AATCC Journal

07 July 2026: Received
13 August 2026: Revised
04 September 2026: Accepted
05 September 2026: Available Online

https://aatcc.peerjournals.net/

Original Research Article

Open Access

Khet Bachao Abhiyan 2026 in Changthang: sustainable agriculture among India's highest farming villages

Phuntsog Tundup[1], Jamyang Lahmo*[2], Tashi Dolkar[1], Stanzin Diskit[2], and Tsering Lanzes[2]

[1]*Krishi Vigyan Kendra (KVK) Nyoma, Leh II, University of Ladakh, Leh, Ladakh – 194101, India*
[2]*School of Agricultural Sciences & Technology, University of Ladakh, Leh, Ladakh – 194101, India*

ABSTRACT

The Khet Bachao Abhiyan (KBA) 2026, a nationwide campaign launched by the Ministry of Agriculture & Farmers' Welfare, Government of India, under the theme 'Healthy Soil – Healthy Crop – Prosperous Farmer', was implemented in the ecologically sensitive Changthang region of eastern Ladakh during 1–30 June 2026. Krishi Vigyan Kendra (KVK) Nyoma, Leh II, University of Ladakh served as the nodal institution, working with the Department of Agriculture, Union Territory (UT) of Ladakh, and with Junior Extension Officers (JEOs) from the Nyoma, Tangtse and Durbuk blocks. The campaign opened with a technology exhibition at the Vibrant Village of Chumur, coinciding with a visit by the Hon'ble Lieutenant Governor of Ladakh, where bio-inputs (neem oil, bionutrient formulations and Jeevamrit), a curd milk churner and UV-stabilised greenhouse polythene were demonstrated to 240 farmers, delegates and school children. Implementation was challenging owing to an extreme cold-arid climate, a short field season, widely dispersed settlements, restricted border-area access and limited local agri-input supply infrastructure. Subsequent field demonstrations covered natural farming inputs (Jeevamrit and Beejamrit preparation), black polythene mulching and oyster mushroom cultivation, alongside structured dissemination of information on the Ladakh Greenhouse Scheme, PM-KISAN, the Kisan Credit Card (KCC), the Compost Pit Scheme, the National Mission on Natural Farming (NMNF) and Agricultural Technology Management Agency (ATMA)-supported training. Across 18 documented programme sites, 755 participant contacts were recorded (Table 3), and vegetable seedlings, neem oil, bionutrient formulations and Jeevamrit were distributed. This paper describes the implementation methodology, key activities, scheme dissemination, participant responses and challenges specific to the cold-arid high-altitude agro-ecosystem, and discusses the replicability of this convergence-based extension model for frontier zones of India. The study documents a national agricultural extension campaign implemented in some of India's highest farming villages, indicates that a KVK–Agriculture Department convergence model is feasible in an extreme high-altitude setting, and proposes a framework, which may be replicable in other frontier agro-ecosystems, that links natural-farming technology transfer with government scheme dissemination.

Keywords: *Natural farming; Jeevamrit; black polythene mulching; oyster mushroom; Changthang; high-altitude agriculture; agricultural extension; cold-arid ecosystem.*

1. Introduction

The Changthang region of eastern Ladakh, situated along the strategic India–China border at altitudes ranging from 4,000 to over 5,000 metres above mean sea level (amsl), represents one of the most challenging agricultural landscapes in the world. Home to nomadic and semi-nomadic Changpa communities, the region is characterised by a hyper-arid cold desert climate, extreme temperature fluctuations, short frost-free growing seasons (typically 90–120 days), and highly alkaline, poorly structured soils with low organic carbon content. The primary livelihood of communities in this region revolves around Pashmina goat rearing, yak herding and small-scale subsistence cropping in the limited arable pockets around villages.

*Corresponding Author: ***Jamyang Lahmo***
*Email Address: ***lamojamyang@gmail.com***

DOI: https://doi.org/10.21276/AATCCReview.2026.14.04.14
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Agriculture in Changthang faces a distinctive set of structural constraints: limited availability of certified seed and planting material, non-availability of manufactured agri-inputs due to logistical bottlenecks, a short cropping season compounded by late thaw and early freeze, and a near-total absence of irrigation infrastructure beyond traditional glacial meltwater channels. Despite these constraints, villages such as Tsaga (at approximately 15,000 feet amsl, among the highest inhabited farming villages in India), Nyoma, Mudh, Korzok, Durbuk and Tharuk continue to support small communities engaged in pea, barley, buckwheat and vegetable cultivation, often within protected structures (greenhouses and low tunnels).

In this context, the Krishi Vigyan Kendra (KVK) Nyoma, Leh II, established under the University of Ladakh, serves as the primary institutional conduit for agricultural extension, technology transfer and farmer capacity building in the Nyoma and Tangtse sub-divisions. Functioning since 2013, KVK Nyoma has developed deep outreach across the Changthang landscape. It earlier implemented the Viksit Krishi Sankalp Abhiyan (VKSA) 2025, a 15-day campaign that reached 1,885 farmers across Changthang (939 male and 946 female), covering all 23 Vibrant

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Villages along the border; the wider VKSA effort involved teams covering 83 villages [1,2].

