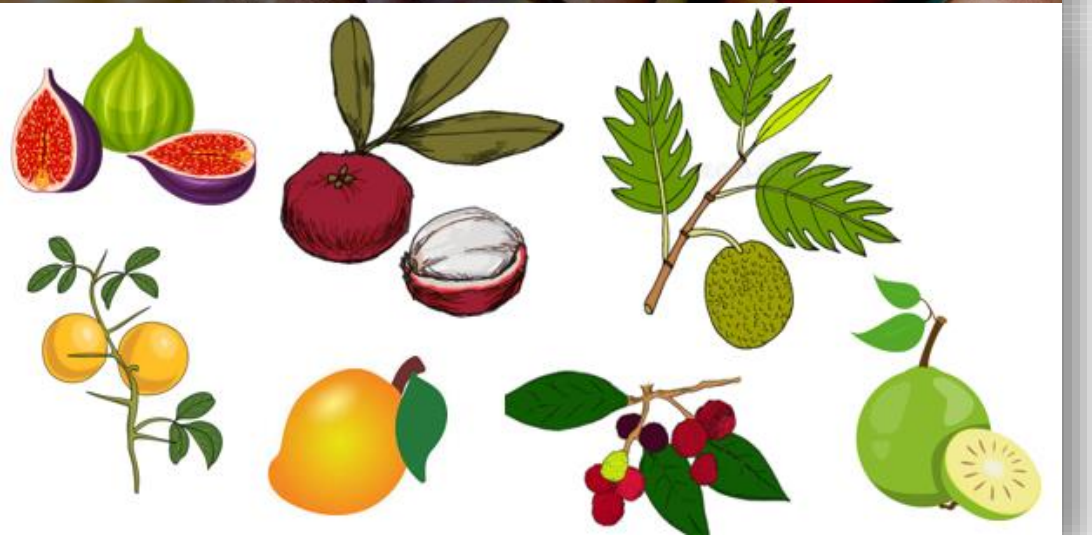


Enhancing Affordable Access to Nutritious Fruits for Underprivileged Communities through Diversified Production, Value Chain Optimization and Nutrition-Sensitive Interventions.

Dr SHOAIB NISSAR KIRMANI
SMS Horticulture
ICAR CITH KVK Baramulla
19-11-2025

Introduction to the project:

Lead Organization: ICAR-CITH, KVK Baramulla along with ICAR-CITH, Srinagar, FOA – SKUAST, Kashmir. Horticulture Line departments of District Baramulla

Co - PI's:- Dr. Javid Iqbal Mir (Principal Scientist, ICAR CITH, Srinagar)
Dr Wasim Hassan Raja (Scientist , ICAR CITH, Srinagar)
Dr. Anjali Gairola (SMS, Home Science, ICAR-CITH, KVK Baramulla)
Dr. Imtyaz Ahmed Lone (Professor and Head, Division of Fruit Science, FOA-SKUAST Kashmir)

Target areas:

1. Baramulla district of UT of Jammu and Kashmir (temperate agro ecology, underutilized lands, and existing horticultural base).
2. Underprivileged Communities who cannot afford or access diverse fruits due to high prices and inefficient distribution.
3. Vulnerable households remain dependent on calorie-rich staples, contributing to anemia, stunting, and malnutrition
4. Farmers who face income losses during market gluts due to lack of diversified Fruit Production.

Why This project:

1. **Delivers year-round, home-grown nutrition to underserved households through climate-resilient fruit crops.**

2. **Creates a community-led fruit economy by skilling women and youth in nurseries and orchard management.**

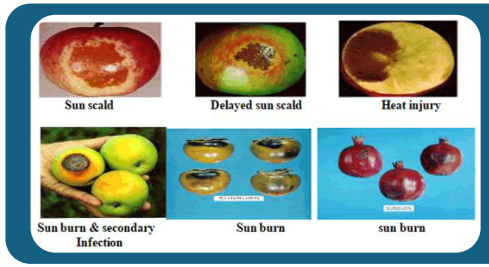
3. **Applies scientifically proven, climate-smart, mixed-species orchard models for sustainable long-term impact.**

