



CFI Research Grant Planning Workshop

16-18 June 2026
Jain Hills, Jalgaon

Presenter: Dr. Kishan Lal Kumawat

Date: 16-06-2026

1. Project Snapshot



- Project title: Clonal propagation, nutritional profiling and value addition of climate-resilient native fruit species for sustainable horticulture in arid region
- Institution: ICAR-Central Institute for Arid Horticulture, Beechwal, Bikaner, Rajasthan-334006
- Principal Investigator: Dr. Kishan Lal Kumawat, Senior Scientist (Fruit Science)
- Project duration: 24 Month (April, 2026 to March, 2028)
- Budget: ₹ 30 Lakh
- Project location(s): ICAR-Central Institute for Arid Horticulture, Beechwal, Bikaner, Rajasthan-334006

2. Landscape, problem statement & target communities

Agroecological context

•Project Geography

•**Location:** Western Arid Rajasthan (Bikaner, Jodhpur, Jaisalmer/Barmer, Sambhar-Jaipur & Pisanagan-Ajmer)

•**Agro-climatic Zone:** Hot Arid Zone

•**Agro-ecological Region:** Western Plain, Kachchh & Part of Kathiawar Peninsula

RAJASTHAN Project Districts



Key Agroecological Features

Climate

- Rainfall: 100–300 mm/year (85–90% during monsoon)
- Temperature - May and June > 40°C; Dec. & Jan. 5°C
- High Evaporation (2716.45 mm ; 2001-19)
- Frequent droughts, strong winds & winter frost

Soil

- Predominantly sandy soils
- Low OM (0.1-0.2%), Low CEC (1-5 meq/100 g), High pH (7-9)
- Poor water-holding capacity
- Salinity/alkalinity in several areas

Water Resources

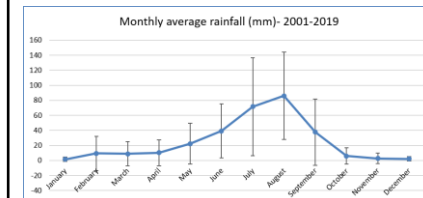
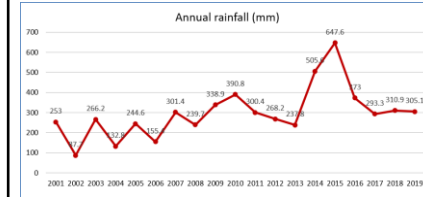
- Scarce and saline groundwater
- Predominantly rainfed agriculture outside IGNP command areas

Farming & Land Use

- Small to medium landholdings
- Mixed crop-livestock production systems
- Major crops: Pearl millet, cluster bean, moth bean, ground nut
- Large areas of degraded and underutilized land

Opportunity for Native Fruit Species

- Naturally adapted to drought, heat and salinity
- Potential for nutritional security and climate-resilient horticulture
- Soil stabilization and sand dune protection
- Enhance biodiversity conservation and ecosystem resilience



2. Landscape, problem statement & target communities



• Key challenges being addressed

- Rapid loss of native biodiversity due to land-use change, infrastructure expansion, invasive species, overgrazing, population pressure, and poor regeneration.
- Lack of propagation technology to conserve and commercialize of rare and endangered arid fruit plants (pilu and ker)
- Lack of scientific evidence regarding nutraceutical and functional features of ker, pilu, jharber and bordi plants
- Lack of diverse value-added products of these crops

• Target beneficiaries

- Objective 1 and 2 : Farmers, nursery entrepreneurs, researchers, students, consumers and food-processing industries through improved propagation technologies, nutritional profiling, value-added products and conservation of native desert fruit species.
- Objective 3: 250–300 rural households and school children through 5 community-based conservation-cum-nutrition units (30–40% women; SC and marginal communities).

