INDIGENOUS TECHNICAL KNOWLEDGE

Traditional Wisdom for Sustainable Agriculture

ICAR-AGRICULTURAL TECHNOLOGY APPLICATION RESEARCH INSTITUTE
ZONE-I, PAU CAMPUS, LUDHIANA-141004, PUNJAB

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PREFACE

In India, Indigenous Technical Knowledge (ITKs) continues to remain underutilized within formal agricultural and rural development systems. Conventional development approaches have largely focused on the transfer of technologies from so-called “advanced” regions, often neglecting the wealth of locally evolved practices and innovations developed by farming communities over generations. These indigenous practices are closely aligned with region-specific agro-ecological conditions and deeply rooted in local socio-cultural traditions. To harness the true potential of ITKs, it is imperative that they are systematically recognized, valued, and scientifically validated to assess their efficacy, safety, and relevance under present-day conditions.

As an integral component of the global knowledge system, ITKs possess significant scientific, ecological, and cultural value. Many of these practices emphasize resource efficiency, environmental sustainability, risk minimization, and resilience to climatic variability. Proper documentation and critical validation of ITKs not only help in preserving this rich heritage but also facilitate their refinement, adaptation, and integration with modern scientific knowledge. Such an approach enables a complementary and interactive development process, where indigenous wisdom and contemporary science work together to address emerging challenges in agriculture and allied sectors.

Recognizing the immense potential of Indigenous Technical Knowledge, ICAR–ATARI, Zone-I initiated a systematic effort to collect and compile indigenous-based practices from farmers and community sources. This task was undertaken through the dedicated efforts of the Krishi Vigyan Kendras (KVKs) functioning across the region, ensuring authenticity, regional representation, and relevance. The present booklet documents 38 indigenous practices traditionally followed in the ICAR–ATARI, Zone-I states of Punjab, Himachal Pradesh, Uttarakhand, and the Union Territories of Jammu & Kashmir and Ladakh. These practices span diverse areas of agriculture, livestock, and rural livelihoods, including crop production, plant protection, ethno-veterinary practices, ethno-medicine, food technology, and post-harvest management.

The primary objective of this compilation is to disseminate these cost-effective, environmentally sound, and widely practiced techniques among farmers, researchers, extension professionals, and scientists. By fostering a deeper understanding of the scientific principles underlying these practices, the booklet aims to encourage their validation, refinement, and broader adoption. It is hoped that this initiative will contribute meaningfully to the promotion of sustainable, climate-resilient, and farmer-centric agricultural practices.

It is a matter of great satisfaction to present this inventory booklet of ITKs practiced in ATARI, Zone-I. We gratefully acknowledge the visionary leadership of Dr. M. L. Jat, Secretary, DARE, and Director General, ICAR, whose guidance has been instrumental in advancing agricultural innovation. We also express our sincere appreciation to Dr. Rajbir Singh, Deputy Director General (Agricultural Extension), ICAR, for his valuable strategic direction. The tireless efforts of the KVKs in documenting indigenous knowledge from farming communities and bringing out this publication in the shortest possible time are highly commendable.

Editors


भाकृअनुप
ICAR

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INDIGENOUS KNOWLEDGE SYSTEMS: SCOPE, RELEVANCE, AND PERSPECTIVES

Indigenous Technical Knowledge (ITK) refers to the locally developed, experience-based skills, practices, techniques, and innovations that communities have evolved over generations to manage their natural resources, crops, livestock, and livelihoods. Because ITKs emerge from long-term interaction with specific environments, they are inherently place-based and adaptive, reflecting sustained observation of local soils, climates, pests, seeds, animals, and social systems. Moreover, this knowledge is continuously refined by farmers, pastoralists, fishers, and rural households through iterative processes of trial and error. In contrast to formal technologies developed in laboratories, ITKs are typically low-input, resource-efficient, and rely on locally available materials. As a result, they encompass a wide range of practices, including seed selection and storage, water-harvesting structures, ethno-veterinary remedies, post-harvest management, and landscape-level conservation methods. Importantly, ITK is social in nature, being embedded in community practices, rituals, and seasonal calendars, therefore, it carries cultural and institutional dimensions alongside its technical aspects. Taken together, ITKs constitute a living repository of agroecological solutions that are finely tuned to local constraints and opportunities.

ITKS & CONTEMPORARY AGRICULTURE

In an era marked by climate variability, rising input costs, concerns about pesticide residues, and the need for resilient smallholder livelihoods, ITKs have regained attention for their multiple contributions to sustainable agriculture. First, ITKs are inherently suited to resource-poor conditions, because they use local inputs and minimal external energy, they reduce farmers' dependence on purchased agrochemicals and fossil-fuelled technologies, thereby lowering production costs and environmental footprints. Second, many ITKs embody agroecological principles biodiversity, soil health, water conservation and integrated pest management which improve system resilience and long-term productivity. Third, ITKs often support food and nutritional security by promoting diverse cropping systems, indigenous grains and mixed farming that supply balanced diets. Fourth, ITKs strengthen social capital, the practices are shared through community institutions, ritual events and informal networks, sustaining knowledge transfer across generations. Finally, documenting and validating ITKs creates opportunities for livelihood enhancement, value addition and local entrepreneurship by converting indigenous practices into safe, standardized, and market-ready interventions. These advantages explain why national research and extension institutions have invested in ITK inventories and validation projects.

SCOPE AND DOMAINS

ITKs cover a broad spectrum of activities across different components of agriculture and rural livelihoods. In crop production, they include practices such as on-farm seed selection, mixed cropping systems (for example, traditional multigrain systems), indigenous methods of soil fertility management using green manures and bio-fumigants, and pest management techniques involving plant repellents, ash dusting, and trap crops. Similarly, in water management, ITKs comprise gravity-fed pond systems, traditional water mills, and underground pit storage of vegetables in cold-desert regions. In livestock and veterinary care, ITKs encompass ethno-veterinary medicines, herbal pastes, and traditional methods for managing reproductive and digestive disorders. Likewise, post-harvest ITKs include mud-pot storage, stone grinding of grains, and smoke- or plant-based fumigation practices that help extend shelf life without refrigeration. Taken together, these examples illustrate how cultural knowledge and technical acumen converge to address locally relevant challenges in a sustainable and context-specific manner.

NEED FOR DOCUMENTATION AND SCIENTIFIC VALIDATION

Although ITKs are widely practiced, many remain undocumented or poorly articulated in scientific terms; consequently, their wider use and policy recognition are often constrained. Systematic documentation is therefore essential, as it helps preserve fragile knowledge that is increasingly threatened by rural out-migration and changing livelihood patterns. At the same time, scientific validation through laboratory analyses, field trials, and socio-economic appraisal is equally important, since it establishes efficacy, safety, dosage, and context of use, while also identifying any unintended environmental or health impacts. Moreover, validation facilitates scaling. Once the benefits of an ITK are substantiated, it can be standardized, integrated into extension advisories, and packaged for wider adoption, for instance as value-added herbal formulations, low-cost devices, or community demonstration models. In this context, the initiative on ITK collection and validation illustrates the need to document and test indigenous practices, thereby bridging traditional knowledge with modern scientific approaches.

ROLE OF KRISHI VIGYAN KENDRAS (KVKs)

Krishi Vigyan Kendras (KVKs), India's district-level agricultural extension centres occupy a pivotal role in documenting ITKs, primarily because of their close proximity to farming communities and their mandate to function as local knowledge hubs. Through on-farm surveys, farmer-to-farmer interactions, and regular field engagements, KVKs are able to identify, record, and validate local innovations. In addition, they document these practices in written, photographic, and audio-visual formats, thereby ensuring systematic preservation. Moreover, their district-level presence allows KVKs to capture crucial context-specific details such as soil type, crop calendars, vernacular terminology, and preparation or application methods, all of which are essential for accurate and meaningful documentation. KVKs also collaborate closely with state agricultural/veterinary universities, ICAR institutes to compile ITK inventories, facilitate participatory documentation through community meetings, and maintain local libraries and digital repositories. Consequently, by documenting ITKs in a structured and participatory manner, KVKs not only help preserve cultural heritage but also generate the baseline evidence required for subsequent scientific validation and wider dissemination.

Beyond documentation, KVKs also perform a crucial bridge function by forwarding promising ITKs to research institutions while simultaneously facilitating their participatory validation. When results indicate potential, KVKs refer the validated ITKs to higher research bodies such as state agricultural universities, ICAR institutes, and specialized laboratories for further investigation, including phytochemical analysis, toxicity testing, and controlled efficacy trials. Thus, this iterative pathway, moving from field-level observation to institutional validation, enables the transformation of tacit local knowledge into documented, reproducible, and scientifically acceptable technologies. In addition, KVKs contribute empirical data, extension bulletins, and actively participate in multi-stakeholder validation workshops, thereby strengthening the overall evidence base for ITKs.

