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Commercial Agriculture for Smallholders and Agribusiness

# The Case for Drought-Resilient Seed and Home Production in Nepal Amid Climate Change

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Agriculture is the backbone of Nepal's economy, contributing about one-third of the country's GDP and employing 74% of its economically active population (World Bank, 2022). However, rising temperatures and erratic rainfall patterns have disrupted traditional farming cycles. While rainfall supports agricultural productivity, temperature fluctuations and unpredictable weather conditions have negatively impacted crop yields, exacerbating food security concerns, especially in rural areas (Acharya and Bhatta, 2013).

Nepal's agricultural vulnerabilities are particularly acute in the hill and high-hill regions, where food grain deficits have affected 27 districts (Acharya and Bhatta, 2013). The growing climate-related challenges demand urgent, targeted interventions to mitigate the adverse impacts on agriculture. These concerns are underscored in several key policy documents, including the Agriculture Development Strategy (2015-2035), Nepal Agriculture Research Council (NARC) Strategic Vision for Agricultural Research (2011-2030), and the Zero Hunger Challenge (ZHC) 2025.

## IMPACT OF CLIMATE CHANGE ON AGRICULTURE

Weather-related events such as floods, droughts, and erratic rainfall have been responsible for about 90% of crop losses. These factors account for a significant portion of the national economic loss, contributing to a 1.5-2% reduction in Nepal's GDP. Droughts alone have caused 38.9% of the weather-related agricultural losses between 1971 and 2007 (MoFE, 2021a). The direct cost of climate-related losses in agriculture is staggering, and the situation is predicted to worsen, with a potential 2-4% annual drop in GDP due to climate change, necessitating an estimated USD 2.4 billion in adaptation funding by 2030 (MoFE, 2021b).

Surkhet, located in the mid-hills of Nepal, exemplifies the vulnerability of many rural districts to climate change. Its topography and climatic conditions make it prone to landslides, floods, and droughts. The region's reliance on rain-fed agriculture makes it highly sensitive to erratic rainfall patterns and temperature fluctuations, which has affected crop yields and food security (WFP, 2020). Nepal's Ministry of Agriculture and Food Security has identified agriculture as a critical sector that needs immediate attention to build climate resilience (GoN, 2019).

**Locally grown potatoes from self-produced seeds, Bheriganga Rural Municipality**

## DROUGHT-RESISTANT SEEDS IN SURKHET

Drought-resistant or drought-tolerant crops can survive and produce yields in regions facing low-water conditions and climate variability. These crops are specifically bred or selected to withstand water stress for longer periods, allowing farmers to continue producing even in the face of insufficient rainfall. For regions like Surkhet, drought-resistant crops provide a needed solution, especially with the increasing frequency of extreme weather events.

Pabitra Seed Company is a women-led initiative that produces and promotes drought-resistant seed varieties in Surkhet region. With technical support from the CASA Programme, Pabitra Seed played a pivotal role in producing high-quality, climate-resilient varieties of rice, maize, wheat, and other crops. This has enabled local farmers to reduce their dependence on external seed markets, which are vulnerable to price fluctuations and supply chain disruptions. Since the introduction of the drought-resistant seeds locally, farmers have experienced these changes:

- **Self-Sufficiency and Food Security:** Surkhet farmers now have consistent access to high-quality, drought-resistant seeds, reducing their dependency on external markets. This contributes to greater food security and economic stability.
- **Promoting Indigenous Knowledge:** Women seed producers in Surkhet combine traditional farming knowledge with modern agricultural techniques, creating crop varieties better suited to local conditions. This integration of indigenous knowledge with scientific research enhances the resilience of local farming systems.
- **Cost Effectiveness:** Producing seeds locally eliminates the need to import expensive seeds, making high-quality, drought-resistant crops more affordable for farmers. The cost savings are substantial, making farming more sustainable in the long term.

Pabitra Seed Company is also experimenting with the drought-resilient seeds it produces in response to unpredictable sowing and harvesting times, as well as changing, erratic rain patterns and agricultural cycles (Case 1).

**Collective of women farmers in a field of drought-resilient wheat varieties**

## CASE 1: Experimenting with Time to Conquer Drought and Pests

In the fields of Bheriganga Rural Municipality, Surket, where once maize grew abundantly, the changing climate began to cast its shadow over the harvests. Five or six years ago, the fertile lands produced a hearty yield of 20 metric tonnes within 22 hectares, thanks to the regular and timely rainfall, which had been the farmers most reliable ally. The maize plants stood tall and sturdy, their golden ears basking under the sun, and pests were never more than a minor inconvenience. Yet, as time marched on, the seasons became fickle, and the rains less predictable; a long and severe drought struck, altering the once-predictable rhythm of sowing and harvesting. The land, once rich and bountiful, began to wither, and so did the maize. Insects, always lurking in the background, began to flourish in the drought's wake. They attacked the plants, causing wilting and stunting growth. What was once a rich harvest of 20 tonnes was reduced to a mere 2-3 tonnes, a fraction of what it had been.