• Project landscape

- Climate-resilient native fruit species of the Thar Desert
- Pilu (*Salvadora oleoides*), Ker (*Capparis decidua*), Bordi (*Ziziphus rotundifolia*), Jharber (*Ziziphus nummularia*)
- Project Interventions
 - ✓ Clonal propagation; ✓ Nutritional profiling; ✓ Value-added products
 - ✓ 4 community-based conservation-cum-nutrition (demonstration) units and 1 school garden



3. Year-1 Implementation plan

Objective	Activity	Plan of work
To develop clonal propagation means for Pilu and Ker for collection, conservation and horticultural utilization of promising genotypes	Standardization of rooting factors in <i>Salvadora oleoides</i> cuttings	Monthly trials to optimize cutting type, IBA concentration, and collection timing. No. of Trials-12; Design: FRBD; Replications: 3; No. of cottage/replication: 100; No. of observation: 17 Parameters associated with root and shoot
	Standardization of rooting factors in <i>Capparis decidua</i> cuttings	Monthly trials assessing cutting type, pre-soaking, IBA levels, propagation media, and collection time. No. of Trials-12; FRBD; Replications: 3; No. of cottage/replication: 100; No. of observation: 17 Parameters associated with root and shoot
To determine the nutritional profile and value addition of Pilu, Ker, Jharber and Bordi for commercial utilization and enhancing consumer acceptance	Nutritional and nutraceutical profiling of pilu, kair, jharber	Parameters to be analyzed: - Proximate composition (Moisture, Carbohydrate, Protein, Fat, fibre, Ash) - Mineral profiling (AAS), - Nutraceutical profiling (Total phenol, flavonoids, carotenoids, anthocyanins, and antioxidant activity) - GC-MS/LC-MS/HPLC based phytochemical profiling
	Value addition and product development	Value added products of ker, pilu, jharber, and bordi will be developed in the institute's post-harvest technology laboratory.
To establish community-based conservation-cum-nutrition units of Pilu Ker, Jharber and Bordi for conservation and nutritional security	Raising of planting material	Seedling plants of Ker, Jharber, and Bordi, along with clonal planting material of Pilu derived from elite genotypes identified by ICAR-CIAH, will be multiplied in nurseries.

4. Fruit Species and production models

Key fruit species promoted



Pilu (*Salvadora oleoides*)



Ker (*Capparis decidua* (Forsk.) Edgew)



Jharber (*Ziziphus nummularia*)



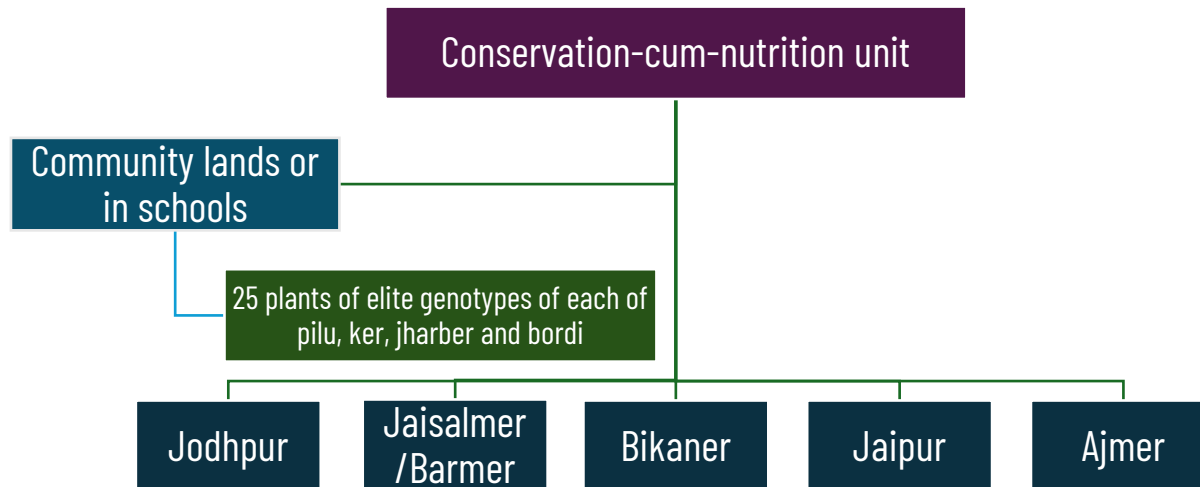
Ber (*Zizyphus routandifolia* Lam.)