STRATEGIC SIGNIFICANCE

Indigenous Technical Knowledge is not anachronistic folklore; rather, it represents a dynamic and context-sensitive body of practices that offers practical solutions to contemporary sustainability challenges. In this regard, KVKs by virtue of their district-level presence, participatory approaches, and extension mandate are uniquely positioned to bridge local wisdom with formal scientific systems. Consequently, when documentation, validation, and scale-out are undertaken in an ethical and scientifically rigorous manner, ITKs can significantly enrich national portfolios of sustainable agriculture. Moreover, they can reduce dependence on external inputs, strengthen rural livelihoods, and enhance climate resilience. Ultimately, the future of sustainable food systems will be shaped not only by laboratory innovations but also by community knowledge, therefore, acknowledging, validating, and responsibly scaling ITKs through KVKs is both an agricultural imperative and a cultural responsibility.

Indigenous Gravity-Fed Irrigation Systems (Zing/Khul) for Water Management

Brief description

In Kargil district of Ladakh UT, a traditional gravity-fed irrigation pond, called zing, is used in cold-arid Ladakh for water regulation. These ponds are constructed on elevated land to divert and store stream water according to community irrigation schedules.

- Ensures uniform irrigation and captures snowmelt to support soil and groundwater.
- Promotes collective management, cooperation, and equitable water sharing.

Benefits

- Stores night-flow water for daytime use, reducing labour and improving efficiency.
- Reduces labour, safety risks, and water wastage.
- Supports crops during dry spells and ensures uniform irrigation.
- Strengthens community cooperation and provides a cost-effective, energy-free system.

Scope & Potential

- Upgrade with flow monitors, regulators, and automated sluices for precision and reduced losses.
- Store more snowmelt and rainfall for year-round supplementary irrigation.
- Use multi-level sediment basins to improve water quality and recycle soil nutrients.
- Replicable in other high-altitude Himalayan regions, combining traditional knowledge with modern irrigation science for climate resilience.

Need for Scientific Validation

- Determine storage capacity, discharge efficiency, and seasonal seepage behaviour.
- Assess effects of sediment-free water on soil health, yield, and irrigation efficiency.
- Conduct sediment load studies and cost-benefit analyses versus modern systems.
- Confirm economic viability and long-term sustainability.

Contributors: Mohammad Mehdi, Shabeer Hussain and F A Shah Khan; KVK, Kargil-II

Low-Cost Micro-Irrigation Using Recycled Glucose Bottles for Critical Crop Watering

Brief description

Farmers of Kathua district, Jammu & Kashmir, use discarded glucose bottles as a micro-irrigation tool, representing an innovative form of drip-trickle irrigation (DTI), especially valuable in rainfed and kandi regions where water scarcity limits crop survival.

- DTI provides slow, continuous moisture at the root zone, enhancing plant survival, root growth, nutrient uptake, and soil aeration during dry periods.
- Highly efficient for orchards and high-value crops, providing precise water to each plant reliably.

Benefits

- Used where irrigation is unreliable.
- Supplies water directly to the root zone.
- Reduces losses from evaporation, runoff, and percolation.
- Supports fertigation, improving yield and quality.
- Cuts irrigation cost and frequency by 50%.
- Increases soil water-holding capacity and porosity.

Scope & Potential

- Agriculture uses over 80% of the country's water resources.
- DTI improves plant growth, fruit yield, and quality in citrus.
- Combining DTI with hydrogel and mulching enhances soil moisture and nutrients.
- Ensures uniform water application, reduces weeds, improves produce quality, and extends shelf life.

Need for Scientific Validation

- Assess soil water-holding capacity and bulk density under DTI.
- Evaluate fertigation efficiency.
- Address constraints: material shortage, leakage, blockage, labour, and lack of follow-up.
- Adjust water discharge for soil type: slow for clay, higher for sandy soils.
- Ensure water quality: free from algae, salts, and metals.

Contributors: Vishal Sharma, Vishal Mahajan, Berjesh Ajrawat, Anamika Jamwal, Ajay Kumar, Sushant Sharma and Amit Kumar; KVK, Kathua

Barahnaja: Mixed Cropping System for Enhancing Agro-Biodiversity

Brief description

Barahnaja, meaning "twelve grains," is a traditional mixed cropping system in Uttarakhand's hilly districts of Tehri Garhwal, Pauri Garhwal, and Chamoli. During the Kharif season, farmers grow multiple crops together, including nutri-cereals (mandua, jhangora), pulses (bhat, gahat, rajma, urad), oilseeds (til, bhangjeera), and vegetables (kakdi, bhindi).

- Crops are chosen based on altitude, slope, soil, and climate.
- Supports biodiversity, soil fertility, pest control, and farmer livelihoods.

Benefits

- Enhances soil health, recycles organic residues, and controls erosion.
- Provides balanced nutrition from cereals, pulses, and oilseeds.
- Reduces crop failure risk under erratic rainfall or pests.
- Requires minimal chemical inputs, using indigenous seeds and organic manures.
- Naturally suppresses weeds and pests.
- Preserves local culture and ensures strong farmer participation.

Scope & Potential

- Can be adapted as a model for sustainable, climate-resilient farming in Himalayan and hilly regions.
- Integration with millet missions can improve nutrition and farmer income.
- Offers opportunities for eco-tourism, organic branding, and heritage food promotion.
- Policy support through PKVY, NMNF, and NAMSA can encourage adoption and preservation.

Need for Scientific Validation

- Study nutrient cycling, carbon sequestration, and water use efficiency.
- Compare yields and income with monocropping systems.
- Assess pest and disease incidence in mixed vs. sole cropping.
- Conduct nutritional profiling of Barahnaja-based diets.
- Model climate resilience across different altitudes to support sustainable adoption.

Contributors: Aalok Gulabrao Yewale; KVK, Tehri Garhwal

Application of Saline Water for Induction of Curd Formation in Cauliflower

Brief description

Farmers in Pithorgarh district, Uttarakhand, apply light salt water (NaCl solution) or brine on cauliflower plants, particularly during the vegetative or early curd initiation stages, as a traditional practice to improve curd quality. This method involves spraying diluted salt water over the foliage, which affects plant physiology and promotes tighter, more compact curd development.

- Simple, cost-effective, and uses easily available materials.
- Induces mild osmotic stress, promoting curd formation.
- Improves leaf cleanliness and overall plant appearance.

Benefits

- Acts as a natural deterrent against pests and fungal pathogens, reducing chemical use.
- Safe, biodegradable, and environmentally friendly, leaving produce residue-free.
- Enhances leaf cleanliness and shine, with minor micronutrient benefits from chloride ions.
- Induces mild stress to promote compact, uniform, high-quality curd formation.
- Cost-effective and uses readily available, easy-to-apply materials.

Scope & potential

- Suitable for wider adoption among cauliflower growers, especially in organic or low-input systems.
- Standardizing salt concentration, timing, and frequency can optimize results for commercial use.
- Can be integrated with eco-friendly practices like neem extracts or bio-fertilizers to improve pest management and curd quality.
- Aligns with sustainable farming goals and growing demand for residue-free, naturally grown vegetables.

Need for Scientific Validation

- Find optimal salt concentration, timing, and frequency.
- Evaluate pest control, curd quality, yield, and post-harvest effects.
- Ensure safety, consistency, and modern system integration.

Contributors: GS Bisht and Abhishek Bahuguna; KVK, Pithorgarh

Utilization of *Grewia optiva* (Biyul) Sticks as Indigenous Hand Tools in Hill Agriculture

Brief description

Farmers of Samba district, Jammus & Kashmir have relied on Biyul plant sticks for generations because they naturally exhibit a combination of strength, elasticity, and durability qualities that are essential for small-scale but frequently used farm tools.

- Biyul tree wood is ideal for making handles of axes, hoes, sickles, and other hand tools.
- Its durability, resilience, and comfortable grip make it a preferred choice for farmers seeking reliable tools.

Benefits

- Strong, durable, and withstands rough handling and weather.
- Naturally elastic, absorbs shocks and vibrations during digging, cutting, or weeding.
- Reduces breakage, extending tool lifespan and minimizing replacements.
- Provides a secure and comfortable grip, improving handling efficiency.
- Widely used for reliable handles of axes, hoes, sickles, and other farm tools.

Scope & potential

- Natural, renewable, and biodegradable, offering an eco-friendly alternative to synthetics.
- Hemicellulose enhances flexibility, suitable for applications needing both strength and slight bend.
- Fine-grained, strong, and durable with high-tensile cellulose fibres.
- Potential for wider agricultural and industrial use.

Need for Scientific Validation

- Studies confirm Biyul tree wood's strength, elasticity, and high cellulose content.
- Validates traditional use in agriculture for making small tools.
- Supports long-standing practices of rural communities.

Contributors: Sanjay Khajuria and Saurav Gupta; KVK, Samba

Use of *Sarkanda* Mulch/Support Structures for Off-Season Cucurbitaceous Crops

Brief description

The use of Sarkanda (*Saccharum munja*) for raising off-season cucurbit crops is a traditional practice maintained by migrant farmers from Uttar Pradesh, now operated by these migrant in SAS Nagar, Punjab.