The Khet Bachao Abhiyan 2026, launched nationally on 1 June 2026 under the aegis of the Indian Council of Agricultural Research (ICAR) and the Ministry of Agriculture & Farmers' Welfare, with the theme 'Healthy Soil – Healthy Crop – Prosperous Farmer', provided a timely and structured platform to deepen and extend this work [3]. The campaign identified 100 districts with the highest Di-Ammonium Phosphate (DAP) consumption and designated them as priority targets, tasking all KVKs with implementing comprehensive outreach programmes that integrated natural farming, soil health management and balanced nutrient use through demonstrations, Kisan Goshtis and stakeholder trainings. In addition to technology demonstrations, KVKs were tasked with disseminating information on ongoing central and UT farmer welfare schemes so that eligible farmers could access income support, credit and infrastructure benefits alongside new technical knowledge.

KVK Nyoma, Leh II, in collaboration with the Department of Agriculture, UT Ladakh, and with the deployment of Junior Extension Officers (JEOs) across multiple blocks, implemented KBA 2026 in Changthang through a series of awareness-cum-demonstration programmes. These opened with a flagship technology exhibition at Chumur and continued through natural farming input preparation (Jeevamrit and Beejamrit), black polythene mulching sheet technology, oyster mushroom cultivation and a wider set of bio-input and low-cost infrastructure demonstrations, together with structured dissemination of government schemes such as the Pradhan Mantri Kisan Samman Nidhi (PM-KISAN), the Kisan Credit Card (KCC), the Ladakh Greenhouse Scheme, the Compost Pit Scheme, input distribution support, the National Mission on Natural Farming (NMNF) and ATMA-supported trainings.

Specifically, this study documents the implementation methodology and key activities of KBA 2026 in Changthang; describes participant awareness of and receptivity to natural farming and other demonstrated technologies; discusses the relevance and adaptability of black polythene mulching and mushroom cultivation to the cold-arid context; documents the government and departmental schemes disseminated to farmers; and examines the immediate outputs and potential replicability of this convergence-based extension model for frontier zones of India.

2. Methods

2.1 Study area and agro-climatic profile

The study was conducted across multiple villages of the Changthang region, Leh district, Union Territory of Ladakh, during June 2026, with additional outreach to Hanle and several Vibrant Villages under the Tangtse sub-division. Programme sites included Chumur (the campaign launch site), Tsaga, Durbuk, Tharuk, Mudh, Chushul and several other Vibrant Villages along the India–China border. Changthang is a high-altitude plateau forming part of the Trans-Himalayan cold desert biome, characterised by extreme aridity, glacier-fed irrigation and heightened sensitivity to climate variability [4,5]. Key agro-climatic parameters relevant to this study are summarised in Table 1. Agriculture in Changthang is inherently low-input: the absence of commercially synthesised agrochemical supply chains, combined with a strong traditional organic farming ethos rooted in the use of livestock manure (particularly yak and sheep dung), positions the region as naturally predisposed to natural farming systems. However, limited scientific guidance on optimised natural input preparation and application has historically constrained productivity. KBA 2026 sought to address this gap through demonstration-based extension, reinforced by scheme-linked financial and infrastructural support.

Table 1: Agro-climatic profile of Changthang, Ladakh

Parameter	Value / description
Altitude range	4,000–5,300 m amsl
Annual rainfall	< 100 mm (hyper-arid)
Winter temperature	−20°C to −30°C
Summer (peak) temperature	10°C to 25°C
Frost-free growing season	90–120 days (June–September)
Soil type	Sandy-loam to loamy, alkaline (pH 7.5–8.5), low organic carbon
Primary crops	Barley, peas, buckwheat, vegetables (in protected structures)
Irrigation source	Glacial melt water channels
Farming system	Subsistence; agro-pastoral (livestock: Pashmina goat, yak, Changluk sheep)

2.2 Institutional framework and convergence

KBA 2026 was implemented in Changthang through an institutionally convergent framework. KVK Nyoma, Leh II served as the District Nodal Institution, with Dr Phuntsog Tundup, Head, KVK Nyoma, functioning as the Nodal Officer for the campaign. The Department of Agriculture, UT Ladakh, provided field-level extension machinery, including Agriculture Extension Officers (AEOs) stationed at Nyoma and Durbuk blocks and Sub-Divisional Agriculture Officers (SDAOs). JEOs from the Nyoma, Tangtse and Durbuk blocks were co-deployed at demonstration sites, ensuring block-level coverage and follow-up beyond the campaign period. Village Nambardars and progressive farmers were mobilised as community anchors for programme organisation, while the Agricultural Technology Management Agency (ATMA) co-organised farmer training events, including a One Day Farmers' Training programme held on 29 June 2026.

