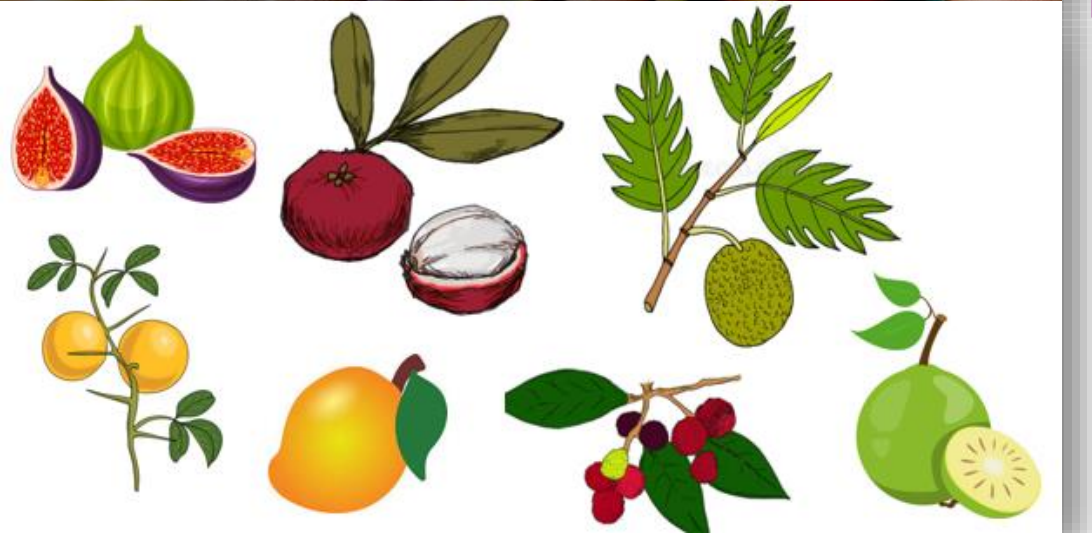

FRUITFUL INDIA सफल भारत

Alliance Bioversity & CIAT

CGIAR

Title of the project

Fruit based Multi storied cropping system for ensuring nutritional and livelihood security to small landholders of Chitrakoot district in Bundelkhand region

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Introduction to project:

1.Project Title: Fruit based Multistoried Cropping System for Ensuring Nutritional and Livelihood Security to Small Landholders of Chitrakoot district in Bundelkhand region

Lead Organization: Deendayal Research Institute,

Major Partners : Tribal Small landholders(farm women), Krishi Vigyan Kendra, village panchayats

2.Target Area: The project will be implemented in 4 tribal villages(Kol and Mawasi tribes) of two blocks namely Majhgawan block of Madhya Pradesh and Manikpur block of Uttar Pradesh.

3.Problems and Gaps (Adoption of innovative technology, availability of fruits and market access:

- Small ad uneconomical land holdings
- Resource limitation(Poor financial condition for initial investment) 57 % families having annual income less than 25000
- Reliance on seasonal wild fruits
- Nutritional Gap -Lack of dietary diversity throughout the year – nutritional insecurity and hidden hunger
- Poor market access due to road connectivity
- Dominance of intermediateries(supply chain is controlled by local traders and commission agents)
- Limited access to credits(small landholders face challenge in accessing formal credit which liit their ability to invest in adopting innovative farming)

Promotion of Multi storied cropping model – more crop per unit area, ensure sustainable production, more income- better their lives

Our experience wit farming community

Deendayal Research Institute(ISO 9001: 2015) is working with its farming communities over 30 years through its Krishi Vigan Kendra Institute is working as a partners with biodiversity over 10 years and succefully implemented projects like Crop diversification, GEF and Ist phase of CFL project

DRI – full support from central as both UP and MP Government in implementation of its activities and programmes

DRI has well established infrastructure, qualified and experienced team of workers