- Farmers hire riverbank land (Rs. 30,000-35,000/acre) to grow pumpkin, bottle gourd, and other cucurbits using water table-based trench cultivation.
- Trenches filled with sand, manure, and fertilizers; seeds sown, and new trenches made as water recedes.

Benefits

- Enables off-season cultivation of cucurbits for early harvests.
- Protects crops from frost, chilling, and extreme weather.
- Improves crop survival, quality, and economic returns.
- Provides a reliable livelihood for migrant farmers and supports family needs.
- Reduces dependency on external inputs and promotes sustainable farming practices.

Scope & Potential

- Suitable for wider adoption in regions with similar agro-climatic conditions.
- Can be enhanced with hybrid seeds, efficient nutrient management, and scientific crop scheduling.
- Early-harvested produce allows premium pricing, incentivizing adoption.
- Farmer training, awareness campaigns, and protected cultivation can support scaling and preserve traditional knowledge.

Need for Scientific Validation

- Determine optimal trench depth for crop protection.
- Optimize fertilizer schedules for better growth and yield.
- Evaluate water-use efficiency and frost protection effectiveness.
- Assess economic returns for wider adoption among farmers.

Contributors: Balbir Singh Khadda, Munish Sharma, Harmeet Kaur and Gulgul Singh; KVK, SAS Nagar

Use of Eucalyptus Leaf Residues in Furrows for Red Ant Management in Potato

Brief description

Farmers in Hamirpur district, Himachal Pradesh, manage red ants in potato by placing chopped, shade-dried eucalyptus leaves in furrows at planting. As moisture builds, the leaves decompose and release aromatic compounds. These create an unfavourable microenvironment that repels ants during early crop stages, protecting tubers and sprouts. The method reduces pest damage without chemicals, supports organic farming, enhances soil biodiversity, and offers a low-cost, eco-friendly solution.

Benefits

- Eco-friendly, residue-free pest control reducing chemical insecticide use.
- Strong repellent action due to eucalyptol, citronellal, limonene, and terpenoids.
- Aroma disrupts red ant foraging and communication.
- Low-cost, locally available, and requires no special equipment.
- Leaf decomposition adds organic matter and supports soil health.

Scope & Potential

- Can be scaled under IPM for red ant management in potato.
- Suitable for wide adoption in red ant-prone regions.
- Integration with cultural and biological practices.
- Development of powders, pellets, and botanical extracts.

Need for Scientific Validation

- Quantify efficacy under different agro-climatic conditions.
- Standardize dose, timing, and application frequency.
- Identify most effective eucalyptus species.
- Assess economic viability and duration of repellency.
- Evaluate impacts on beneficial insects and soil biota.

Contributors: Chhavi and Vishal Dogra; KVK, Hamirpur

Border Planting of Garlic and *Lilium* spp. for Rodent Deterrence in Apple Orchards

Brief description

Planting garlic (*Allium sativum*) and lilium along apple orchard borders in Kashmir is an indigenous method to deter rodents, especially during fruit maturity. Garlic emits a strong sulphur-rich odor that disrupts rodent movement, while lilium is unpalatable for feeding or burrowing. Together, they form a biological barrier reducing rodent entry. The practice is eco-friendly, low-cost, farmer-friendly, supports biodiversity, and integrates well with non-chemical and integrated rodent management strategies.

Benefits

- Eco-friendly technique for controlling red ants.
- Easily integrates with cultural and biological pest management practices.
- Well suited for red ant-prone potato-growing regions.
- Potential for value-added products like leaf powders, pellets, or extracts.

Scope & Potential

- Simple, low-cost, and easily replicable across apple-growing regions.
- Well suited for smallholders seeking eco-friendly alternatives to chemicals.
- Integrates smoothly with IPM, biological, and cultural practices.
- Allows innovation in planting, intercropping, and habitat management.

Need for Scientific Validation

- Scientific validation is needed to confirm rodent control.
- Field trials should measure damage reduction and compare methods.
- Standard protocols are needed for reliable IPM recommendations.
- Impacts on yield and orchard ecosystem health need assessment.

Contributors: Ishtiyaq A. Khan, Umer Bin Farook, Shabir A Ganaie and Malik Raies Ul Islam; KVK, Anantnag

Application of Wood Ash for Management of Red Pumpkin Beetle (*Aulacophora* spp.)

Brief description

The red pumpkin beetle severely damages cucurbit crops, with adults feeding on leaves, flowers, and fruits, and grubs attacking roots. In hilly regions, warm, humid conditions favor rapid beetle build-up. Farmers in Reasi district of Jammu and Kashmir traditionally use household wood ash as a low-cost, locally available pest control method. Applied to seedlings or plant bases, ash repels beetles, reduces damage, and enriches soil with potassium, calcium, and trace elements, supporting healthy growth and offering an eco-friendly pest management method for cucurbit cultivation.

Benefits

- Acts as physical barrier, irritates pests, reduces feeding and egg-laying.
- Eco-friendly, residue-free, suitable for organic and low-input farming.
- Mineral-rich, improves soil fertility, plant vigour, and yield.
- Alters leaf micro-environment to discourage pests.
- Safe for humans, livestock, and beneficial insects.

Scope & Potential

- Simple, low-cost, and multi-beneficial for cucurbit growers.
- Reduces chemical use, costs, and health/environmental risks.
- Suitable for organic, low-input, hill, and rainfed farming.
- Improves soil fertility, crop strength, and provides sustainable pest control.

Need for Scientific Validation

- Standardize ash type, dosage, and timing.
- Assess pest and yield impact.
- Test effectiveness in different climates.
- Integrate into IPM guidelines.

Contributors: Banarsi Lal and Sanjay Koushal; KVK, Reasi

Maize–Cowpea Intercropping for Mitigation of Wild Boar Damage in Maize

Brief description

Farmers in Reasi district, Jammu and Kashmir face significant wild boar damage in maize fields due to soft stems and attractive cobs. To reduce losses, they practice mixed cultivation of maize with cowpea. Wild boars dislike cowpea, which causes digestive discomfort, and avoid fields where it grows. Sown in alternate rows or along boundaries, cowpea acts as a natural deterrent. This method not only protects maize but also supports mixed farming by providing an additional nutrient-rich leguminous crop, enhancing soil fertility and offering extra fodder or pulses for farmers.

Benefits

- Deters wild boars, protecting maize safely.
- Eco-friendly, chemical-free, fits existing farms.
- Mixed cropping with cowpea enhances soil fertility through nitrogen fixation.
- Cowpea provides additional fodder or pulses, boosting farm income.
- Simple, low-cost, and practical for small and marginal farmers.

Scope & Potential

- Strong potential for wider adoption in areas prone to wild boar damage.
- Simple, low-cost, and effective under field conditions.
- Well suited for large-scale adoption by small and marginal farmers.

Need for Scientific Validation

- Standardize planting patterns and assess effectiveness across agro-climatic zones.
- Scientific data will build farmer confidence and support wider adoption.
- Integrate the practice into formal crop protection advisories.

Contributors: Banarsi Lal and Sanjay Koushal; KVK, Reasi

Use of Lentil as a Trap/Barrier Crop for Protection of Wheat from Rabbit Damage

Brief description

Rabbit damage is a common problem in wheat-growing areas, especially in hilly regions like Reasi, Himachal Pradesh, where rabbit populations are high. Rabbits feed on young wheat shoots, reducing crop vigour and yield. To manage this, natural farmers traditionally sow lentil along field borders or within wheat plots. Lentil is believed to cause digestive discomfort in rabbits, discouraging repeat visits after initial exposure. Consequently, wheat fields bordered or intercropped with lentil act as natural deterrent zones. This indigenous, low-cost practice reduces crop losses, limits reliance on fencing or chemical repellents, and offers an eco-friendly biological barrier for rabbit management.

Benefits

- Prevents crop damage without harming animals.
- Low-cost, no special inputs required.
- Suitable for small and marginal farmers.
- Fits well in natural and organic farming systems.
- Improves soil fertility through nitrogen fixation.
- Enhances soil health for succeeding wheat crop.
- Provides additional income from lentil harvest

Scope & Potential

- Eco-friendly, chemical-free wildlife deterrent
- High potential in hilly and forest-fringe rabbit-prone areas.
- Low-cost, locally adaptable alternative to conventional controls.
- Integration with research for eco-friendly wildlife management.

Need for Scientific Validation

- Validate lentil's deterrent and digestive effects on rabbits.
- Assess effectiveness across agro-climatic conditions.
- Standardize sowing patterns and field layout.

Contributors: Banarsi Lal and Sanjay Koushal; KVK, Reasi

Application of Sour Buttermilk Spray for Management of Fungal Diseases in Crops

Brief description

The indigenous use of sour buttermilk (chaach) as a foliar spray is a low-cost, eco-friendly method to manage fungal diseases in vegetables and fruit crops. In Fatehgarh Sahib, Punjab, farmers ferment buttermilk with mustard oilcake and alum for 10-15 days, then filter and spray it at 15 day intervals. Beneficial lactic acid bacteria and organic acids suppress fungi, enhance leaf microflora, boost plant immunity, and reduce chemical fungicide use, and support residue-free, organic farming.