- Native to hot arid region
- Source of edible fruit and high quality fodder
- Tolerant to drought, high and low temperature, salinity.
- Require minimum external input making them ideal for low-input, climate resilient horticulture

Production systems to be demonstrated *(ex. Homestead orchards, Community orchards, Agroforestry systems, WADI systems, Nutrition gardens, School gardens)*



- 4 demonstration units (Community-based conservation-cum-nutrition units)
- 1 School gardens



Seasonal fruit calendar

Availability of native fruits across the year for different species

● Ker ● Pilu ● Jharber ● Bordi

Crop	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Ker												
Pilu												
Jharber												
Bordi												

5. Year-1 Targets and deliverables :



Key Performance Indicator	Target (Absolute number)
Villages covered	-
Households reached	-
Women beneficiaries	-
Youth beneficiaries	-
Trees planted	-
Fruit species promoted	-
Trainings planned	-
Nurseries established	-

6. Collaboration Opportunities (Offer and Ask)



ICAR-CIAH, Bikaner

Scope of Collaboration

The collaboration will include:

- Establishment of conservation-cum-nutrition units
- Promotion of climate-resilient native fruit species
- Nutritional and livelihood enhancement interventions
- Community-based participatory implementation



What we can offer (ICAR-CIAH)	Support we need (GRAVIS/GCK)	Joint Responsibilities
Scientific & technical expertise	Identify demonstration sites	Establish 2-3 conservation-cum-nutrition units
Planting materials	Facilitate land access & local permissions	Conduct baseline, midline & endline surveys
Germplasm	Community mobilization & beneficiary selection	Assess fruit consumption, DDS & livelihoods
Training facilities	Plantation establishment & irrigation support (2 years)	Organize trainings & capacity-building programmes
Value addition	Quarterly monitoring of plant survival and growth	Conduct EDPs on fruit processing & value addition
Nursery protocols	Support data collection & impact assessment	Document success stories & policy briefs
Technical manuals & extension materials	Mobilize SHGs, schools & farmer groups	Promote nutrition, conservation & livelihoods

7. Baseline, Midline and Endline Assessment Plan:



Baseline (at the time of unit establishment)

Sample: 250 households (50 per district × 5 districts)

Data to be Collected

- Fruit consumption frequency
- Household Dietary Diversity Score (DDS)
- Income sources
- Knowledge & practices on native fruits
- Soil organic matter at demonstration sites

Midline (Q4 2027 – Q1 2028)

Assessment Focus

- Survival and growth of plants
- Establishment success of clonal Pilu plants
- Orchard management practices
- Functionality of demonstration units

Endline (After 4 Fruiting Seasons)

Nutrition Indicators

- Fruit consumption frequency
- DDS improvement
- Access to Pilu, Ker, Bordi & Jharber

Livelihood Indicators

- Income diversification
- Participation in value-added products

Ecological Indicators

- Soil organic matter
- Plant health and survival
- Habitat restoration benefits

Year-1 : Milestone-linked Deliverables:

Objective	Activity	Year-1
		Deliverable
To develop clonal propagation means for Pilu and Ker for collection, conservation and horticultural utilization of promising genotypes	Standardization of rooting factors in <i>Salvadora oleoides</i> cuttings	- Most suitable time for collection of cutting from plants - Optimal cutting type, - Optimal IBA/NAA concentration
	Standardization of rooting factors in <i>Capparis decidua</i> cuttings	- Optimal time for cottage collection - Optimal cutting type, - Optimal IBA/NAA concentration - Effect of leaching time
To determine the nutritional profile and value addition of Pilu, Ker, Jharber and Bordi for commercial utilization and enhancing consumer acceptance	Nutritional and nutraceutical profiling	Proximate and biochemical data
	Value addition and product development	Developed value-added products
To establish community-based conservation-cum-nutrition units of Pilu Ker, Jharber and Bordi for conservation and nutritional security	- Raising planting material - Establishment of community-based demo units	Raised planting material for demonstration units.

8. Budget summary, risk & mitigation strategy:



Category	YEAR 1 (₹)	YEAR 2 (₹)	TOTAL (₹)
Personnel	360000 + 384000= 744000	360000 + 384000=744000	1488000
-Young professional -I (01) and Field Assistant (02)			
Planting material and field/propagation trials	25000	25000	50000
Nutritional profiling	300000	150000	450000
Value-addition	50000	-	50000
Capacity building and awareness workshops	-	100000	100000
Travel (only project related)	100000	300000	400000
Monitoring, documentation and publication	-	150000	150000
Capital expenditure	50000	-	50000
Sub-total	1269000	1469000	2738000
Administration (10%)	126900	146900	273800
Total (INR)	1395900	1615900	3011800