This convergence model, first piloted by KVK Nyoma during VKSA 2025, was further strengthened under KBA 2026. The embedding of Agriculture Department personnel, particularly JEOs, within KVK-led demonstration events was intended to create a durable institutional interface at the panchayat level and to ensure that the technical messages delivered by KVK scientists, together with information on farmer welfare schemes, were reinforced through the block-level agricultural administration.

The ICAR monitoring framework for KBA 2026 required daily reporting on the Kisan Sarathi Portal, covering village coverage, farmer contacts, demonstration conduct and stakeholder meetings. KVK Nyoma complied with this requirement throughout the campaign period, and programme activities were disseminated via the official Instagram page of KVK Nyoma, Leh II, providing real-time digital documentation and public outreach.

2.3 Programme design and implementation approach

KBA 2026 was implemented over 1–30 June 2026 in Changthang. The implementation approach followed the national standard operating procedure (SOP) issued by the Agricultural Extension Division, ICAR Headquarters [3], adapted to the Changthang setting. Programme delivery followed an awareness-cum-demonstration model: each event combined expert talks, farmer interaction sessions, hands-on field demonstrations, scheme awareness sessions and input distribution, so that knowledge transfer was anchored in direct practice.

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2.4 Site selection

Programme sites were selected based on village accessibility within the campaign timeframe, presence of active farming households, priority given to Vibrant Villages along the India–China border, and availability of co-located Agriculture Department staff (JEOs/AEOs). Primary documented sites included Chumur (a Vibrant Village and the campaign launch site, visited by the Hon'ble Lieutenant Governor of Ladakh); Tsaga village, Nyoma block (approximately 15,000 feet amsl, among India's highest farming villages); Durbuk block, together with Mudh, Nyoma Nidder, Sato Kargyam, Phobrang, Teri, Nee, Kesar, Kumdok and Chumathang; and Nyoma, Tukla, Liktsey, Phulak, Tarchit and Hemya. At each site, the relevant demonstration module (Jeevamrit, mulching, bio-inputs and/or mushroom cultivation) was implemented with minor adaptations based on local crops and farming-system context, alongside a structured session on relevant government schemes.

2.5 Technology interventions

Four categories of technology demonstration were conducted under KBA 2026 in Changthang.

(a) Natural farming input demonstrations – Jeevamrit. Jeevamrit is a liquid bio-inoculant formulation central to natural farming, prepared using desi cow dung (5 kg), desi cow urine (5 litres), jaggery (1 kg), flour of pulse (1 kg) and soil from the base of a banyan or peepal tree, dissolved in 200 litres of water and fermented for 48–72 hours. In the Changthang context, minor adaptations were explored using locally available livestock inputs (yak and/or cow dung and urine) as alternatives, consistent with the philosophy of resource-based natural farming systems. At Durbuk and Tharuk, Dr Phuntsog Tundup personally demonstrated the preparation of Jeevamrit and Beejamrit, explaining the underlying soil microbiome science and the economic rationale, which is particularly relevant in a region where manufactured inputs are expensive and logistically difficult to procure. At Tsaga, the Jeevamrit demonstration was the central activity, with farmers provided hands-on training on preparation and field application methods.

(b) Black polythene mulching sheet technology. Black polythene mulching was demonstrated as an adaptation tool for the Changthang agro-ecosystem. In this cold-arid region, two principal challenges for crop production are intense solar radiation leading to rapid soil moisture evaporation, and weed pressure from persistent seed banks that become active during the short summer growing season. Black polythene mulch addresses both by covering the soil, which conserves moisture and suppresses weeds, and, importantly in Ladakh's cold climate, can accelerate soil warming by absorbing solar radiation and so marginally extend the effective growing season. The demonstrations, co-presented by Mr Mohd Ramzan, Sub-Divisional Agriculture Officer (SDAO), Leh, covered mulch selection and specification, field preparation and mulch-laying technique, planting-hole punching, inter-row spacing for vegetable crops, and mulch disposal or incorporation at season end. The relevance of this technology for both open-field vegetable cultivation and greenhouse beds was discussed in the context of the Ladakh Greenhouse Scheme.

(c) Mushroom cultivation demonstration. Mushroom cultivation was introduced as a low-land, indoor enterprise with potential for income generation in Changthang communities, given the extremely limited arable land in the region and the need for supplementary household income during winter months when outdoor agriculture is impossible. Oyster mushroom (*Pleurotus ostreatus*) production protocols were covered, including substrate preparation (using local straw, barley husk and agricultural waste), spawn inoculation, bag/bed preparation, fruiting-chamber conditions and post-harvest handling. Stone dwellings in Changthang maintain relatively cool and humid interiors in summer, which was identified as conducive to fruiting of oyster mushrooms, which thrive at 15–25°C.