Benefits

- Eco-friendly and non-toxic to humans, animals, and environment.
- Easy to prepare and apply by small and marginal farmers.
- Low-cost, using locally available curd or buttermilk.
- Suitable for organic and natural farming systems.
- Improves soil microbial activity after wash-off.

Scope & Potential

- Ready-to-use Laboratory bio-sprays possible for easy adoption.
- Can combine with neem, garlic-chili, or cow urine for synergy.
- Scope to standardize fermentation, dilution, and spray timing.
- Can be promoted under certified organic programs
- High potential in organic and low-input farming.

Need for Scientific Validation

- Study long-term effects on soil and leaf microbiomes.
- Compare performance with chemical fungicides.
- Identify active microbes and antifungal compounds.
- Standardize dose, crop-wise use, and spray interval.
- Test efficacy against major fungal diseases.

Contributors: Reet Verma and Guranshpreet Singh Sethi; KVK, Fatehgarh Sahib

Fumigation with Guggul Smoke for Fungal Disease Management in Cucurbits

Brief description

Guggul, also known locally as Pura, traditionally has played a vital role in Indian medicine, primarily as a source of bioactive oleo-gum resin. This resin contains a wide range of antimicrobial constituents, including alkaloids, glycosides, steroids, terpenoids, flavonoids, and the oleo-gum resin itself. In addition to its medicinal uses, guggul has been traditionally employed in agricultural practices by farmers of SAS Nagar, Punjab to manage microbial infections, particularly fungal diseases in cucurbit crops. The fumigation process involves burning guggul resin to release aromatic fumes, which are believed to inhibit the growth of various fungal and bacterial pathogens, thus providing an eco-friendly alternative to chemical fungicides.

Benefits

- Strong antifungal and antibacterial action.
- Helps prevent crop losses.
- Reduces airborne microbial load around crops.
- Natural, eco-friendly, and chemical-free.
- Simple and low-cost practice.
- Uses locally available indigenous guggul.

Scope & Potential

- Eco-friendly alternative to chemical fungicides.
- Suitable for cucurbit disease management.
- Fits well in organic and natural farming.
- Reduces airborne and surface fungal pathogens.
- Useful for small and eco-conscious farmers.
- Can combine with neem or turmeric extracts.

Need for Scientific Validation

- Test efficacy against major cucurbit pathogens.
- Standardize fumigation protocols.
- Compare performance with chemical fungicides.
- Identify active antifungal compounds.
- Validate safety and environmental benefits.

Contributors: Balbir Singh Khadda, Munish Sharma, Harmeet Kaur and Gulgul Singh; KVK, SAS Nagar

Use of Mustard Oilcake (*Sarson Khal*) for Disease Management in Basmati

Brief description

Mustard cake (sarson khal), a by-product of oil extraction, is traditionally used as an eco-friendly soil amendment and biocontrol agent in Basmati rice fields to enhance soil fertility and suppress both soil-borne and foliar diseases. Farmers mix 2.5 kg mustard cake, 2.5 kg cow dung ash, and 1 kg slaked lime in 40 L water, stir twice daily for 3-4 days, then dilute 30 L supernatant in 100-120 L water and spray 2-3 times per acre from 7-10 days after transplanting. Fermented buttermilk (2 L per spray) is added if yellowing or disease appears to boost antimicrobial effect.

Benefits

- Reduces dependence on chemical fungicides.
- Supports organic, natural, and residue-free farming.
- Bio-fumigant action improves soil health and root growth.
- Increases yield and market value of Basmati rice.
- Low-cost, locally available, and easy to apply.
- Fits well into smallholder farming systems.

Scope & Potential

- Eco-friendly, low-cost practice suitable for rice-growing regions.
- Scalable through standardized dose, timing, and application.
- Reduces chemical use, lowers costs, and improves export quality.
- Potential for enriched composts and bio-fumigant formulations.

Need for Scientific Validation

- Quantify bio-fumigant action of glucosinolates and allyl isothiocyanates.
- Evaluate disease suppression, yield response, and soil microbes.
- Standardize methods for IDM integration.

Contributors: Urvi Sharma and Satbir Singh; KVK, Ropar

Garlic Bulb Curing by Hanging with Foliage for Enhanced Shelf Life

Brief description

Farmers in Kullu, Himachal Pradesh, use an indigenous post-harvest method of hanging freshly harvested garlic bulbs with leaves in a shaded, ventilated area for 10-15 days. This slow, uniform curing reduces excess moisture, ensures proper neck drying, and forms firm, papery scales, preserving bulb integrity, flavour, and aroma. The method lowers the risk of neck rot, fungal infections, and premature sprouting, minimizing post-harvest losses. Garlic can be safely stored for 5-6 months, allowing farmers to sell when market prices are higher, thereby enhancing profitability and supporting sustainable, low-cost post-harvest management.

Benefits

- Hanging garlic bulbs ensures even drying and airflow.
- Neck drying prevents fungal and bacterial infections naturally.
- Papery skin enhances shelf life and marketability.
- Leaves ease bundling, transport, and reduce losses.
- Low-cost, needs only shade and ventilation.

Scope & Potential

- Boosts storage, quality, market value, and branding.
- Low-cost curing for hill and dry temperate regions.
- Smallholders use hanging, commercial producers use racks, sheds, or modular structures.
- Solar/forced-air improves efficiency in humid areas.

Need for Scientific validation

- Validate curing conditions and region-specific guidelines.
- Study moisture, temperature, humidity, drying time, microbes, bulb quality, weight, and storage.
- Widely practiced but not yet standardized.
- Refines and authenticates indigenous knowledge.

Contributors: Ramesh Lal, RK Rana, SK Bansal, SK Thakur and Radhika Negi; KVK, Kullu

Indigenous Pit Storage Method for Safe Winter Storage of Seed Potato

Brief description

Potato is a major cash crop in Himachal Pradesh, with Lahaul and Spiti as key hubs for high-quality seed production. The high-altitude climate supports disease-free seed, with around 680 hectares in the district. The district's single May-September cropping season and snowbound winters pose storage challenges. Farmers use traditional earthen pits, lined with grass and covered with soil, to maintain stable temperature and humidity, protecting tubers from freezing, dehydration, and early sprouting, and ensuring viability for the next season.

Benefits

- Underground pits preserve seed dormancy and vigour by maintaining moisture and temperature.
- Prevents rot, drying, and early sprouting under extreme conditions.
- Made from soil, straw, and crop residues, low-cost, energy-efficient, and eco-friendly.
- Requires no refrigeration.
- Simple, ideal for remote and tribal areas.

Scope & Potential

- Ensures reliable supply of high-quality planting material.
- Widely used by nearly all seed potato farms in Lahaul.
- Can be standardized and replicated in similar hilly regions.
- Improvements like better insulation or aeration can enhance efficiency.
- Can serve as a model for community-based, low-cost cold storage.

Need for Scientific validation

- Establish scientific reliability.
- Validate the indigenous technology scientifically.
- Assess disease incidence.
- Compare pit and ambient temperature and humidity.

Contributors: Radhika Negi; KVK, Lahaul & Spiti-I

Kuthar: A Multi-Grain Storage Structure for Rural Himalaya

Brief description

The *Kuthar* is a traditional, elevated wooden grain storage structure widely used in Himachal Pradesh, offering durable, indigenous long-term preservation. Made from strong woods like Deodar, it holds 9-35 tonnes of grains, including paddy, maize, wheat, barley, and sorghum. Thick walls, a tightly fitted floor, and rat-proofing cones protect against moisture and rodents. A sloped roof with broad overhangs shields grains from rain, snow, and wind, ensuring high-quality storage and extended longevity, making it a cost-effective and sustainable solution for mountain farming communities.

Benefits

- Elevated design protects grains from pests and moisture.
- Wooden structure regulates airflow, preserving quality.
- Durable local wood lasts decades with little upkeep.
- Stores multiple grains for diversified farming.
- Simple, cost-effective, and eco-friendly.

Scope & Potential

- Innovations can improve *Kuthar* while keeping traditional design.
- Better materials, coatings, and rat-proofing enhance durability.
- Modular and solar-assisted designs boost efficiency for all farms.
- Sensors monitor temperature, humidity, and pests.
- Can be promoted as a low-cost, sustainable storage solution.

Need for Scientific Validation

- Conduct comparative studies of *Kuthar* vs. modern storage for grain preservation.
- Monitor moisture levels, pest infestations, and spoilage rates.
- Quantify effectiveness in maintaining grain quality.
- Perform economic analysis of post-harvest loss reduction.
- Use results to support wider adoption among farmers.

Contributors: Usha Sharma and Nagender Butail; KVK, Shimla

Use of Mud Pot Storage Systems for Long-Term Preservation of Paddy

Brief description

The use of large mudpots for storing paddy is a traditional, effective, and eco-friendly practice widely followed at household and community levels, particularly in rural regions of India. These structures are known by different names such as Kothi, Kuthla, or Saal, while in Kashmir they are called Loppun. Made from locally available materials, these mudpots offer a low-cost and sustainable option for small-scale, on-farm grain storage. Although they are best suited for short- to medium-term storage of up to a year with proper maintenance rather than large-scale industrial storage they hold considerable relevance in rural contexts where traditional methods continue to be valued for their practicality and cultural significance.