Gaps in current availability, adoption rates, and market access	Reasons for selecting fruit tree species/varieties or cultivation models	Brief Evidence / Field Experience Supporting the Need
Despite high fruit production in Baramulla, **underprivileged households lack access** due to high prices, seasonal gluts, and poor last-mile distribution. **Post-harvest losses (20–30%)** reduce market availability and increase consumer prices. **Adoption of diversified fruit species is low**, with farmers largely dependent on a few commercial fruits (apple, walnut), limiting year-round supply. **Weak value chains**, limited cold storage, and absence of community-level processing restrict market access for both producers and consumers. **Underutilized and barren lands remain unproductive**, missing opportunities for fruit-based nutritional improvement.	Selected fruit species (kiwi, Persimmon, Berries, Apricot, Peach and other underutilized temperate fruit and nut crops) are **nutrient-dense**, climate-resilient, and suitable for **diversifying diets**. These species offer **staggered fruiting periods**, ensuring year-round availability and reduced dependency on a single crop. Many underutilized fruits have **low-input requirements** and high adaptability to temperate agroecology, making them ideal for marginal and common lands. Multi-tier and intercropping models were chosen because they **increase nutritional yield per unit area**, improve soil health, and enhance ecological resilience. Community-led orchards and nurseries were included as they enable **local ownership**, low-cost supply, and long-term sustainability.	KVK Baramulla field surveys show **nutritionally vulnerable households rarely consume fruits**, despite local abundance, due to affordability and access barriers. Repeated farmer interactions reveal **heavy losses during market gluts**, especially in apple and pear, indicating urgent need for local storage and value addition. Demonstrations at KVK and CITH have shown **high success of underutilized fruits** (kiwi, peach, apricot, plum and also persimmon) in temperate regions, with good community acceptance. SHG and FPO engagements indicate **strong interest in fruit processing**, but lack of training and small-scale infrastructure limits participation. Previous community orchard pilots show **positive local adoption**, suggesting strong potential for common-land nutri-orchards and homestead fruit models. Existing CITH and SKUAST-K research validates the **nutritional superiority of diversified fruit species**, supporting their inclusion in nutrition interventions.

Project Objectives

Diversified Fruit Production

- Identify and promote low-cost, high-nutrition fruit crops (indigenous and exotic) suited for diverse agro-climatic zones, ensuring round-the-year fruit availability



. Post-Harvest Management

- Develop cost-effective storage, processing, and distribution models to reduce wastage and ensure affordable prices for the underprivileged