(d) Bio-input and low-cost infrastructure demonstrations. In addition to the three principal technology modules, KVK Nyoma conducted a wider set of bio-input and infrastructure demonstrations across programme sites, most prominently at the Chumur exhibition marking the campaign launch. These included distribution of neem oil and vegetable seedlings as low-cost eco-friendly inputs; a dedicated demonstration on black polythene mulching for moisture conservation and weed suppression; preparation and application of bionutrient formulations combined with neem oil for integrated nutrient and pest management; a curd milk churner demonstration illustrating simple on-farm dairy value addition; and distribution of Jeevamrit to reinforce natural-farming adoption at the household level. Two greenhouse-covering technologies were also demonstrated: UV-stabilised polythene for new-generation greenhouses, and UV film retrofitting for traditional Ladakhi greenhouse structures, both aimed at improving light transmission, durability and season extension in protected cultivation.

2.6 Dissemination of government and departmental schemes

Alongside the technology demonstrations, each programme site incorporated a dedicated scheme-awareness session in which KVK scientists and Agriculture Department officials briefed farmers on centrally sponsored, central sector and UT departmental schemes relevant to their farming and livelihood needs [6–9]. Farmers were provided information on eligibility criteria, application procedures and the nearest points of contact (block-level AEOs/JEOs) for enrolment. The major schemes communicated to farmers are summarised in Table 2. Scheme awareness sessions were reinforced through printed information material distributed at each site, and farmers were encouraged to approach block-level AEOs/JEOs for follow-up assistance with applications, particularly for PM-KISAN registration, KCC linkage, and the Ladakh Greenhouse and Compost Pit schemes. The One Day Farmers' Training organised under ATMA at Nyoma (29 June 2026) served as a capstone event for consolidating scheme-related queries raised during the month-long campaign.

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Scheme / Programme	Category	Key provisions communicated to farmers
PM-KISAN (Pradhan Mantri Kisan Samman Nidhi)	Central sector	Income support of Rs 6,000 per year to eligible farmer families in three equal instalments, directly transferred to bank accounts.
Kisan Credit Card (KCC)	Central sector	Provides farmers timely access to short-term institutional credit for production, post-harvest expenses and allied activities at subsidised interest rates.
Ladakh Greenhouse Scheme	UT departmental	Supports construction of passive-solar greenhouses to extend the effective growing season and enable off-season vegetable cultivation in the cold-arid climate of Ladakh.
Compost Pit Scheme (under organic farming)	UT departmental	Financial and technical support for construction of farm-level compost pits to promote on-farm recycling of organic waste and livestock manure into quality compost.
Input distribution support	UT departmental	Subsidised/free distribution of vegetable seedlings, improved seed, neem oil, bionutrient formulations and other eco-friendly agri-inputs, alongside demonstration of low-cost farm tools such as curd milk churners, to encourage adoption of low-chemical farming practices.
National Mission on Natural Farming (NMNF)	Central sector	Promotes chemical-free farming through farmer training, cluster-based adoption, and support for preparation of on-farm natural inputs such as Jeevamrit and Beejamrit.
Agricultural Technology Management Agency (ATMA)	Centrally sponsored	Supports farmer training, exposure visits and demonstration programmes (such as the One Day Farmers' Training organised under ATMA) to strengthen extension outreach at the block level.

2.7 Farmer outreach and data collection

Participation data, observation records and interaction-session summaries were documented at each programme site by KVK Nyoma scientists and Agriculture Department officials. Data were recorded in prescribed formats and uploaded to the Kisan Sarathi Portal as per ICAR reporting norms. Additional documentation was maintained through geo-tagged photographs and video records, shared via the official Instagram page of KVK Nyoma, Leh II (https://www.instagram.com/kvk_nyoma_changthang) and the associated X (formerly Twitter) handle (https://x.com/leh_kvk50748).

3. Results

3.1 Programme launch at Chumur village (Vibrant Village)

KBA 2026 in Changthang was formally launched at Chumur village, one of the Vibrant Villages along the India–China border, coinciding with a visit of the Hon'ble Lieutenant Governor of the Union Territory of Ladakh to inaugurate developmental works under the Vibrant Villages Programme [10]. On the occasion, KVK Nyoma, described in campaign publicity as the highest-altitude KVK in India, mounted a technology exhibition led by Dr Phuntsog Tundup, Head, KVK Nyoma, showcasing climate-resilient farming practices, protected cultivation technologies, improved low-cost vegetable production techniques including low tunnel technology, fodder development initiatives such as demonstrations of the improved fodder variety SFO-01 ,value addition of farm and livestock produce, and integrated farming systems suited to the cold-arid conditions of Changthang.

The exhibition served as the launch platform for KBA 2026 awareness in the district, with dedicated stalls introducing farmers, delegates and school children to a range of bio-inputs, farm tools and low-cost technologies, including neem oil (distributed as a botanical bio-pesticide), vegetable seedlings (to encourage kitchen-garden and open-field cultivation), a field demonstration on black polythene mulching, bionutrient formulations combined with neem oil, a curd milk churner demonstration, UV-stabilised greenhouse polythene as a durable covering material for new greenhouse structures, and UV film application on traditional Ladakhi greenhouses as a low-cost retrofit to improve light transmission and structural durability.