Benefits

- Sealed pots prevent moisture and fungal growth.
- Mudpots keep paddy cool and stable.
- Airtight walls and raised base deter pests and rodents.
- Preserves dried paddy (10-12% moisture) for over a year.
- Made from local, biodegradable materials; cost-effective.

Scope & Potential

- Ideal for households and smallholders storing home or seed grain.
- Can be improved with better design, sealing, and modern integration.
- Made from local, low-cost, eco-friendly materials.
- Usable across varied agro-climatic regions.
- Preserves cultural heritage and craftsmanship.

Need for Scientific validation

- Needed to standardize and improve design for reliable storage.
- Addresses moisture, structural, and pest risks.
- Enables integration into modern grain management.

Contributors: Shabir Ahmad and Bilal Ahmad; KVK, Budgam

Use of *Temru* Leaves and Fruits to Manage of Storage Insect Pests in Pulses

Brief description

Temru (*Diospyros melanoxylon*), abundant in mid-hill regions of Rajouri, Jammu & Kashmir, is valued for its medicinal properties and culinary uses. Its woody branches serve as natural toothbrushes, and fresh fruits are eaten as chutney for flavour and health benefits. Locally, tribal communities use crushed or powdered dried fruits and leaves to protect stored pulses from pests, especially pulse beetles, in small household units (25-30 kg). Sometimes, a paste or crude extract from fresh fruits is lightly mixed with grains for full coverage. This simple, natural method effectively safeguards pulses during storage.

Benefits

- Prevents storage losses without health risks, entirely plant-based.
- Retains natural aroma, taste, and cooking quality of grains.
- Antimicrobial and insect-repellent properties protect pulses from pests.
- Supports safe, extended household storage.
- Reduces economic losses and improves food security.

Scope & Potential

- Temru grows abundantly in forests, field bunds, and community lands.
- Fully organic, fits eco-friendly, chemical-free trends.
- Can be scaled through awareness, demonstrations, and documentation.
- Potential for standardized plant-based formulations.

Need for Scientific validation

- Identify active compounds and assess pest repellency/toxicity.
- Standardize application methods and dosages.
- Evaluate grain quality, seed viability, and safety.

Contributors: Arvind Kumar Ishar, Suraj Parkash, Parul Gupta, Vikas Gupta; KVK, Rajouri

Indigenous Zero-Energy Vegetable Storage Systems in Ladakh for Winter Food Security

Brief description

Vegetable cultivation in Ladakh is limited to April-October due to extreme winters, making fresh vegetables scarce and costly during the long isolation period from November to May. To ensure winter food availability, Ladakhi farmers have developed indigenous, zero-energy vegetable storage systems adapted to the cold desert climate. The main methods Sadong, Tsothbang, and Charches use underground structures, natural insulation, and controlled ventilation to maintain stable temperature and humidity. These techniques allow safe storage of potatoes, carrots, turnips, cabbage, and onions for 5-8 months without electricity, forming a vital component of regional food security and traditional knowledge systems.

Benefits

- Minimizes post-harvest losses, ensuring winter vegetable access.
- Preserves nutritional quality using local materials.
- Energy-free and environmentally sustainable.
- Suitable for Ladakh's cold, arid conditions.
- Low-cost and low-maintenance, ideal for small farmers.
- Comparable storage duration to modern cold storage.
- Climate-smart, resilient, and culturally relevant.

Scope & Potential

- Reduces post-harvest losses and improves nutritional security.
- Converts traditional systems into modern, low-cost cold storage models.
- Suitable for wider adoption in cold-arid and high-altitude regions.
- Can be improved with better insulation, humidity control, and standardization.
- Supports climate-resilient agriculture.

Need for Scientific Validation

- Standardize storage conditions and quantify temperature/humidity dynamics.
- Evaluate varietal suitability and post-harvest quality.

Contributors: Feroz Din Sheikh and Kunzang Lamo; KVK, Leh-I

Application of Horse Chestnut (*Aesculus indica*) to Manage Menstrual Disorders

Brief description

The Himalayan or Indian horse chestnut, locally known as Khanor or Bankher in Himachal Pradesh, grows abundantly in forests, ravines, and along watercourses. Various parts of the tree are traditionally used as fodder, medicine, and timber. In the Chuhar Valley of Mandi district, the seeds are dried and ground into flour known as Tattwakhar, which is used to prepare halwa on special occasions or mixed with wheat flour to make chapatis.

Benefits

- Traditionally used to reduce menstrual pain and gynecological problems.
- Helps balance hormones and ease menstrual symptoms.
- Processed seed flour is fed to milch animals to improve milk yield.
- Seeds are also used as natural soap.

Scope & Potential

- Used for leucorrhoea, heavy bleeding, and menstrual pain.
- Shown beneficial in pelvic congestion and chronic pelvic pain.
- Needs standard processing, dosage, and safety norms for wider use.
- Can be expanded to Himalayan, hilly, and tribal regions.
- Supports livelihoods through SHGs and value-added processing.

Need for Scientific Validation

- Scientific proof is limited despite widespread traditional use.
- Phytochemical, pharmacological, and safety studies are essential.
- Clinical trials needed to develop safe, standardized guidelines.
- Collaboration with KVKs, ICAR, AYUSH, and local healers can aid validation.
- Holds promise as a low-cost, natural option for women's health care.

Contributors: Kavita Sharma, Kalpna Arya, LK Sharma, Pankaj Sood; KVK, Mandi

Use of *Acorus calamus* (Vach) Rhizomes as a Botanical Fly Repellent

Brief description

Vach, or sweet flag, is traditionally used in Himachal Pradesh and across India as a natural insect and fly repellent. Its roots contain bioactive compounds, including asarones, which have repellent, insecticidal, and larvicidal effects by affecting insect nervous systems. Farmers place dried roots near animal sheds, grain stores, and homes to reduce insect activity, prevent breeding, and protect living spaces and stored produce.

Benefits

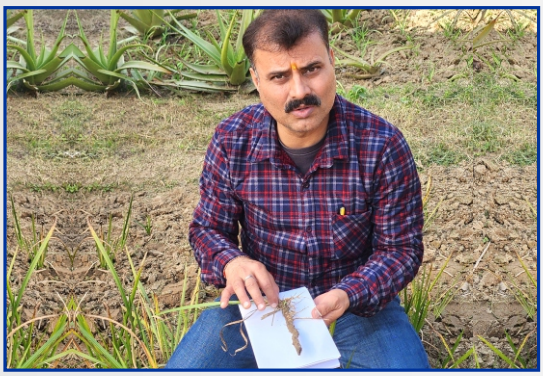
- Its roots act as both a repellent and insecticide.
- Effective against flies, bed bugs, mites, and cockroaches.
- Safe, residue-free, and non-toxic to humans and animals.
- Dried roots release aroma slowly for long protection.
- Suitable for rural, tribal, and grain-storage use.

Scope & Potential

- Applicable in homes, livestock units, and cities.
- Vach can be scaled through standardized products.
- Sprays, powders, fumigation sticks, and diffusers can be developed.
- Useful in IPM, organic farming, and storage.
- Vach naturally repels insects and is eco-friendly, biodegradable, and low-cost.

Need for Scientific Validation

- Further validation is needed to standardize dosage and formulations.
- Safety guidelines must be developed for wide use.
- Chemical variation due to growth and processing needs study.
- This will improve acceptance in agriculture and veterinary use.



Contributors: Sanjay Khajuria and Saurav Gupta; KVK, Samba

Augmented Natural Methods for Post-Harvest Ripening of Produce

Brief description

Farmers in Shopian district, Jammu and Kashmir, follow natural apple ripening practices using the fruit's own ethylene and ambient conditions. Apples are hand-picked at proper maturity (August–October), sorted, and stored in cool, dry, ventilated spaces to avoid damage. Ripening is accelerated, when required, by layering apples with paddy husk or straw, keeping them with ripe fruits, or exposing them to mild smoke. These indigenous methods ensure uniform ripening while preserving quality without chemical use.

Benefits

- Naturally ripened apples retain vitamins, phytonutrients, and antioxidants.
- Flavour, aroma, and colour develop uniformly without chemicals.
- Methods avoid toxic substances like calcium carbide.
- Supports sustainable, low-input, and organic farming.
- Fetches higher prices in premium markets.

Scope & Potential

- Linking natural ripening with organic certification, premium branding, and traceability.
- Optimizing traditional storage enhances quality and reduces post-harvest losses.
- Low-cost technologies like ethylene absorbers and better cushioning improve ripening consistency.
- Training, demonstrations, and cooperative knowledge sharing promote wider adoption.
- Collective marketing enables better prices.
- Growing demand for residue-free apples offers value addition and market expansion.