Achievements of Ist phase of CFL project

- successfully motivated over 1000 farm families in 77 tribal villages to cultivate fruit trees
- Champion farmers who have actively participated in the implementation of the project
- Organized 34 promotional campaign to sensitize farmers on importance of fruits
- 4 workshops on importance of fruits in human health and nutrition
- 26 Capacity building training programmes tribal communities (540 farm women and 462 farmers)
- 47 mother plants block of improved varieties at champion farmers field
- Established fruit plant nursery for raising quality planting material
- Over 9500 fruit saplings have been planted by 1042 farmers
- 81.31 % plants survival rate with minimum in ber(44.85%) and maximum in Guava(91.11%)

Study on health and Nutritional Status on Mawasi Tribal women(100 women between age group of 18-46 years

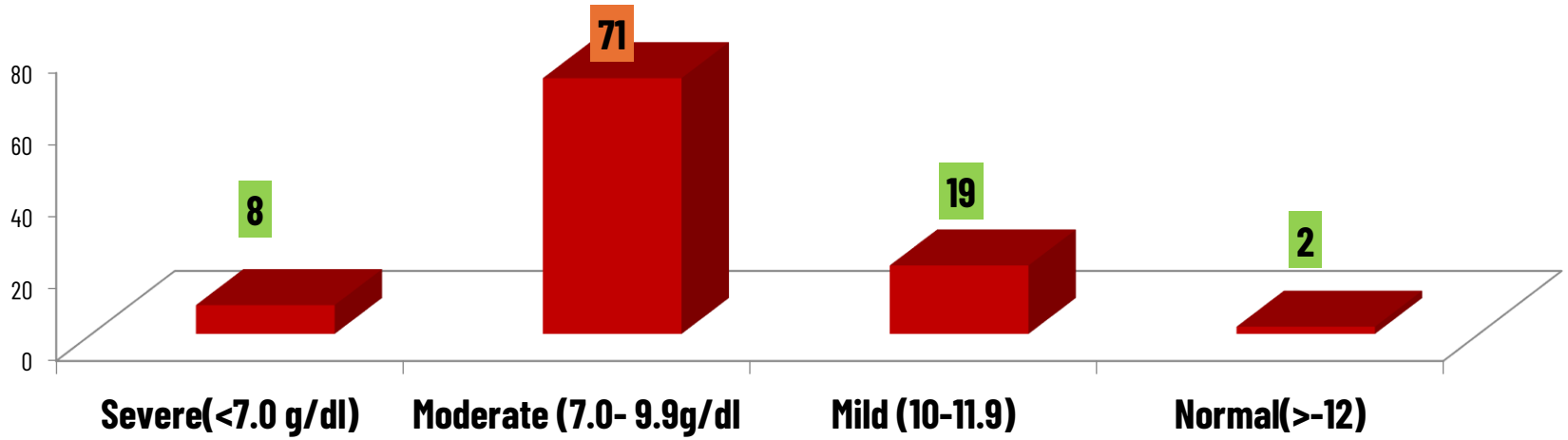
Frequency of Food Group Intake

Food Groups	Daily	Twice a week	Weekly	Twice a month	Monthly
Cereals	100	0	0	0	0
Pulses and legumes	29	53	18	0	0
Milk & milk products	3	17	29	33	18
Green leafy vegetables	89	11	0	0	0
Roots and tubers	100	0	0	0	0
Other vegetables	16	34	39	11	0
Fats and oils	100	0	0	0	0
Fruits	0	3	23	39	35
Sugar &Jaggery	100	0	0	0	0
Meat,eggs,fish and poultry	0	0	5	13	16

Dietary Intake by 24 Hour Food Recall method

Nutrients	Mean Intake	RDA	% of Deficiency
Energy(kcal/d)	1618 ± 201.42	2230	27.44
Protein(g/d)	37.4 ± 6.92	55	32.00
Fat(g/d)	18.3 ± 3.48	25	26.80
Iron(mg/d)	8.1 ± 2.34	21	61.43
Calcium(mg/d)	314 ± 182.41	600	47.67
Zinc(mg/d)	5.82 ± 1.32	10	41.80
Vitamin A(mg/d)	1176 ± 238.9	4800	75.50
Thiamin (mg/d)	0.89 ± 0.3	1.1	19.09
Riboflavin(mg/d)	0.73 ± 0.34	1.2	39.17
Niacin (mg/d)	9.94 ± 6.62	14	29.00
Folic acid(mg/d)	59.37 ± 15.04	200	70.32
Vitamin B-12(mg/d)	0.37 ± 0.43	1.0	63.00
Vitamin C(mg/d)	18.07±13.41	40	54.83