Jeevamrit prepared by KVK Nyoma was also distributed to farmers at the exhibition stall. With 240 farmers, delegates and school children in attendance, Chumur registered the highest single-site attendance of any KBA 2026 programme site in Changthang (Table 3), reflecting the scale of the Vibrant Village event and the interest generated by the Hon'ble Lieutenant Governor's visit.

The event was documented and disseminated via the official Instagram page of KVK Nyoma, Leh II [10] (Fig. 3).

3.2 Programme at Tsaga village, Nyoma block

On 4 June 2026, KVK Nyoma organised an awareness-cum-demonstration programme at Tsaga village, Nyoma block, situated at approximately 15,000 feet amsl and recognised as one of the highest inhabited farming villages in India [11]. The programme was attended by 42 farmers, including village representatives. Activities included expert interaction on soil health management, crop production challenges in the cold-arid context, a practical demonstration on the preparation and application of Jeevamrit, and a briefing on PM-KISAN, KCC and the Ladakh Greenhouse Scheme. Vegetable seedlings and neem oil were distributed to participating farmers to encourage eco-friendly input adoption. The Junior Extension Officer, Nyoma block, facilitated farmer mobilisation and local logistics (Fig. 1).

3.3 Programme at Mudh village, Nyoma block

On 5 June 2026, KVK Nyoma, in collaboration with the Department of Agriculture, Nyoma, organised an awareness programme at Mudh village, Nyoma block (Fig. 2), aimed at enhancing farmers' knowledge of sustainable agricultural practices, soil health management and government support schemes [23]. Dr Phuntsog Tundup, Head, KVK Nyoma, delivered a session on natural farming techniques and eco-friendly farming practices, and elaborated on soil health management, nutrient deficiency symptoms in crops and their management for improving crop productivity and maintaining soil fertility. Ms Nawang Palkit, In-charge Agriculture Extension Officer, Nyoma, sensitised farmers to available government schemes, with detailed information on the Vermicomposting Pit Scheme, PM-KISAN, KCC and the Ladakh Greenhouse Scheme. The programme recorded 87 participants, the second-highest attendance among the documented sites (Table 3), including progressive farmers, village representatives, Self-Help Groups (SHGs) and other members of the farming community. Farmers interacted actively with the resource persons and sought solutions to agricultural issues affecting crop production in the region. Farmers at Mudh reported awareness of natural farming techniques and pest issues in greenhouses (Table 4).

3.4 Programme at Durbuk and Tharuk villages

On 8 June 2026, KVK Nyoma, in collaboration with the Department of Agriculture, UT Ladakh, organised a Kisan Goshti and field demonstration at Durbuk in the forenoon, followed by an awareness-cum-demonstration programme at Tharuk village in the afternoon [12].

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The Durbuk programme was attended by 41 farmers, including the village Nambardar and progressive farmers, and was welcomed by the In-charge Agriculture Extension Officer, Durbuk, Ms Chemet Lamo. Participants at Tharuk are included in the Durbuk figure (Table 3).

Dr Phuntsog Tundup delivered a presentation on the objectives of KBA 2026 and conducted live demonstrations on Jeevamrit and Beejamrit preparation, along with a session on Agnihastra, a natural pest deterrent formulation. Dr Tashi Dolkar, Scientist, KVK Nyoma, covered value addition of vegetable crops, post-harvest management and product diversification as income-enhancement strategies. Ms Tsering Dolkar, Agriculture Extension Officer, Leh, presented the Ladakh Greenhouse Scheme and its role in extending the cropping season, along with the Compost Pit Scheme under organic farming. Mr Mohd Ramzan, SDAO, Leh, provided information on PM-KISAN, KCC, input distribution support, and the benefits of black polythene mulching for moisture conservation and weed suppression. Practical field demonstrations on Jeevamrit, Beejamrit preparation, low tunnel technology and black polythene mulching were conducted at both Durbuk and Tharuk, giving farmers direct exposure to the full suite of KBA 2026 technology interventions and associated schemes.

3.5 Farmers' Training under ATMA

As an activity within the KBA 2026 campaign window, a One Day Farmers' Training programme was organised by the Department of Agriculture, UT Ladakh, under ATMA on 29 June 2026. The training brought together farmers from multiple Changthang settlements for a consolidated session covering natural farming demonstrations, mushroom cultivation, and guidance on PM-KISAN, KCC, the Ladakh Greenhouse Scheme, the Compost Pit Scheme and NMNF-supported input access. The event reflected the close coordination between KVK Nyoma and the Department of Agriculture in delivering a unified extension and scheme-awareness message to farming communities.



Fig. 1. Khet Bachao Abhiyan at Tsaga village, Changthang, with officials from KVK Nyoma and the Department of Agriculture, Ladakh.



Fig. 2. Farmer–scientist interaction during the Khet Bachao Abhiyan at Mudh village, Changthang, focusing on crop- and farm-related issues and their practical solutions.



Fig. 3. Inaugural day of the Khet Bachao Abhiyan at Chumur, Changthang, marking the commencement of the campaign with the participation of farmers, scientists and officials.