Need for Scientific Validation

- Scientific standardization is needed for maturity indices, safe storage, and controlled smoke-based ripening.
- Establishing protocols ensures consistent quality and suitability for commercialization.
- Traditional tree-ripening supports full synthesis of sugars, acids, and aromatic compounds.
- The fruit-in-a-bag method is effective due to natural ethylene action.

Contributors: Shaiq Ahmad Ganai; KVK, Shopian

Stone-Based Milling Systems for Barley and Wheat in Cold Desert

Brief description

The Rantak, or churak, is Ladakh's traditional water mill that uses snow-fed streams to grind grains like wheat, barley, buckwheat, maize, and peas. Built from local stone and wood, it requires no electricity or fuel, making it sustainable and self-reliant. Used for generations, it supports community cooperation and reflects adaptation to Ladakh's rugged, cold-arid environment. Though modern mills have reduced its use, it remains a symbol of eco-friendly, culturally rooted technology.

Benefits

- Slow, low-temperature Rantak grinding preserve vitamins, minerals, and natural fats.
- Produces flour with longer shelf life, lower spoilage, and superior taste, aroma, texture, and baking quality.
- Minimal heat and oxygen exposure reduces nutrient loss.
- Generates minimal wastage, making it resource-conserving.

Scope & potential

- Operate without electricity or fuel, pollution-free, minimal maintenance.
- Climate-resilient, lowers GHG emissions and external power dependence.
- Wider use ensures nutritious, traditional flour and reduces carbon footprint.
- Innovations: improved water-flow, modular design, easy repairs, community training.
- Scaling strengthens rural economy, preserves skills, and supports households.

Need for Scientific Validation

- Compare grinding efficiency, nutrient retention, flour quality, and environmental benefits with modern mills.
- Study durability, water-flow, energy use, carbon footprint, and socio-economic impacts.
- Use results to standardize designs and integrate mills into sustainable agriculture.



Contributors: Feroz Din Sheikh and Sabiya Asmat; KVK, Leh-I

Use of *Biyul* Tree Bark for Ruminal Impaction and Dystocia in Cattle

Brief description

In Mandi, Himachal Pradesh, farmers use Biyul (*Grewia optiva*) tree bark as a traditional ethno-veterinary remedy. Crushed fresh bark releases a mucilaginous extract that eases ruminal impaction in cattle and buffaloes by softening compacted feed and stimulating gut motility. During difficult calving, the same extract is applied per vaginum to reduce friction and assist safe delivery, providing a natural, accessible, and cost-effective alternative when commercial veterinary lubricants are unavailable.

Benefits

- Natural and safe for animals.
- Provides immediate first-aid remedy in emergencies.
- Highly cost-effective using locally available plant material.
- Reduces dependence on chemical veterinary products.
- Simple to prepare and easy to administer.
- Builds farmer confidence through traditional acceptance and accessibility.

Scope & Potential

- Simple and widely available, ideal for hilly and rural livestock regions.
- Strong potential for wider dissemination.
- Improves animal welfare and reduces treatment costs.
- Standardization of bark extraction, preparation, and dosage ensures reliability.
- Strengthens community-based veterinary care systems.

Need for Scientific Validation

- Validate scientifically for veterinary use.
- Identify active compounds and optimal dosage.
- Test efficacy and assess side effects.
- Bridge traditional knowledge with modern veterinary science.

Contributors: Brij Vanita, Pankaj Sood, Neha Chauhan, DS Yadav, and Ankaj Thakur; KVK, Mandi

Herbal Management of Mastitis using *Cuscuta reflexa* (Akashbel)

Brief description

Akashbel, a parasitic climbing herb common in India, is rich in bioactive compounds like alkaloids, flavonoids, tannins, phenolics, saponins, and terpenoids, giving it therapeutic value. Traditionally, farmers in rural and hilly areas of Himachal Pradesh use it to manage mastitis in dairy animals. About 100 g of the plant is boiled in 1.0 L of water to produce a concentrated decoction, which is applied to the udder and teats. The extract reduces inflammation, inhibits microbial growth, and promotes tissue healing. Being locally available, easy to prepare, and cost-effective, this practice is farmer-friendly, sustainable, and valuable where veterinary medicines are scarce.

Benefits

- Inhibits bacteria and reduces udder inflammation.
- Cuts antibiotic use, lowering resistance and milk residues.
- Antioxidants support tissue repair and healing.
- Akashbel's phytochemicals help manage mastitis.
- Locally available, cost-effective, and farmer-friendly.

Scope & Potential

- Scientific validation and policy support can integrate it into sustainable ethno-veterinary care.
- Standardizing preparation, dosage, and frequency improves reliability and adoption.
- Can be promoted via dairy extension, and farmer field schools.
- Value-added products like sprays, washes, or gels enable commercialization.
- Akashbel mastitis management is simple, low-cost, and effective.

Need for Scientific validation

- Validate antimicrobial efficacy and safety.
- Conduct trials to standardize protocols.
- Determine optimal dose.
- Compare with standard treatments.

Contributors: Deepali and Yogita Sharma; KVK, Una

Management of Livestock Diarrhoea using Cottonseed and Ghee

Brief description

Diarrhoea is a frequent problem in livestock, particularly in rural, resource-limited farms. When veterinary support is unavailable, farmers in Reasi district of Jammu and Kashmir use traditional remedies such as a mixture of cotton and ghee. Cotton's natural fibres absorb excess gut moisture, while ghee lubricates and soothes the digestive tract, helping stabilize bowel movements and support faster recovery. This traditional, low-cost practice is widely used as a first-aid remedy for livestock diarrhoea.

Benefits

- Eco-friendly, chemical-free, and safe for milk and meat.
- Prevents dehydration, secondary infections, and sustains milk production.
- Supports gut health, controls diarrhoea, and aids recovery.
- Reduces treatment costs and empowers farmers to manage livestock health.
- Uses readily available cotton and ghee; low-cost and accessible.

Scope & Potential

- Simple, low-cost, and easy to prepare.
- Widely accepted by traditional, organic, and low-input farmers.
- Suitable for rural and remote livestock care systems.
- Integration into community-based animal health and extension initiatives enhances reach.
- Can be promoted via documentation, awareness programs, and demonstrations.

Need for Scientific Validation

- Validate efficacy, safety, and dosage.
- Assess risks.
- Identify suitable species and age.
- Support informed adoption.
- Enable mainstream integration.

Contributors: Banarsi Lal and Sanjay Koushal; KVK, Reasi

Winter Diarrhoea Management in Livestock using Fenugreek and Jaggery

Brief description

Diarrhoea in livestock, especially in winter, is common due to low temperatures, dietary changes, and weakened immunity. Rural farmers often use an indigenous methi/ fenugreek (*Trigonella foenum-graecum*) and gur (jaggery) mixture to manage it. Fenugreek aids digestion and reduces inflammation, while jaggery provides energy, warmth, and mild laxative balance. The seeds are soaked or crushed and mixed with softened jaggery before feeding. This simple, effective remedy is valuable where veterinary support is limited.

Benefits

- Soothes gut, regulates bowel, and reduces fluid loss.
- Supports health, feed intake, and productivity.
- Provides energy and warmth, aiding recovery.
- Eco-friendly, chemical-free, and safe.
- Uses readily available fenugreek and jaggery, low-cost.

Scope & Potential

- Strong potential for wider adoption among livestock-rearing communities.
- Affordable, ingredients easily available, and simple to prepare.
- Suitable for resource-poor and remote areas.
- Integration with extension services and community health initiatives enhances adoption.

Need for Scientific Validation

- Establish safety, optimal dosage, and physiological effects.
- Evaluate digestion, nutrient absorption, metabolism, and overall health.
- Standardize preparation, administration frequency, and recommended quantity.
- Facilitate integration into formal livestock health and extension systems.

Contributors: Banarasi Lal and Sanjay Koushal; KVK, Reasi

Use of *Grewia optiva* Sticks for Management of Tympany in Livestock

Brief description

Tympany (bloat) is a serious digestive disorder in ruminants caused by excessive gas accumulation in the rumen, leading to abdominal distension and potential life-threatening complications. In rural and tribal areas with limited veterinary access, farmers use indigenous remedies such as *Biyul* tree sticks in Samba district of Jammu and Kashmir. These fibrous sticks stimulate chewing and continuous salivation. Ruminant saliva, being alkaline, buffers rumen acidity, reduces foam formation, and helps break down and expel trapped gases, providing natural relief from bloat.

Benefits

- Stimulates saliva, improves rumen buffering and digestion.
- Naturally releases trapped gases and relieves bloat.
- Non-invasive, safe, low-cost; uses locally available Biyul tree sticks.
- Requires no equipment or synthetic drugs, ideal for remote areas.
- Calms animals and supports comfort and productivity.

Scope & Potential

- Standardization into powders, pellets, tinctures, or blocks.
- Ensures safe, measured, and consistent dosing.
- Strong scope for refinement beyond raw stick use.
- Collaboration for commercial natural anti-bloat products.

Need for Scientific Validation

- Validate anti-bloat and rumen-modulating effects.
- Determine optimal dosage and safety.
- Identify bioactive compounds in Biyul tree.
- Compare efficacy with conventional treatments.