Nutrition-Sensitive Interventions

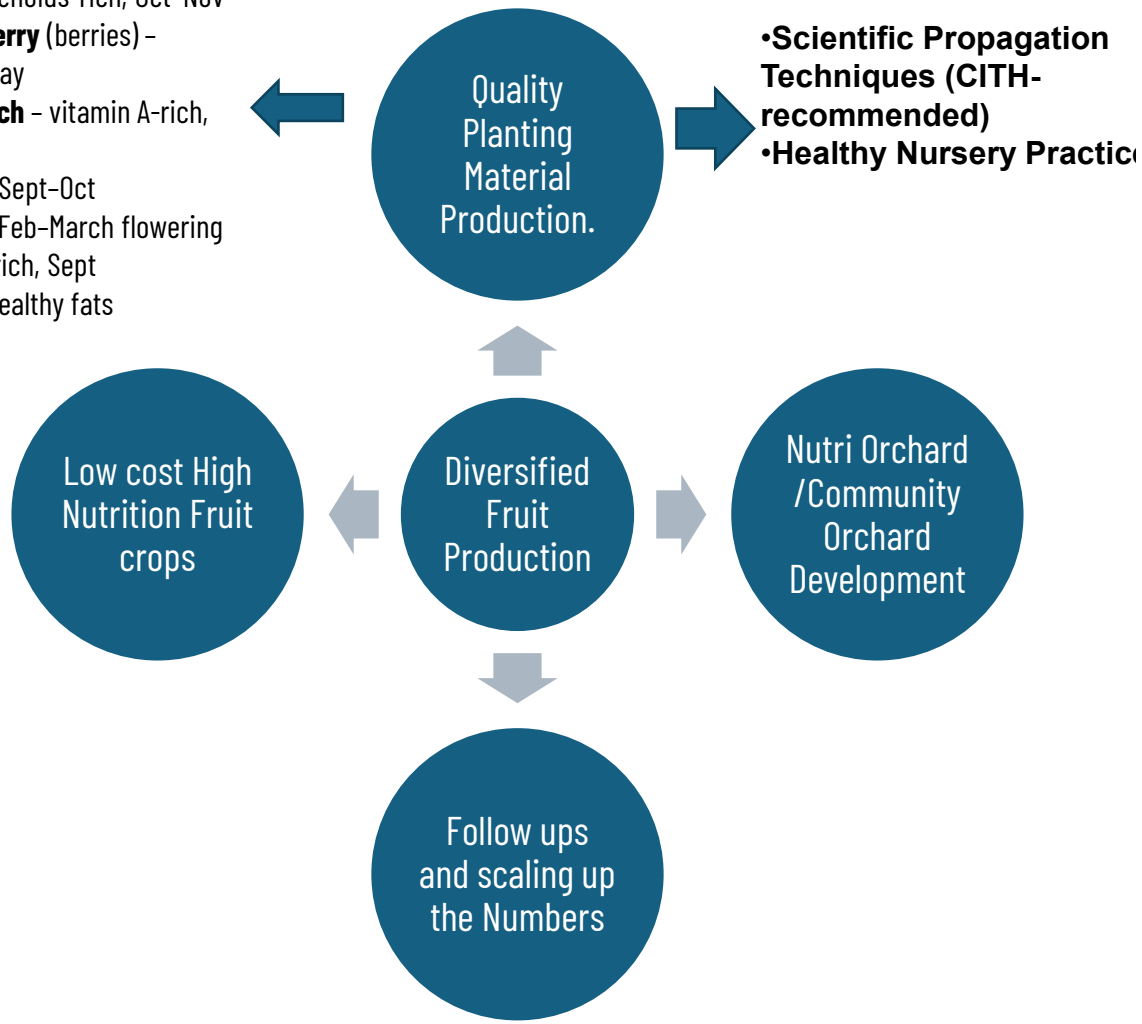
- Assess nutritional gaps in vulnerable populations and design fruit-based interventions to improve dietary diversity and nutritional security

Capacity Building

Conduct training and awareness programs to empower communities and stakeholders and to transfer research outcomes into practice among marginalized communities

Methodology and implementation approach:

Kiwi – high vitamin C, Nov–Feb harvest
Persimmon – carotenoids-rich, Oct–Nov
Strawberry/Blueberry (berries) – antioxidants, Feb–May
Apricot/Plum/Peach – vitamin A-rich, May–July
Walnut – omega-3, Sept–Oct
Almond – proteins, Feb–March flowering
Chestnut – starch-rich, Sept
Hazelnut – rich in healthy fats



Capacity Building

Conduct training and awareness programs to empower communities and stakeholders and to transfer research outcomes into practice

Training Need Assessment
- Baseline surveys & FGDs to identify knowledge gaps
- Map community skill levels (youth, women, farmers, 5ts)

Hands-on Demonstrations
- On-farm & on-station practical demos:
- Fruit processing (jarn, juice, dehydration)
- Nursery raising & grafting
- Kitchen nutrition gardens
- Safe storage techniques

Community Awareness Campaigns
- Use village-level nutrition days, schools, anganwodi centres
- Street plays, mobile van videos, posters to promote fruit consumption & dietary diversity