Determined to find a solution, the Pabitra Seed team decided to experiment. They planted maize in two phases: towards the end of January 2024 (one in the 3rd week of Magh) and another in mid-February (1st week of Falgun), both harvested by the 4th week of Jestha. The results were surprising. The maize sown in January produced better yields with fewer pests, suggesting that timing could be key to avoiding drought stress and pest outbreaks. Encouraged by this success, the team expanded the experiment to sow an extra seven plots in January this year, all with the same foundational seeds and farming practices. The goal: to return to a harvest of 20 tonnes or closer, but a lot more than just a mere 2-3 tonnes. The farmers planted the drought-resilient seed in the recommended month of January and indeed from 22 hectares of land, 12 tonnes of maize were harvested, which is promising.

***Mr Chandra Ojha, General Manager of Pabitra Seed, Mehelkuna, Bheriganga Rural Municipality***

Foundational seeds of maize produced by Pabitra Seed Company


Maize: Arun-2 used on the experimental field of Bheriganga Rural Municipality

Experimental maize field of Bheriganga Rural Municipality

The Nationally Determined Contributions (NDC) of Nepal emphasise the need for climate-smart agriculture, including the adoption of drought-resistant seeds to boost agricultural resilience. In addition to drought-resistant seeds, the promotion of home-based seed production is crucial for ensuring agricultural sustainability in Nepal. It also ensures that seeds are better adapted to local environmental conditions, making them more resilient to climate-induced stresses. The shift towards drought-resilient crops and home-based seed production aligns with Nepal's international climate commitments, including the Paris Agreement.

# WOMEN AT THE FOREFRONT OF CLIMATE RESILIENCE

The leadership of women in seed production initiatives like Pabitra Seed Company is crucial in promoting climate resilience in Nepal. Women bring unique perspectives and innovations to agriculture, especially in adapting to local climate conditions. By producing and preserving indigenous seed varieties, these women contribute not only to food security but also promote gender equality in agriculture. This aligns with the Sustainable Development Goals (SDGs), particularly SDG 5 (Gender Equality) and SDG 13 (Climate Action).

Women-led seed production initiatives also emphasise the importance of gender-sensitive climate policies that recognise the central role women play in agricultural innovation and climate resilience. Empowering women in agriculture leads to more sustainable, inclusive, and climate-resilient farming systems (Case 2).

**Women farmers' discussion with junior technical assistants on climate-resilient agriculture**

## CASE 2: Building Climate Resilience One Training at a Time

Rising temperatures and erratic rainfall patterns have devastated traditional farming methods, leaving local farmers vulnerable. The drought of 2015-16 further exposed the fragility of their livelihoods, with farmers facing crop failures and economic hardship.

Recognising the urgent need for change, Pabitra Seed Company, in partnership with the CASA Programme in Nepal, launched a comprehensive training programme to help smallholder farmers adapt to the changing climate. Through this initiative, 1,684 farmers (among them 1,010 women) received crucial education on drought-resistant seeds like wheat, maize, and rice, and on sustainable farming techniques that could withstand the increasingly unpredictable climate.

The impact of this training has been profound. Farmers like Sita Bhandari and Rupa Thapa, members of Pragatisil Gai Bhaisi Palan Krishak Samuha (farmers group), have experienced firsthand the effectiveness of drought-resistant seeds. After purchasing WK 12 wheat seeds from Pabitra Seed, Rupa not only harvested a successful wheat yield (1.7 tonnes) from the 100 kg of seeds bought but also contributed to the local economy by selling surplus seeds (400 kg) back to the company. Her farm, once vulnerable to drought, is now thriving thanks to the training and seeds she received.

Similarly, Dil Kumari Thapa, President of Udaya Taja Tarkari Mahila Krishak Samuha, Gurbakot Municipality 2, implemented intercropping, planting wheat alongside peas, a technique shared and learned from CASA's training of junior technical assistants. This new method has made her farm stronger, improved the soil, and helped her grow more crops, all while saving time and effort, especially in setting up supports for her pea plants.

Member of Pragatisil Gai Bhaisi Palan Krishak Samuha in her potato field

President of Udaya Taja Tarkari Mahila Krishak Samuha growing peas for foundational seeds

The CASA training has equipped these farmers with the tools and knowledge to not only survive but to thrive in the face of climate change. With practical techniques like drought-resistant seed varieties and sustainable farming practices, Surkhet's farmers are actively combating the effects of climate change, ensuring their resilience for years to come. The partnership between Pabitra Seed and CASA exemplifies how integrated approaches of combining indigenous knowledge, gender empowerment, and climate-smart practices can build a sustainable agricultural future for Nepal. The key takeaway is clear – climate resilience is not just about enduring shocks, it is about actively adapting, innovating, and growing stronger with each season.

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