Contributors: Sanjay Khajuria and Saurav Gupta; KVK, Samba

Use of *Cassia fistula* (Amaltas) Seeds for Alleviation of Abdominal Pain in Livestock

Brief description

Amaltas is widely used in traditional veterinary care for managing digestive disorders in livestock. The fruit pulp, not the seeds, holds therapeutic value due to its natural laxative and carminative properties. When given in proper amounts, it softens intestinal contents, relieves constipation, and helps expel trapped gases, reducing colic and abdominal discomfort. Easily available and mild in action, it serves as a low-cost, safe first-aid remedy for cattle, buffaloes, goats, and equines in areas with limited veterinary access.

Benefits

- Dual laxative and carminative action relieving constipation and gas.
- Gentle on digestion, avoids irritation, dehydration, or harsh purging.
- Eco-friendly, plant-based, and safe for animals and the environment.
- Supports rumen function and overall digestive health.
- Widely available and requires minimal processing.

Scope & Potential

- Ensure safe, consistent, and easy dosing across species.
- Shift from raw pulp to standardized formulations.
- Develop pellets, syrups, capsules, or herbal boluses.
- Commercialize via veterinary herbal product lines.

Need for Scientific Validation

- Determine optimal dosage and administration methods.
- Evaluate efficacy across livestock species.
- Assess long-term safety.
- Generate evidence for expert approval and wider adoption.

Contributors: Sanjay Khajuria and Saurav Gupta; KVK, Samba

Turmeric–Mustard Oil Paste to Manage Infection and Inflammation on Disbudding

Brief description

Applying a turmeric and mustard oil paste on calves' disbudding sites is a simple, cost-effective traditional practice. It provides antimicrobial, anti-inflammatory, and healing-promoting effects, preventing infection, reducing inflammation, and accelerating recovery. Leveraging bioactive compounds, this natural remedy maintains a sterile environment and supports innate healing, making it ideal for smallholder and low-input livestock systems.

Benefits

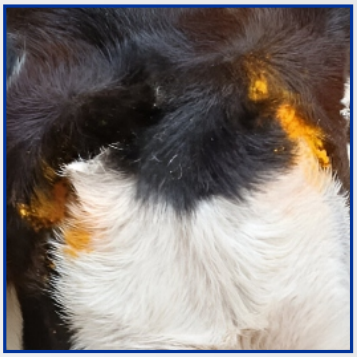
- Prevents infections through antibacterial and antifungal action.
- Reduces pain and swelling, speeding wound healing.
- Protects wounds from flies, dirt, and moisture.
- Cuts antibiotic use and improves calf welfare.
- Natural, low-cost, and farmer-friendly.

Scope & Potential

- Suitable for smallholder, sustainable, antibiotic-free dairy systems.
- Improves post-disbudding recovery and herd productivity.
- Low-cost and locally available calf care solution.
- Easy to integrate into routine calf management.

Need for Scientific Validation

- Compare healing and infection rates with standard treatments.
- Assess inflammation reduction and recovery time.
- Standardize paste composition and concentration.
- Optimize application method and frequency.
- Establish safe, evidence-based protocols.



Contributors: Gurlal Singh and Rakesh Kumar; KVK, Faridkot

Garlic (*Allium sativum*) Supplementation for Parasite Control in Backyard Poultry

Brief description

Garlic in poultry boosts immunity and controls internal and external parasites naturally. Its sulphur compounds, antibacterial, and antifungal properties reduce mite, lice, and worm infestations. Administered via feed, water, or coop spray, it is flexible, cost-effective, safe, and suitable for backyard and low-input systems.

Benefits

- Boosts immunity, reducing disease incidence and mortality.
- Controls internal parasites due to antiprotozoal and anthelmintic action.
- Repels external parasites like mites and lice.
- Antibacterial and antifungal effects lower harmful microbes.
- Improves productivity, egg quality, and growth in small-scale poultry.
- Chemical-free, supports organic and sustainable poultry systems.

Scope & Potential

- Improves flock health, reduces disease, and enhances product quality.
- Affordable, locally available, and safe for smallholder and organic poultry systems.
- Meets demand for chemical- and antibiotic-free poultry products.
- Scalable for backyard, rural, and commercial poultry farming.
- Scope for standardized garlic powders, supplements, or liquid extracts.

Need for Scientific Validation

- Determine optimal dosage, frequency, and application method.
- Quantify effects on parasite load, immunity, growth, and health.
- Compare efficacy with conventional chemical treatments.

Contributors: Balbir Singh Khadda, Munish Sharma, Harmeet Kaur and Gulgul Singh; KVK, SAS Nagar

Post-Partum Nutritional Management in Cattle using Boiled Grains

Brief description

Feeding boiled grains post-calving provides cows with a mild, easily digestible energy source during physiological stress. Reduced appetite after calving necessitates gentle, palatable food to support recovery and lactation. Grains like wheat, maize, or bajra, often mixed with jaggery and a pinch of salt, offer a practical, accessible, and effective solution for meeting post-calving nutritional needs.

Benefits

- Boiled grains enhance digestibility and provide post-calving energy.
- Stimulates appetite and recovery after calving.
- Supports lactation, body condition, and reproductive health.
- Wheat bran aids placenta expulsion and eases gut discomfort.
- Simple, low-cost, using readily available household grains.

Scope & potential

- Simple, effective, and suitable for broader adoption.
- Integrate into post-calving feeding to improve milk, body condition, and reproduction.
- Standardize grain type, quantity, and supplements for optimal results.
- Reduces reliance on commercial feeds, cost-effective and sustainable.

Need for Scientific Validation

- Quantify benefits during the 21-day transition period.
- Assess appetite, energy balance, weight, and metabolic disorder prevention.
- Support evidence-based post-calving management.

Contributors: Parminder Singh and Maninder Singh Bons; KVK, Hoshiarpur

Use of Peanut (*Arachis hypogaea*) Oil for Management of Sub-Estrus in Cows

Brief description

Peanut oil, preferably homemade for purity, is traditionally used to treat sub-estrus in cows. Cows are fed 50-100 ml daily for 10-15 days, adjusted for body weight. This natural, cost-effective method stimulates ovarian activity, restores normal estrous cycles, and avoids synthetic hormones. It integrates easily into regular feeding schedules, making it ideal for smallholder and low-input dairy farmers seeking a practical reproductive management solution.

Benefits

- Treats sub-estrus by improving ovarian activity and estrus detection.
- Enhances conception rates and shortens inter-calving intervals.
- Supports milk production and reproductive efficiency.
- Practical for rural farmers, integrates with routine dairy management.
- Inexpensive, safe, and hormone-free.

Scope & Potential

- Peanut oil is a simple, affordable, effective remedy.
- Integration into herd management boosts reproduction and farm productivity.
- Reduces reliance on costly hormonal treatments.
- Sub-estrus lowers conception, milk yield, and progeny productivity.

Need for Scientific validation

- Assess estrus, conception, inter-calving, and reproductive efficiency.
- Standardize peanut oil dosage, duration, and frequency.
- Provide evidence for adoption and modern dairy integration.

Contributors: Sachin Pant and R K Sharma; KVK, Champawat

Polyherbal Therapy for Infection Management in Cows

Brief description

A traditional cow remedy combines fenugreek seed powder (25-30 g), turmeric powder (20-25 g), and ghee (30-40 g) with wheat flour to form a laddu. Administered nightly to heifers or adult cattle for at least 15 consecutive days, no additional feed is given until morning to allow full medicinal effect. This simple, cost-effective practice is traditionally used by farmers to prevent and manage infections, especially reproductive tract and systemic infections, promoting general health and immunity.

Benefits

- Treats reproductive tract infections and aids recovery.
- Turmeric and Fenugreek support reproduction.
- Improves general immunity.
- Ghee enhances absorption and healing of active compounds.
- Safe, cost-effective, accessible, reduces reliance on antibiotics.

Scope & potential

- Turmeric-ghee-fenugreek laddu is simple, affordable, effective.
- Integrate into herd health to reduce drug use.
- Promote via extension programs and farmer workshops.
- Ready-to-use formulations aid smallholder adoption.
- Reproductive infections lower productivity and cause losses.

Need for Scientific validation

- Evaluate effectiveness against reproductive and systemic infections.
- Conduct studies on reproductive health, infection clearance, and immunity.
- Standardize dosage, duration, and frequency of laddu administration.
- Assess impact on overall cattle productivity.

Contributors: Sachin Pant and R.K Sharma; KVK, Champawat

Nutritional Management of Anestrus in Cows using Germinated Lentil and Wheat

Brief description

A traditional remedy for anestrous in cows involves feeding 50 g each of sprouted lentil and wheat daily for 21 days. This natural, cost-effective practice stimulates ovarian activity, resumes estrous cycles, and improves fertility. Widely adopted by smallholder farmers, it enhances overall reproductive health, body condition, and productivity while serving as a safe alternative to hormonal treatments.