3.6 Summary of programme coverage

A total of 755 participant contacts were recorded across 18 programme sites (Table 3). The largest attendances were at Chumur (240), Mudh (87), Chushul (47) and Tsaga (42). Given the sparse population of Changthang villages, this represents meaningful outreach, with active participation of women, particularly in sessions on mushroom cultivation, value addition and scheme briefings, consistent with KVK Nyoma's prior extension work. Because the figures are attendance records, individuals who attended more than one event may be counted more than once.

Table 3: Khet Bachao Abhiyan 2026 programme coverage by KVK Nyoma, Leh II in Changthang

Programme site / village	Participants
Chumur (including Korzok)	240
Tsaga	42
Mudh	87
Durbuk (including Tharuk)	41
Chushul	47
Phobrang	21
Sato Kargyam	31
Teri	28
Kumdok	12
Nee	14
Kesar	17
Chumathang	31
Nyoma	21
Liktsey	31
Tukla	13
Phulak	21
Tarchit	28
Hemya	30
Total	**755**

3.7 Technology demonstrations: farmer response and observations

Farmer response to the technology modules, as recorded informally by KVK scientists and Agriculture Department officials, varied with prior knowledge and local relevance.

Natural farming inputs (Jeevamrit): Receptivity appeared high. Many participants were familiar with livestock manure-based soil amendments through traditional practice, and the demonstrations provided a scientific framework for what was already an intuitive practice. The adaptation rationale of using yak dung and urine, which are locally abundant, resonated with farming communities. Farmers expressed particular interest in Beejamrit as a seed treatment, recognising the problem of seedling loss to soil pathogens in cold, wet soils during early-season establishment.

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Black polythene mulching: Mulching technology was received with high interest, particularly at Durbuk and Tharuk where open-field vegetable cultivation is practised. Farmers identified weed management as a major drudgery task, consuming significant labour during the short growing season. The dual benefit of moisture conservation and weed suppression, combined with the potential soil-warming effect, made the technology appear highly relevant. Concerns regarding the cost of polythene sheeting and the need for disposal at season end were raised and addressed by the SDAO, Leh.

Mushroom cultivation: Mushroom cultivation generated significant curiosity as a novel enterprise. Farmers, particularly women participants, showed keen interest in indoor cultivation using locally available straw substrates. The economic estimates presented, indicating a potential yield of up to 800 g to 1 kg of oyster mushroom per kg of dry substrate over two to three flushes (a best-case figure) and a market value of Rs 150–200 per kg in Leh, were well received. The primary concern raised was access to spawn and technical support for the first production cycle.

Government and departmental schemes: In the informal impression of the programme team, awareness of PM-KISAN and KCC was moderate to high among farmers already linked to formal banking, while awareness of KCC benefits specific to allied and horticultural activities was comparatively lower. The Ladakh Greenhouse Scheme and Compost Pit Scheme drew strong interest given their direct relevance to season extension and on-farm input generation. The ATMA-organised training was appreciated as a single-window platform bringing together technology demonstration and scheme information.

3.8 Village-level farmer feedback

Qualitative feedback recorded by KVK Nyoma scientists and Agriculture Department officials during farmer interactions across programme villages is summarised in Table 4.

Table 4: Village-level farmer feedback recorded during Khet Bachao Abhiyan 2026

Village(s)	Farmer feedback / key observation
Chumur, Korzok, Nyoma, Mudh, Nyoma Nidder	Marketing of organic manures identified as priority need
Tsaga	Farmers keenly interested in natural farming to improve soil biodiversity
Mudh	Aware of natural farming techniques; pest issues reported in greenhouses
Shachukul	Pest issues reported
Durbuk, Tharuk	Quality seed and pest issues reported
Chushul	Aphid infestation reported in Ladakh greenhouses
Phobrang	Marketing issues reported
Sato Kargyam	Practising organic farming since ancestral times; natural farming techniques practised for the past 3 years
Teri, Kumdok	Mulching needed for soil-temperature moderation and weed management
Nee, Kesar	Already practising both organic and natural farming techniques
Nyoma, Nyoma Nidder, Mudh, Nyoma, TR (Tibetan Refugee Settlement)	Traditional fermented organic manure prepared using locally available sheep and goat manure
Liktsey	Quality seed availability an issue
Tukla	Practising organic farming; high adoption rate of mulching
Phulak	High adoption rate of mulching
Tarchit	High pest infestation of aphids reported
Hemya	Practises wood-ash method of pest management

TR = Tibetan Refugee Settlement, Nyoma (assumed included in the Nyoma figure in Table 3). Korzok and Shachukul are shown in Table 3 as merged into the counts above.

4. Discussion

The convergence model, with co-deployment of KVK scientists and Agriculture Department JEOs/AEOs at each programme site together with ATMA-supported training, appeared important for credibility and farmer trust. Farmers responded positively to the visible collaboration between the university-based KVK and the UT Agriculture Department, and interpreted joint delivery of technology and scheme information as institutional commitment. This observation, which rests on informal feedback, is consistent with the broader literature on convergence-based agricultural extension in remote and underserved regions [13].