Development of Training Modules
- Prepare IEC material in local language (leaflets, videos, infographics)
- Nutrition basicies
- Fruit-based diets
- Low-cost value addition
- Natural farming for fruit crops
- Postharvest handling & storage

Skill Development Workshops
- Targeted training for:
- Youth entrepreneurs (processing units, nurseries)
- Women SHGs (value-added products)
- Farmers (production & postharvest management)

Follow-up & Technology Backstopping
- Monthly follow-up visits
- WhatsApp advisory groups for continuous guidance
- Link trainees with markets,

Methodology and implementation approach Contd..:

Methodology – Nutrition-Sensitive Interventions

1 Baseline Nutrition Assessment

- 24-hr dietary recall + FFQ to compute HDDS & MDD-W rhesenferemnts
- Anthropometry (Wt, Ht/MUAC) & Hb screening
- Biochemical profiling Ferritin, Folate, n.subsample

2 Identification of Nutritional Gaps

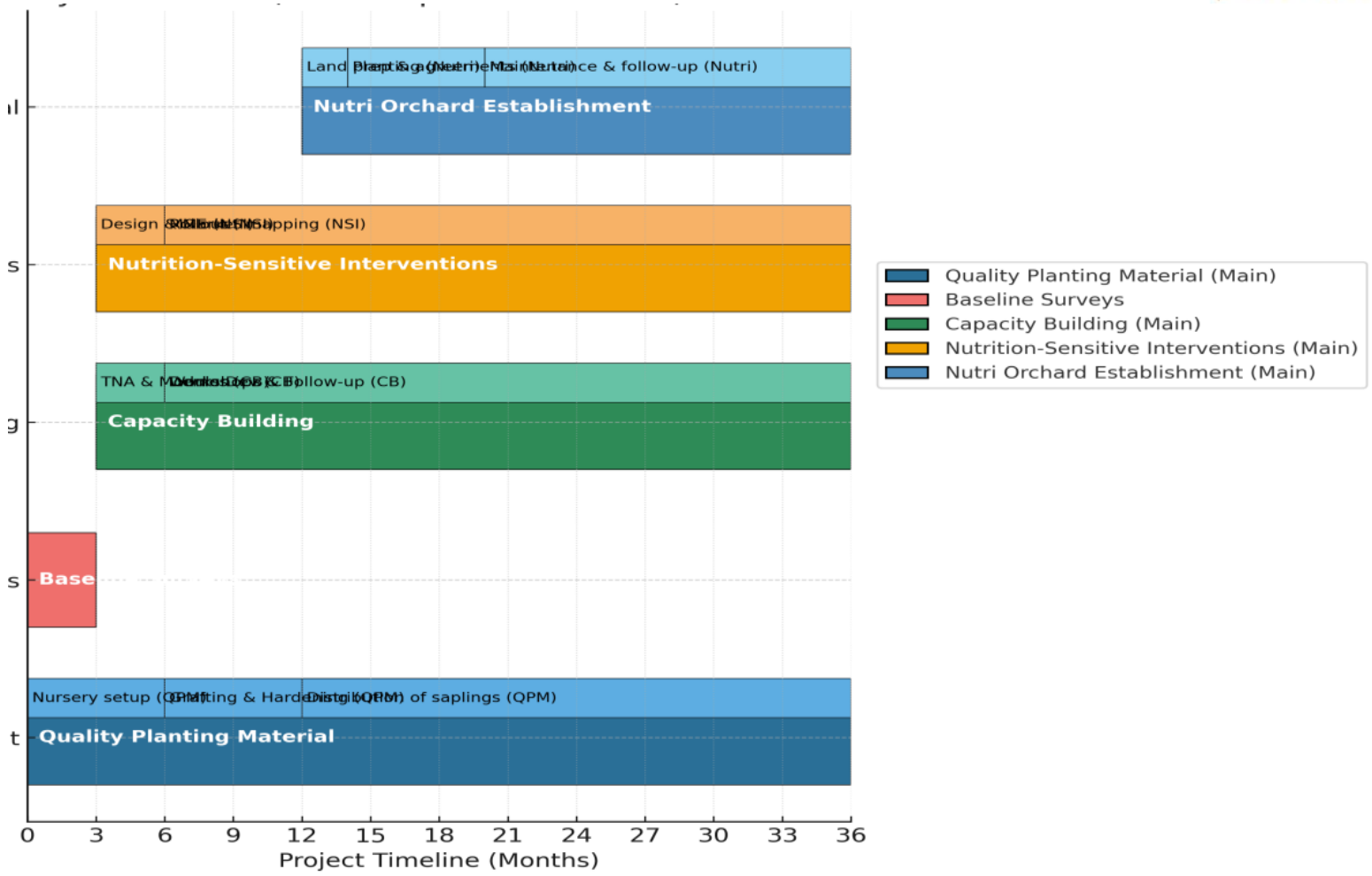
- Stratified assessment of vulnerable households
- Mapping afforčability barriers & seasonal fruit avallability
- Market price survey to model low-cost fruit baskets