Benefits

- Stimulates ovarian activity, hormonal balance, resumes estrous cycles, and boosts conception.
- Improves nutrition, digestibility, and mineral/vitamin availability.
- Supports immunity, overall health, productivity, and serves as a natural alternative to hormones.
- Safe, non-toxic, affordable, and uses locally available grains.

Scope & Potential

- Simple, low-cost, and farmer-friendly for smallholder and rural dairy systems.
- Can reduce anestrous, improve reproductive efficiency, and economic returns.
- Promote through farmer training, awareness campaigns, and on-farm demonstrations.
- Integrate into routine herd management and extension services.
- Standardized feeding protocols, pre-packaged supplements, or community sprouting units.

Need for Scientific Validation

- Determine optimal quantity and feeding duration for effectiveness.
- Assess impact on reproductive hormones and fertility outcomes.
- Conduct controlled trials to measure estrous induction and conception rates.
- Evaluate overall improvements in reproductive health.

Contributors: Sachin Pant and R.K Sharma; KVK, Champawat

Honey-Based Wound Management in Farm Animals

Brief description

Honey is a natural wound-healing agent for animals with antibacterial, anti-inflammatory, and antioxidant properties. It maintains a moist environment, supports tissue regeneration, accelerates granulation, and reduces odour and discharge. Its osmotic effect inhibits microbial growth, while enzymes aid wound cleaning and repair. Honey soothes inflamed tissues, reduces pain, and improves animal comfort. Farmers in Nainital district of Uttarakhand use this as a complementary alternative to synthetic antiseptics and antibiotics for livestock wound care.

Benefits

- Affordable, and widely available.
- Reduces infection risk and promotes tissue repair.
- Maintains moist wound environment, preventing dryness and dressing adhesion.
- Anti-inflammatory: decreases swelling, redness, and pain.
- Safe, natural, cost-effective, and suitable for smallholder farmers.

Scope & Potential

- Wide potential for wound care in sustainable and organic livestock systems.
- Integration with modern veterinary practices enhances adoption.
- High relevance due to global demand for natural, eco-friendly, health-promoting products.
- Opportunities for innovation: standardized medical-grade honey, ready-to-use dressings.

Need for Scientific Validation

- Requires scientific validation for safety, consistency, and reproducible wound-healing effects.
- Determine optimal formulations, dosages, and application methods.
- Study mechanisms of action for therapeutic efficacy.
- Validate against medical and veterinary regulatory standards.

Contributors: Balwan Singh; KVK, Nainital

Use of *Zanthoxylum armatum* (Timur) Paste for Ectoparasite Control in Livestock

Brief description

Timur in northern India are traditional medicinal plants with antimicrobial, antiparasitic, and insecticidal properties. Farmers in Uttarakhand use paste from leaves, seeds, or bark on animals to control lice, mites, and ticks. Its bioactive compounds like alkaloids, essential oils, and flavonoids, repel parasites, reduce irritation, and promote skin health, making Timur an effective, low-cost, eco-friendly tool for sustainable livestock management.

Benefits

- Controls ecto-parasites, reducing irritation, stress, and infections.
- Soothes inflammation, prevents itching, and promotes skin healing.
- Improves animal comfort, productivity, and overall well-being.
- Safe, biodegradable, and chemical-free, supporting sustainable livestock management.
- Cost-effective and locally available for smallholder farmers.

Scope & Potential

- Growing demand for natural, chemical-free remedies favours Timur paste.
- Widely available in Himalayas and northern India for large-scale use.
- Offers antimicrobial, antifungal, and anti-inflammatory benefits.
- Farmer outreach and organic integration enhance adoption and rural livelihoods.
- Can be developed into standardized or ready-to-use formulations.

Need for Scientific Validation

- Scientific validation needed to quantify Timur paste efficacy.
- Determine optimal concentration, application frequency, and safety.
- Understand mode of action for better reproducibility.
- Support integration into modern veterinary and evidence-based livestock management.

Contributors: Kanchan Arya; KVK, Pithorgarh

KEY LEARNING, WAY FORWARD & POLICY IMPLICATION

The compilation of Indigenous Technical Knowledge (ITKs) across Punjab, Himachal Pradesh, Uttarakhand, Jammu & Kashmir, and Ladakh demonstrates that ITKs are integral components of locally adapted livelihood systems rather than isolated practices. Spanning crop production, plant protection, ethno-veterinary care, food processing, and post-harvest management, these practices show strong internal coherence rooted in agroecological principles, risk diversification, and efficient resource use. Their continuity over generations reflects both functional effectiveness and social acceptance within farming communities.

KEY LEARNING

Relevance under Resource and Climate Constraints: A key learning from the documentation is the high relevance of ITKs in contexts of rising input costs, climate variability, and smallholder vulnerability. Most practices depend on locally available materials, low external energy, and simple tools, making them well suited to marginal, rainfed, hill, and cold-arid regions. These attributes position ITKs as practical resilience strategies that complement formal technologies.

Multifunctionality and Sustainability Orientation: Many ITKs simultaneously support productivity, ecological sustainability, and household food and nutritional security. Practices such as mixed cropping, botanical pest management, traditional storage, and ethno-veterinary remedies contribute to biodiversity conservation, soil health, reduced chemical use, and cost savings, highlighting their potential to strengthen integrated farming systems and sustainable intensification pathways.

Social and Cultural Embeddedness of Knowledge: The compilation highlights that ITKs are deeply embedded in social institutions, cultural norms, and seasonal rhythms. Knowledge transfer is largely informal and intergenerational, with women, elders, and community specialists serving as key custodians. However, this embeddedness also makes ITKs vulnerable to erosion due to rural out-migration, shifting aspirations, and weakening traditional institutions, underscoring the need for systematic documentation.

Central Role of KVKs in ITK Systems: The exercise reaffirms the pivotal role of Krishi Vigyan Kendras (KVKs) as district-level knowledge intermediaries. Their close engagement with farming communities enables accurate identification, contextual documentation, and participatory validation of ITKs. KVK-led approaches that combine field observation, farmer interaction, and on-farm trials are particularly effective in capturing tacit knowledge often missed by conventional research methods.

Importance of Participatory and Layered Validation: Scientific validation of ITKs is most effective when undertaken through a stepwise and participatory process. On-farm testing by KVKs under local conditions generates practical evidence, while subsequent laboratory and controlled studies by ICAR institutes and SAUs enhance scientific credibility. Given the context-specific nature of many ITKs, validation should clearly define domains of applicability rather than seek universal generalization.

WAY FORWARD

ITK documentation should be mainstreamed as a regular function of extension and research systems rather than treated as an ad-hoc activity. KVKs should integrate ITK identification and recording into annual action plans, diagnostic surveys, and extension programs. ICAR-ATARIs may facilitate the adoption of standardized yet flexible documentation formats that capture technical details, ecological context, cultural dimensions, and gender roles.

Strengthening Knowledge Repositories: Development of district-, regional-, and national-level ITK repositories is essential. Digital platforms with multilingual content, supported by physical repositories at KVKs, will ensure wider accessibility and long-term preservation. Audio-visual documentation and geo-tagging should be promoted to enhance usability for research, extension, and policy planning.

Enhancing Validation and Research Integration: Dedicated support is required to strengthen KVK capacities in designing robust on-farm trials and generating standardized evidence. ICAR-ATARIs should play a coordinating role in prioritizing ITKs, harmonizing methodologies, and linking KVKs with ICAR institutes and SAUs for advanced scientific evaluation. Greater convergence between natural sciences and social sciences is necessary to assess not only efficacy and safety but also socio-economic viability, labour implications, and adoption behaviour.

Ethical Protocols and Benefit Sharing: Clear ethical guidelines must govern ITK documentation and validation, including prior informed consent, acknowledgment of knowledge holders, and fair benefit-sharing mechanisms. Special efforts should be made to document ITKs held by women, pastoralists, tribal communities, and other marginalized groups whose knowledge remains underrepresented in formal systems.

Scaling through Extension and Demonstration: Validated ITKs should be promoted through frontline demonstrations, farmer field schools, exposure visits, and identification of farmer champions. KVKs should develop simple, actionable extension materials in local languages to facilitate adoption. Context-specific scaling strategies, sensitive to agro-ecological and socio-cultural conditions, will enhance effectiveness.

Convergence with National Programs and Markets: ITKs should be systematically aligned with national initiatives such as the Paramparagat Krishi Vikas Yojana, National Mission on Natural Farming, and climate-resilience programmes. Linking validated ITKs with certification systems, value addition, and market access can convert traditional practices into viable livelihood opportunities. Engagement with FPOs, SHGs, and rural enterprises will further support scale-out while retaining community ownership.

POLICY IMPLICATION

Indigenous Technical Knowledge represents a dynamic and context-responsive innovation system rather than residual folklore. By embedding ITKs within ICAR's research-extension-policy continuum, India can enrich its sustainable agriculture portfolio, reduce dependency on external inputs, and strengthen climate resilience. Systematic documentation, participatory validation, and responsible scaling through KVKs and ICAR-ATARIs are therefore both a scientific necessity and an institutional responsibility.

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