Prevalence of Anemia among tribal Women



Agro ecology favors Year round availability of fruits

November- February

January- February

November- February

February- march

April-May

June- July

June-July

July-August

July-August

September- Octobar

October – November

October- March

Project Objectives:

- To ensure year-round availability of fruits and vegetables for nutritional security of the marginalized farm families.
- To make the farm family livelihood secure by generating income from sale of surplus fruits and vegetables.
- To conceptualize Multi storied horti based farming system by utilizing the inter space for growing seasonal vegetables.
- To demonstrate good agro ecological practices for sustainable production.

Methodology and implementation :

Land use model	Multi storied cropping model	Multi storied cropping model
Farming Situation	Irrigated	Rain fed
Target Group	ST & SC women	ST & SC women
Area per farmer(Sqm)	1600	1600
No. of Farmers	100	100
No. of fruit Species	10	10
No. of sites	02	02
Method of irrigation	Micro Sprinkler	Submerged Pitcher System
Top Storey Plant	Mango, Guava, Lemon, pomegranate, custard apple, Jackfruit, ber, bael, Jamun	Mango, Guava, Lemon, pomegranate, custard apple, Jackfruit, ber, bael, Jamun
Filler Tree (intra row Spacing of fruit trees)	Papaya	Karonda
Ground Storey Crop	Growing Leafy Vegetable,Root and Tuber crop,Fruit Vegetables as intercropping	Growing Rainy Season Vegetables as intercropping
Planting System	Square system	Square
Method of irrigation	Micro Sprinkler	Submerged pitcher

Methodology and implementation approach(1):

A.	Top Storey Crop			
Sr.No.	**Fruit Species**	**Dwarf Cultivars**	**Planting Distance**	**No. of Plants**
1.	Mango	Amarpali, Arunika, Ambika, Pusa Manohari	5M X 5 M	8
2.	Guava	Shweta, Dhawal, Lalit, Pusa Srijan Thai Guava, Arka Amulya,	5M X 5 M	8
3.	lemon	Kagzi, Luccknow Seedless, Kumcard	5M X 5 M	8
4.	Pomegranate	Bedana,Thai, Afgan Dwarf, Super Bhagwa	5M X 5 M	8
5.	Custard apple	Balanagar, NMK-01, Red Sitaphal, Arka Sahan, Arka Sitaphal	5M X 5 M	8
6.	Ber	Gola, Pant Aparna, Thai ber, Illachi, Kaithali	5M X 5 M	8
7.	Bael	Goma Yashi, Pant Aparna, Pant Shivani, Pant Sujata, CISHB-2	5M X 5 M	8
8.	Jack fruit	Thai Dwarf, Red All Time, All Time Jackfruit, Vietnam Super early	5M X 5 M	8
9.	Jamun	Goma Priyanka, Thai King, Early Dwarf white, Dwarf Balck Jamun	5M X 5 M	8
B.	**Filler Tree(Planting in intra row spacing of top stroey crop)**			
	Papaya	Red Lady 786, Lal Pari F1, Thai Papaya,Red Sun		72
	Karonda	Pant Manohar, Pant Swarna, Pant Sudarshan and Thai Sweet		72
	Ground storey crop			
C.	Seasonal Veg.	Summer, rainy and winter vegetables		

Methodology and implementation approach(2):

Agro ecological practices proposed for ensuring sustainable production:

Practice	Proposed Strategy	Implication of Intervention
Soli Health management	Incorporation of FYM/Compost @ 50 t/ha,	Improved soil fertility, structure and moisture retention
	Practice cover cropping	Add organic matter and suppress weed and protect soil erosion
	Planting across the slope	Reduce soil erosion and conserving water
Water/moisture conservation	Micro irrigation	Water saving
	Rain water harvesting	Life saving irrigation
	Use of organic mulches	Reduce evaporation and moisture retention, resistance to drought
	Submerged pitcher system of planting	Protect plants from moisture stress and heat stress
Intercropping	Multiple cropping	Increase bio diversity, improve nutrient cycling, and natural pest control
	Companion cropping	Improve soil fertility
	Crop rotation legume vegetable based	Improved soil Health and break disease cycle
Use of Biological Inputs	Use of microbial formulations- Jeevamrut	Enhanced nutrient availability and nutrient uptake by plants
	Use of Light traps	Pest control
	Use of Botanical pesticide- Neemastra, Brahmastra	Pest management, environment friendly

Methodology and implementation approach(2):

Details of training module, capacity building programmes

Training module	Biological input production, Training and pruning skill, Nutritional garden establishment and maintenance
Awareness campaign	Nutrition sensitive agriculture
Farmer' Field School	Practical training on sustainable agricultural practices
Women SHG Formation	Women empowerment
CSB and CHC	Preserve and distribute nutri-rich vegetable seeds, timely operation in orchard
Farm women Workshop	Importance of Fruits and vegetables in good health and nutrition

Work plan Time schedule of different Activities :Timeline of Key milestone

S.No	Activities	Ist Year	IInd Year	IIIrd Year	Ivth Year	Vth Year
1.	Planning, identification of HHs, Promotional Campaign	✿				
2.	Site selection, varietal selection, Nutrition garden deign, and layout, Ordering planting material, pits digging, soil and Bed preparation	✿				
3.	Planting Fruit Plants, Initial care, formative pruning	✿	✿			
4.	Agro ecological practices(Intercropping, Water ad Nutrient management, weed and pest management, pruning and training, Intercropping	✿	✿	✿	✿	✿
5.	Establishment of CHC and CSB	✿	✿			
7.	Capacity Building Programmes(Training, SHG, FFS , Workshop)	✿	✿	✿	✿	✿

Social and nutrition impact pathway – Project outcomes/Impact:

Project outcomes/Impact:

Sr.No.	Particulars	Ist year	IInd year	IIIrd year	Ivth year	Vth year	VIth year
1.	Projected Annual Fruit Production(kg)		1000	1160	2350	2650	3150
2.	Projected Annual Vegetable Production(kg)	7500	7500	7500	6000	4000	3000
3.	Lower out of pocket cost for fruits & Vegetable per annum	14500	14500	14500	14500	14500	14500
4.	Employment generation per annum(MD/day)	365	365	365	365	365	365
5.	Income generation(in Lac)	1.02	1.18	1.21	1.32	1.40	1.50

Nutrition Impact

- **Increased access to nutrients** : Year round availability of fresh fruits & vegetables- increase intake of essential vitamins and minerals
- **Improved dietary diversity**: Income from selling garden produce or consumption of diverse crop- Better nutrition to farm family
- **Reduced Malnutrition**: Increased consumption of nutrient rich foods will lower the incidence of diseases associated with malnutrition

Social Impact

- **Enhanced household food and nutritional security**: Direct access to food will improve household food availability, accessibility & utilization
- **Improved Livelihood and household economic welfare**: Sale of surplus produce will generate income & improve livelihoods
- **Empowerment of Women**: Garden managed by women which will increase their decision making power & social standing within family & community
- **Increased Community engagement**: Sharing of garden knowledge and practices – foster self-reliance & social participation
- **Improved quality of life**: Therapeutic activity will encourage physical activity and reconnect with nature and sustainable practices

Environmental and climate advantages

Environmental Impact:

- **Local Bio diversity Enhancement :** Garden with a variety of fruit plants and vegetables will create habitats and food sources for pollinators (bees, butterflies)and beneficial insects
- **Improved Soil Health**: Natural/ organic practices will enrich the soil with organic matter and beneficial microorganisms
- **Water conservation:** Water efficient techniques micro sprinkler and submerged pitcher irrigation, mulching will minimize water loss
- **Waste reduction :** Composting garden waste
- **Pollution interception:** Fruit plants in home garden will improve local air quality by intercepting air borne pollutants and absorbing CO2
- **Reduced Carbon footprint of food supply chain**: Growing fruit and vegetables locally will reduce drastically green house gas emission associated with long distance transportation and refrigeration of commercial produce