3 Design of Fruit-Based Interventions

- Seasonal fruit baskets (fresh + dried/processed)
- Portion & frequency guideness
- Two delivery models nutritionists
- SHG kiosks & mobile fruit vans

4 Behaviour Change & Education

- Short-focused IEC modules on fruit consumption
- Process metrics, uptake scoo-page, kiosk uptime
- Outcome metrics: HDDS, MDD-W Hb, ferritin, folate/B12 and icl
- Analysis: Difference-in-Differences & mixed-effects models



Methodology and implementation approach….:

Crop	Propagation Method	Key Nutritional Value	Growing Period	Cultural Management
Strawberry	Runner propagation	Vit C, antioxidants	4–5 months	Raised beds, mulching, drip irrigation
Blueberry	Softwood cuttings, tissue culture	High antioxidants, Vit K	2–3 years to fruit	Acidic soil (pH 4.5–5.5), organic mulches
Apricot	Grafting/budding on wild apricot/peach rootstock	Vit A, fiber	3–4 years	Pruning, irrigation at pit-hardening, thinning
Persimmon	Grafting/budding	Vit A, manganese	4–5 years	Needs warm summers, regulated irrigation
Peach	T-budding, grafting on peach rootstock	Vit C, beta carotene	2–3 years	Winter pruning, fruit thinning, pest control
Plum	Grafting on myrobalan/peach rootstocks	Vit C, antioxidants	3–4 years	Irrigation at fruit set, training systems
Kiwi	Grafting, cuttings	Vit C, Vit K	3–5 years	Trellis system, pollinator plants 1:8, high organic matter
Walnut	Grafting, patch budding, seedling rootstocks	Omega-3 fats	7–10 years	Deep soils, pruning, irrigation in early summer
Almond	Grafting on peach rootstocks	Vit E, healthy fats	3–4 years	Frost protection, pruning, bee pollination
Chestnut	Seedlings, grafting	Carbohydrates, Vit C	3–5 years	Well-drained soil, regular weeding
Hazelnut	Layering, grafting	Healthy fats, Vit E	4–5 years	Needs cross-pollination, pruning suckers

Crop	Major Storage Losses	Post-Harvest Needs	Suitable Models (as per project)
Strawberry	Very high (30–40%)	Immediate cooling, dehydration	Solar dehydrators, cold chains, community kiosks
Blueberry	Moderate	Cold storage, punnet packaging	CA storage trials, direct-to-community sale
Apricot	High (25–30%)	Drying, pulping	Solar dryers, low-cost pulp units
Persimmon	Moderate	Controlled softening, drying	Polystyrene trays, mobile vans for soft fruit
Peach	High (20–30%)	Cooling, careful handling	Cold storage + SHG-led sale outlets
Plum	High	Cooling, pulping	Cooperative value addition units
Kiwi	Low–moderate	Cold storage, grading	Kiosks + CA storage
Walnut	Very high pre-processing losses	Mechanical drying	Mechanized nut dryers
Almond	Low	Drying, hulling	Community hulling units
Chestnut	High due to fungal rot	Refrigeration	Local market kiosks
Hazelnut	Moderate	Drying, grading	FPO-led processing