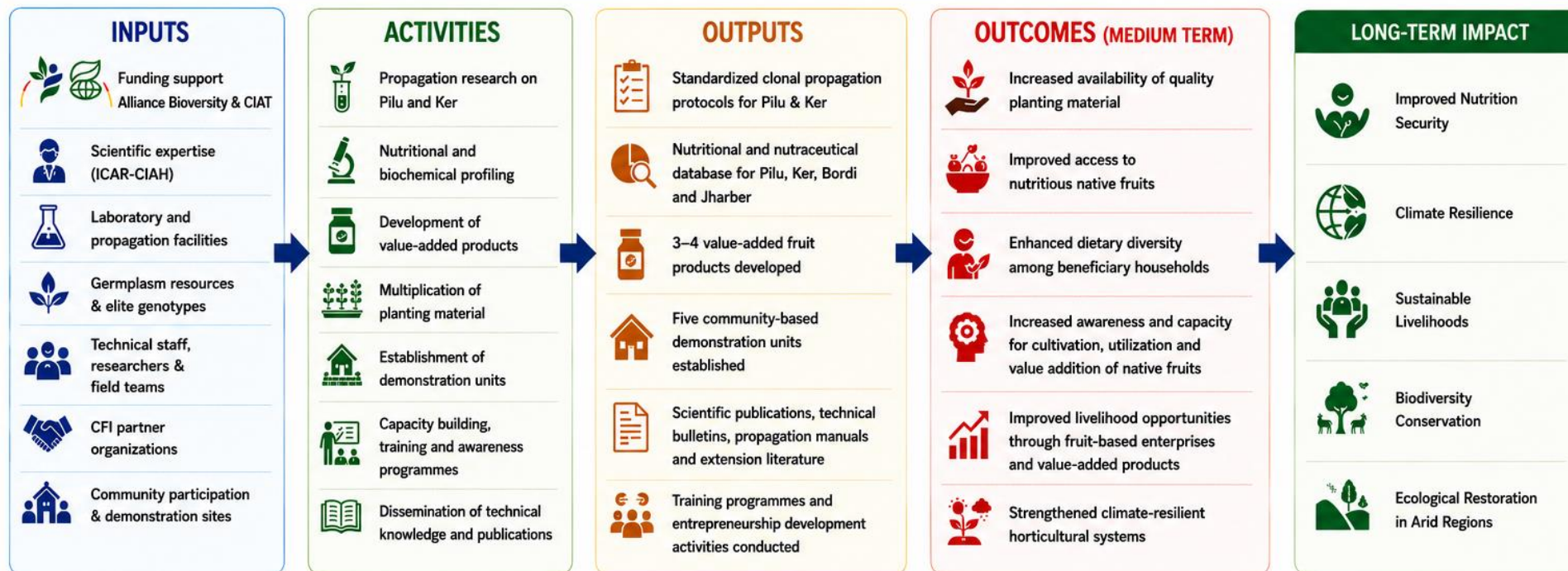
Risk and Mitigation Matrix



Risk Category	Risk	Probability	Mitigation Strategy
Scientific/technical	Low rooting success, particularly in Ker	High	Multiple propagation trials, factorial optimization, pre-treatment methods
Climate	Drought or extreme temperatures affecting survival, especially during the first year of demonstration unit establishment	Low	Site selection with 1-2 years of irrigation availability, mulching, targeted irrigation during establishment
Social	Low participation from women/SC households	Medium	Community mobilization, participatory training
Market	Poor acceptance of value-added products	Medium	Consumer awareness campaigns, taste trials, linkage with local markets to improve acceptance
Operational	Delay in collection and analysis of fruit samples	Medium	Advance scheduling of sample collection and analyses, outsourcing HPLC and mineral analyses, inclusion of buffer periods in project timeline

THEORY OF CHANGE: NUTRITION, CLIMATE RESILIENCE AND LIVELIHOODS THROUGH NATIVE FRUITS

Promoting Underutilized Native Fruits of the Thar Desert (Pilu, Ker, Bordi, Jharber) for Nutrition Security, Climate Resilience and Livelihood Enhancement



NOTES

This project follows a nutrition-first pathway by increasing access to nutrient-rich indigenous fruits while simultaneously strengthening climate resilience through promotion of drought-tolerant perennial species. Conservation, propagation, nutritional validation, value addition and community demonstrations are integrated to create a scalable fruit-based development model for improved dietary diversity, livelihood opportunities and ecosystem restoration in the Thar Desert.

KEY TARGET GROUPS



Aligned with CFI Goals: Nutrition Security • Climate Resilience • Ecosystem Restoration • Sustainable Livelihoods • Community Empowerment



Thanks