Climate impact Impact:

- **Resilience to Climate change :** crop and varietal diversification and intercropping will provide resilience to crop loss and income during stress year to tribal communities
- **Heat mitigation :** Garden will help in regulating local temperature through shading and the evapo-transpiration of water from leaves
- **Genetic resource conservation:** Home garden preserving a wide variety of fruit species will develop resistance to drought/heat in due course of time – play crucial role in breeding climate resilient cultivars in future
- **Carbon Sequestration :** Improvement in soil health with organic practices will help in absorbing CO2 from atmosphere- small scale " carbon sink"

Scaling, sustainability and cost efficiency:

Scaling up Fruit based Multi storied Nutrition garden:

- Convergence of Government Schemes: Convergence of Govt. schemes such as MGNREGS (Labour component support for land preparation, digging pits for planting trees and creating on – farm water conservation structures) ,MIDH & TSP (material component support supply of quality planting material, seeds saplings and fruit plants, technical expertise and capacity building training for farmers),ICDS (raising awareness about nutrition and health) , KVKs(technical expertize- essential technical knowledge and guidance on suitable crop varieties, cultivation techniques) for further replication of homestead nutrition garden in adjacent villages

Community Structure to ensure ongoing maintenance of nutrition garden:

- To ensure sustainable maintenance of homestead nutrition garden , **Garden management committee (GMC)**comprising of women SHG group, RHEO for horticulture department and SMS (Horticulture) from KVK will be formed. Women SHG members will be trained in sustainable agricultural practices, organic input production, water management, canopy management and insect pest management. RHEO and SMS(Horticulture) will provide regular gardening advice especially on sustainable practices like nutrient and pest management, specialized practices like training and pruning for canopy management in fruit plants and crop rotation and intercropping in vegetable crops. SHG will share knowledge, pool surplus produce for sale and address common challenges like water scarcity and peast control. Committee will also establish community seed bank of nutri -rich varieties for ensuring availability of quality seeds

Cost norms, local contributions and alignment with government schemes for enhancing sustainability and cost effectiveness:

Reduced cost of nutrition garden- Land preparation, compost, pit digging and fencing work by indentified farm family

Local Contribution: Horticulture department(NHM and cluster nutritional kitchen garden scheme offer subsidies for seeds, water harvesting system and micro irrigation system) and Krishi Vigyn Kendra- technical expertise on establishing nutrition garden and onsite input production

Alignment with govt schemes MGNREGS ,MIDH and TSP for institutional and financial support and institutions like primary school and anganbadi kendras for supply of surplus produce

8.Budget summary and risk and mitigation strategy:

Sr.No.	Description	Budget (INR Lacs)					
		Ist Year	Iind Year	IIIrd Year	Ivth Year	Vth Year	Total
1.	2 Field Assistant@ Rs 15000 per month	3.6	3.6	3.6	3.6	3.6	18.0
2.	Computer with printer	1.0					1.0
3.	Garden tools 20 sets@ 5000 per set		1.0				1.0
4.	Planting material @ Rs 12000(200 no.)	12.0	12.0				24
5.	POL/Travel cost	1.25	1.25	1.0	1.0	1.0	5.5
7.	Capacity Building Programmes(Training, FFS, Awareness campaign etc.,)	2.0	0.75	0.5	0.5	0.5	4.25
8.	Contingency(CSB, CHC)	1.5	1.5	0.25	0.25	0.25	3.75
	Total	21.4	20.1	5.35	5.35	5.35	57.5

Risk	Mitigation strategy
Fruit Plants mortality due to poor graft union, lack of water, adverse weather and pest and disease	Planting fruit cultivars with strong graft union, Planting fruit trees with Submerged pitcher system technique and mulching , Use protective measures like shade net / crop residue during extreme heat, need based application of neem based bio pesticides
Plant mortality due to Drought/ Dry spell	Planting fruit trees with Submerged pitcher system technique and mulching and filling the pitcher with water during dry spell , selecting drought tolerant fruit plants better adapted to local conditions
Damage from stray or wild animals	Fencing around the garden – locally available material or wire fencing

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Thanks