Crop	Nutrition-Sensitive Value	Policy Relevance
Strawberry	High Vit C for anemia and immunity	Suitable for school fruit snacks in season
Blueberry	Strong antioxidants for health resilience	Promotion as a high-value health fruit
Apricot	Vit A for child nutrition	Integrable into fruit basket programs
Persimmon	Rich in Vit A & fiber	Good for winter nutrition gaps
Peach/Plum	Vit C and dietary fiber	Affordable options for poor households
Kiwi	Extremely high Vit C	Recommended for deficiency-prone families
Walnut/Almond	Good fats, brain health, protein	For SHG processing into nutrient mixes
Chestnut/Hazelnut	Energy-dense	Ideal for winter nutritional baskets

Crop Category	Training Focus Needed	Key Extension Themes
Berries (Strawberry, Blueberry)	Planting, mulching, drip, harvesting	Low-input berry cultivation for smallholders
Temperate Fruits (Apricot, Persimmon, Peach, Plum, Kiwi)	Pruning, training, canopy management, intercropping	Multi-tier orchards for year-round availability
Nut Crops (Walnut, Almond, Chestnut, Hazelnut)	Grafting skills, drying, value addition	Post-harvest nut drying and SHG-led processing

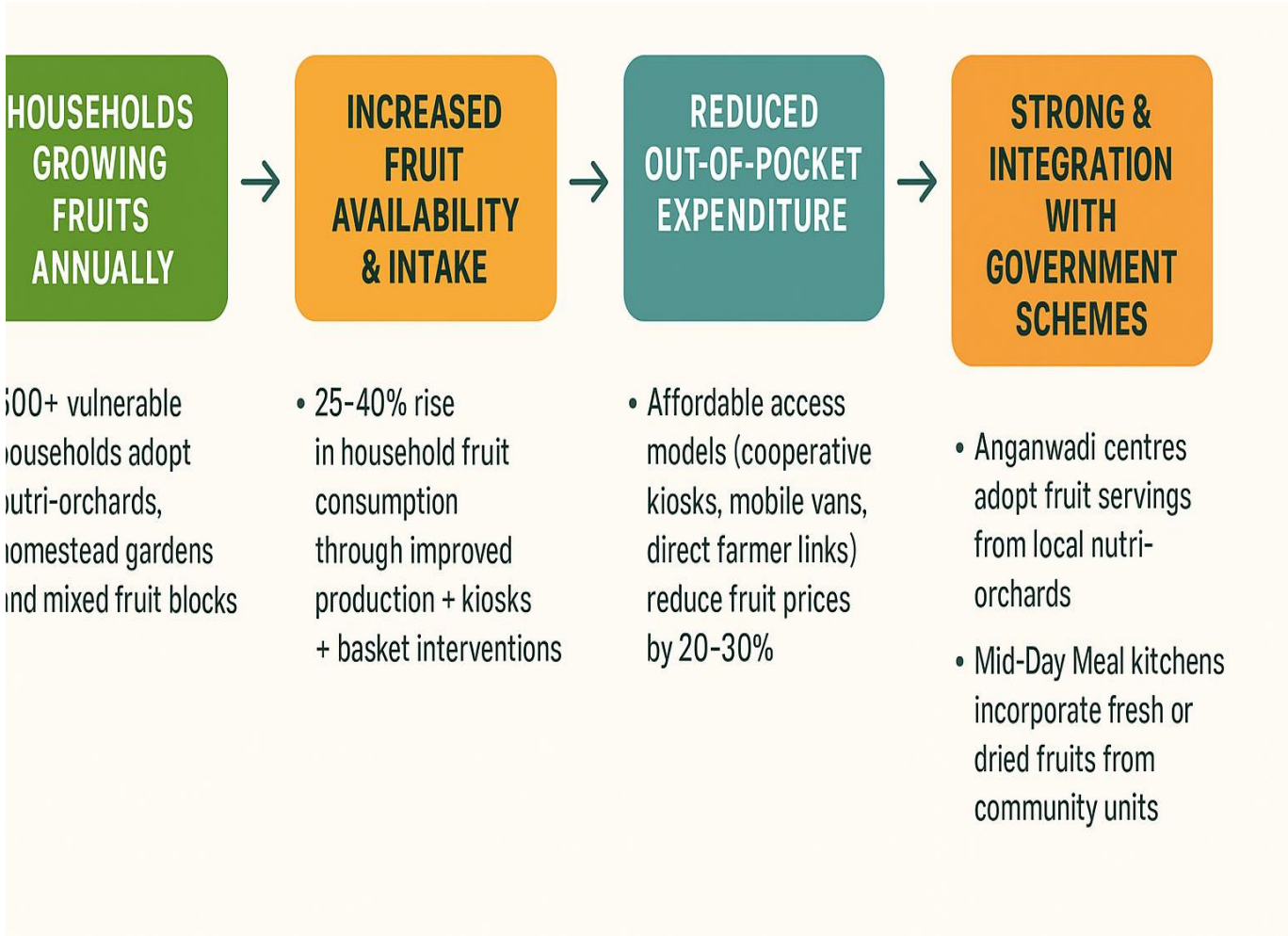
Social and nutrition impact pathway – Project outcomes/Impact