The Changthang region presents a paradoxical but potentially favourable context for natural farming transition. On one hand, chemical fertiliser availability is severely limited by supply-chain constraints, creating a de facto natural farming condition in many villages. On the other hand, the absence of structured scientific guidance on optimised natural input preparation and application has resulted in sub-optimal soil nutrition management. The KBA 2026 demonstrations on Jeevamrit and Beejamrit, backed by NMNF support, were aimed at filling this gap by providing protocols for inputs that align with existing traditional knowledge and available local resources [8,14,15].

The use of yak and/or cow dung and urine as substrates for Jeevamrit adaptation in Changthang is a contextually relevant adaptation. Yak dung may harbour microbial communities adapted to the cold conditions of high-altitude pastures, and it is plausible that it could act as an effective bio-stimulant on cold, poorly structured Ladakh soils; however, this hypothesis has not yet been tested, and controlled trials are needed. The adaptation is consistent with the natural farming philosophy of utilising locally available resources [15,16] and reflects the institution's contextual knowledge built over more than a decade of work in the region.

Black polythene mulching in the Changthang context may offer benefits beyond those typically documented in temperate or tropical settings. In addition to weed suppression and moisture conservation, the soil-warming effect could be valuable where soil temperature in early June, at the onset of the growing season, may be as low as 5–8°C, below the minimum germination temperature for many vegetable crops. Studies elsewhere report that black mulch can raise soil temperature by several degrees compared with bare soil [17,18]; as an indicative estimate, a warming of about 3–5°C and an extension of the functional growing season by roughly 7–14 days might be expected under Ladakhi conditions, but these values have not been measured locally and should be verified through on-farm trials.

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If confirmed, the thermal benefit, combined with simpler weed management, would make black polythene mulching a promising single-input technology for Changthang vegetable cultivation.

The introduction of mushroom cultivation under KBA 2026 addresses a structural constraint of the Changthang farming system: the near-total cessation of outdoor agricultural activity during the winter months (October–May), which leaves households dependent on livestock-based income alone. Indoor mushroom production using locally abundant cereal straw as substrate could provide additional income in the agricultural off-season [19,20]. However, because oyster mushrooms thrive at 15–25°C while winter temperatures in Changthang fall to −20°C to −30°C (Table 1), winter production would require a heated or insulated room, and the extra cost of maintaining temperature must be included in any economic assessment. Production in the warmer months, in the relatively cool interiors of traditional stone dwellings, is more readily feasible. The alignment of this technology with KVK Nyoma's emphasis on income diversification through value addition makes mushroom cultivation a contextually grounded extension recommendation for Changthang, subject to validation of the production cycle.

The integration of scheme-awareness sessions with technology demonstrations appeared to strengthen the overall reach of KBA 2026 in Changthang. Linking PM-KISAN and KCC to the campaign gave farmers a tangible financial-support pathway alongside new technical knowledge, while the Ladakh Greenhouse and Compost Pit schemes provided direct infrastructural pathways for adopting the technologies being demonstrated. The involvement of ATMA in co-organising a dedicated Farmers' Training reinforced this convergence, suggesting that combining technology transfer with scheme facilitation is a model that could be replicated in future campaigns in remote, scheme-underpenetrated regions.

KBA 2026 built institutionally and operationally on the foundation established by VKSA 2025 [1,2,21]. While VKSA 2025 was primarily an awareness and scheme-dissemination campaign covering 1,885 farmers across 23 Vibrant Villages in 15 days, KBA 2026 adopted a more intensive, demonstration-centred approach, combining hands-on technology transfer with continued scheme dissemination at selected sites. Together, the two campaigns represent a two-stage extension model, awareness followed by skill-based demonstration and scheme convergence, that appears well suited to the Changthang context.

The principal strengths, weaknesses, opportunities and threats identified during implementation are summarised in Table 5. Key strengths include the KVK–Agriculture Department convergence model and high farmer receptivity to resource-based technologies rooted in traditional practice; principal constraints include extreme logistics in remote terrain and the absence of a structured post-demonstration follow-up mechanism. Opportunities include an 'Organic Ladakh' branding initiative and mushroom cultivation as a potential winter livelihood, while climate-change-driven glacial retreat and rural youth outmigration were flagged as long-term threats to the sustainability of the model.