Short Term

- Reduced post-harvest losses
- Affordable fruit access for underprivileged households
- Women SHGs gain livelihood opportunities through processing units.
- improved farmer incomes

Long Term

- : Improved nutrition security (reduced micronutrient deficiencies),
- Policy and scalable models for nutrition-sensitive agriculture integration ensures systemic change, with potential replication in other horticultural regions of India
- Ecological resilience via diversified orchards



Environmental and climate advantages

Improved Soil Health & Biodiversity

- Mixed-species orchards (kiwi + persimmon + berries + walnuts + pomegranate + stone fruits) increase root diversity and enhance soil microbial activity. Walnut, almond & chestnut contribute deep-root systems ⟶ improve soil structure & carbon sequestration. Berry crops (strawberry, blueberry, raspberry) act as living ground cover, reducing soil erosion and improving soil organic carbon.
- Intercropping with legumes/vegetables enhances nitrogen cycling and reduces dependence on chemical fertilizers.
- Use of locally adapted varieties increases ecological compatibility and reduces input requirements

Enhanced Climate Resilience & Adaptation

Walnut, chestnut & hazelnut show high resilience to temperature fluctuations and store significant long-term carbon ⟶ climate mitigation. Kiwi & persimmon tolerate moderate heat stress and contribute to diversified climate-resilient orchard systems. Berry crops have short cycles and quick turnover ⟶ reduce climate risk exposure. Mixed-nutri-orchard design buffers against crop failure under extreme weather by spreading risk across species. Reduced post-harvest losses (30–40%) lowers carbon footprint associated with wastage and long-distance transport.

Water Use Efficiency

- Kiwi & persimmon managed with drip irrigation + mulching, reducing irrigation demand by 30–40%.
- Blueberry & almond thrive under regulated deficit irrigation (RDI) improving water productivity.
- Pomegranate, walnut, apricot & plum are low-water-demand species with high drought tolerance once established.
- Berry raised beds & mulched rows improve water retention, lowering irrigation cycle

Additional Environmental Benefits

- Solar-powered cold storage & dryers cut dependency on conventional energy. Minimal synthetic inputs through integrated nutrient and pest management reduces environmental contamination. Shaded microclimates created by multi-tier orchards lower ambient temperatures and improve local ecosystem functioning. Pollinator diversity increases with multi-species flowering patterns (berries + stone fruits + nuts). give all this in grapial style without losing a word

Scaling, sustainability and cost efficiency

Underutilized and barren land will be transformed into productive nurseries and Nutri Orchards, converting idle spaces into nutrition and income-generating assets for the community.
Model Nursery at ICAR KVK Baramulla can supply 10,000 quality saplings of Varied Crops per year to scale Nutri Orchards across 15–20 villages after third year onwards.

Standard low-cost orchard models can be replicated in 30–40 Farmers Place within 3 years.

Community structures (SHGs, FPOs, youth groups) allow expansion to 3–5 adjoining blocks after project maturity.

Youth and women-led nursery and orchard jobs generate direct and indirect income while reducing sapling costs by 60–70% and making the entire model self-sustaining

By the end of this project, we will have a diverse, community-preferred Nutri Orchard model—featuring multi-species fruit crops that directly address nutrient deficiencies in children and women—supported by local cluster nurseries, low-cost sapling production, and youth- and women-led employment, creating a self-sustaining, scalable, and cost-efficient fruit ecosystem for the district

At the end of the project, the evidence generated may be used to guide district and state policies for integrating Nutri Orchards, community nurseries, and fruit-based nutrition models into government schemes

Budget summary

	Item	BUDGET (in Rs)			Total (In Rupees)
		1st Year	2nd Year	3rd Year	
A.	Recurring				
1.	Salaries/wages of Young Professional and Skilled workers as per ICAR Norms	5,00,000	5,00,000	5,00,000	15,00,000
2.	Consumables like fertilisers, pesticides	1,00,000	1,00,000	1,00,000	3,00,000
3.	Travel	50,000	50,000	50,000	1,50,000
4.	Contingencies / other Costs	20,000	20,000	20,000	60,000
5.	ICT-based training materials (manuals, leaflets, digital guides)	10000	10000	10000	30,000
6.	Extension, Training /Awareness Programmes	100,000	100,000	100,000	3,00,000
7.	Production Material like Rootstocks, Seed, Grafting Operations	3,00,000	1,00,000	100,000	5,00,000
8.	Nutrition, Value Chain and Post Harvest Research	3,00,000	3,00,000	3,00,000	9,00,000
B.	Non-Recurring				
1.	Land Preparation, Earthing etc	2,00,000	Nil	Nil	2,00,000
2.	Borewell, Temporary Fencing, Drip, Mulching etc for Nursery Establishment	5,00,000	Nil	Nil	5,00,000
	Grand Total				44,40,000

Risk and mitigation strategy

S.No.	Risks	Mitigation Strategy
1	Improper baseline survey leading to weak planning.	Conduct rigorous community baseline, nutrient profiling, and structured questionnaires. Use structured sampling, GPS-based field mapping, and scientifically validated nutrient profiling tools.
2	Nursery success percentage may be low due to skill or climate variability.	Adopt standardised CITH propagation protocols and cultivar-specific grafting techniques. ICAR-CITH & KVK expert guidance + multi-species propagation to minimise failure.
3	Poor establishment or mortality in demo orchards.	Continuous expert follow-ups, technical monitoring, training for capacity building and timely corrective actions. Implement precise irrigation scheduling, soil amendments, micronutrient correction, and pest–disease diagnostics
4	Low community acceptability of selected fruit crops.	Nutrition campaigns, fruit fairs, taste-testing events, and awareness drives. Conduct adaptive trials with multiple varieties and select genotypes showing best survival and yield performance.
5	Grazing damage to young plants.	Protective fencing, community watch groups, and designated orchard caretakers.
6	Underutilized land may show poor soil health or low moisture.	Soil improvement, mulching, moisture conservation, and expert crop planning. Apply organic matter enrichment, soil microbial inoculants, pH correction, and deep tillage where required.
7	Post-harvest losses reducing project outcomes.	Solar dryers, cold storage, training on grading/packing, and community-level value addition.

Alliance
Bioversity & CIAT

CGIAR

Thanks