Table 5: SWOT analysis of Khet Bachao Abhiyan 2026 in Changthang

SWOT component	Key points
STRENGTHS	• Strong KVK–Agriculture Department convergence model • Natural compatibility: traditional organic practices align with natural farming • Institutional continuity from VKSA 2025 platform • High farmer receptivity to resource-based technologies • Availability of local inputs (cow dung, straw and other resources) for natural farming
WEAKNESSES	• Extreme logistics: remote terrain limits site coverage frequency • No follow-up mechanism post-demonstration • Limited mushroom spawn supply infrastructure in Ladakh • Short duration for cultivation of various vegetable types
OPPORTUNITIES	• Organic premium market: Ladakh's 'Organic Ladakh' brand potential • Mushroom cultivation as a potential winter livelihood (with heating or insulation) • Vibrant Villages Programme integration for infrastructure support • Self-Help Group (SHG) and Farmer Producer Organisation (FPO) formation for collective marketing • WhatsApp and social media for real-time extension support
THREATS	• Climate change: accelerated glacial retreat affecting water availability • Youth outmigration reducing the agricultural labour pool • Growing dependence on tourism/army labour as an alternative source of income • Increasing wild animal depredation of crops

SHG = Self-Help Group; FPO = Farmer Producer Organisation.

4.1 Strengths and limitations of the study

This study benefits from its coverage of one of India's most remote and previously under-documented high-altitude farming systems, and from triangulation of Kisan Sarathi Portal records, geo-tagged photographic documentation and social-media dissemination. Nonetheless, several limitations should be acknowledged. First, participation figures were compiled from site-level attendance and Kisan Sarathi Portal records rather than a randomised survey, and may include some double-counting where farmers attended more than one event. Second, the qualitative feedback summarised in Table 4 was recorded informally during farmer interactions and was not systematically coded or statistically analysed. Third, the one-month campaign window did not permit assessment of medium- or long-term technology adoption, soil-health change or scheme-enrolment outcomes; a longitudinal follow-up study would be required to establish these. Finally, as an implementation report rather than a controlled trial, the findings describe programme reach and farmer receptivity rather than causally attributable impacts on yield or income.

5. Conclusion

The implementation of Khet Bachao Abhiyan 2026 by KVK Nyoma, Leh II in the Changthang region shows that a context-specific, convergence-based agricultural extension campaign is operationally feasible in one of India's most geographically and climatically challenging landscapes, consistent with globally recognised traditional mountain farming heritage systems [22]. The campaign reached 755 participant contacts at sites between approximately 13,800 and 15,000 feet, opening with a large technology exhibition at the Vibrant Village of Chumur during a visit of the Hon'ble Lieutenant Governor of Ladakh, and continuing through practical demonstrations of natural farming inputs, black polythene mulching, mushroom cultivation, and low-cost bio-input and greenhouse technologies tailored to the high-altitude cold-arid agro-ecosystem, reinforced by structured dissemination of PM-KISAN, KCC, the Ladakh Greenhouse Scheme, the Compost Pit Scheme, NMNF and ATMA-supported training.

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The convergence model, integrating KVK scientific expertise with Agriculture Department field machinery and ATMA-supported training through co-deployed JEOs, was workable and was well received by participants, building on the institutional relationships and farmer trust established during VKSA 2025. Its effects on adoption, yield, income and scheme enrolment were not measured and remain to be established.

Future scope: Future extension cycles in Changthang and comparable frontier regions would benefit from a dedicated KVK-coordinated Natural Farming Resource Centre at Nyoma for Jeevamrit, Beejamrit and spawn supply; wider scaling of mulching demonstrations linked to horticulture-mission subsidy support; formal institutionalisation of the KVK–Agriculture Department–ATMA co-deployment model for ICAR campaigns in tribal, border and high-altitude districts; dedicated scheme-facilitation desks at future Kisan Goshtis; Bhoti-language extension content for social-media dissemination; and a longitudinal impact-assessment study tracking natural-input adoption, soil organic carbon, scheme enrolment and crop productivity over a 3–5 year horizon.

Acknowledgements
The authors express sincere gratitude to the Agricultural Extension Division, ICAR Headquarters, for the policy and operational framework of Khet Bachao Abhiyan 2026, and to ATARI Zone-I, Ludhiana for institutional guidance. The Department of Agriculture, UT Ladakh, and specifically the Agriculture Extension Officers and Junior Extension Officers of Nyoma and Durbuk blocks, are acknowledged for their field collaboration, along with ATMA, UT Ladakh, for co-organising the One Day Farmers' Training. The authors also acknowledge the Administration of the Union Territory of Ladakh for the opportunity to showcase KVK Nyoma's technologies during the Hon'ble Lieutenant Governor's visit to Chumur, which served as the launch platform for the campaign in Changthang. The farming communities of Changthang are the true protagonists of this work.

Ethics approval and consent to participate: This paper reports on a government-mandated agricultural extension campaign and does not involve clinical research on human subjects or animals; no ethical approval was required. Farmers, delegates and officials depicted in campaign photographs consented to participation and documentation at the time of the events.

Data and material availability: Participation records referenced in this paper were compiled from Kisan Sarathi Portal submissions (ICAR) and site-level attendance registers maintained by KVK Nyoma, Leh II, and are available from the corresponding author on reasonable request. Campaign photographs and video documentation are publicly available via the official Instagram page of KVK Nyoma, Leh II (https://www.instagram.com/kvk_nyoma_changthang).

Conflict of interest: The authors declare that they have no competing interests.

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