

# Late Blight of Potato in Uttarakhand

## Challenges and Solutions for Sustainable Farming

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Received: July, 2025; Accepted: August, 2025; Published: October, 2025

Potato cultivation in Uttarakhand plays a vital role in the state's agriculture, especially in the hilly regions where it is a major cash crop. The cool climate and fertile soils provide ideal conditions for growing high-quality potatoes that support local livelihoods and food security. However, late blight disease poses a serious threat, causing significant crop losses and affecting the livelihoods of local growers. Late blight of potato, caused by the fungal-like

organism *Phytophthora infestans*, is one of the most devastating diseases affecting potato cultivation worldwide. In India, the state of Uttarakhand known for its cool climate and hilly terrain is particularly vulnerable to this disease. Over the years, late blight has emerged as a major constraint to potato production in the region, posing a serious threat to the livelihoods of thousands of small and marginal farmers.

### The Disease and its Symptoms

Late blight thrives in cool, humid conditions exactly the kind of environment found in Uttarakhand's hill districts. The pathogen attacks all parts of the potato plant, including leaves, stems, and tubers. Early symptoms include small, water-soaked spots on leaves that quickly enlarge into brown lesions. Under humid conditions, a white, downy fungal growth can be observed on

the undersides of leaves. The infection often spreads rapidly, especially during wet weather, leading to the collapse of entire fields in a matter of days. On tubers, the disease causes brown, firm rot beneath the skin, rendering the potatoes unmarketable and unfit for storage. The disease can also spread to storage areas if infected tubers are not identified and removed.



**Vulnerability in Uttarakhand** Potato is one of the most important cash crops for farmers in Uttarakhand, especially in districts like Nainital, Almora, Chamoli, and parts of Tehri Garhwal. These areas, with their frequent cloud cover, mist, and cool temperatures, provide ideal conditions for the late blight pathogen to thrive.

The timing of disease outbreaks varies depending on the altitude and season. In mid and high hills, the disease is more prevalent from December to March, while in the lower hills and valleys, outbreaks typically occur during the monsoon season. Farmers in the region often reuse seed tubers, which increases the risk of disease carryover and recurrence.

### Economic and Agricultural Impact

The impact of late blight on potato cultivation is significant. In severe outbreaks, farmers may

lose up to 80–100% of their crop. For manage outbreaks, farmers resort to repeated fungicide

applications, which significantly increases input costs. In a typical season, 10 to 12 sprays may be required, putting financial strain on smallholders. Even when the crop survives, tubers affected by the disease often deteriorate in storage or are rejected in markets, reducing their economic value. This adds to the losses already faced during cultivation.

Beyond the immediate financial impact, late blight can disrupt local food security, especially in households that rely on homegrown potatoes for consumption. The overuse of chemical fungicides may also degrade soil health and contaminate water sources, particularly in

### Management and Control Strategies

In the hilly regions of Uttarakhand, late blight remains a major threat to potato cultivation, causing significant yield losses each year. To tackle this challenge effectively, farmers need a combination of resistant varieties, innovative technology, biological controls, and modern fungicides suited for hill conditions.

One of the most promising approaches is the use of **disease-resistant potato varieties (Kufri Jyoti, Kufri Pukhraj, Kufri Chandramukhi, Kufri Lauvkar, Kufri Khyati, and Kufri Surya etc.)** bred to withstand the cool and humid environment of the hills. These varieties reduce the frequency of fungicide sprays and help farmers save costs while protecting the environment.

Alongside resistant varieties, **mobile-based weather forecasting tools and disease prediction apps** have emerged as powerful aids. These technologies provide timely alerts on weather conditions that favor late blight outbreaks, allowing farmers to apply treatments precisely when needed, thereby minimizing unnecessary chemical use.

### Conclusion

Late blight of potato continues to be a persistent and serious challenge for potato farmers in Uttarakhand. With changing climatic patterns and increasing dependency on a single cash crop, the risk of disease outbreaks remains high. However, through a combination of scientific

sensitive hill ecosystems. In some cases, persistent crop failure leads to indebtedness and migration, with younger generations leaving farming altogether. Thus, the impact of late blight extends well beyond the farm, affecting the socio-economic fabric of rural Uttarakhand.



In addition, the use of **biological control agents** such as beneficial fungi like *Trichoderma* species can suppress the blight pathogen naturally. These bio fungicides are environmentally friendly and suitable for the fragile hill ecosystem.

To complement these measures, new chemical fungicides with improved efficacy and safety profiles are available. Products containing active ingredients like **Fluopicolide, Mandipropamid, and Dimethomorph** have shown excellent control of late blight, even on strains resistant to older chemicals like metalaxyl. These fungicides offer longer lasting protection and can be used in rotation with traditional fungicides to prevent resistance development. However, their use should be carefully managed according to recommended doses and timing to protect both the crop and the environment.

By integrating resistant varieties, modern forecasting, biological controls, and new-generation fungicides, farmers in Uttarakhand's hills can sustainably manage late blight, secure better yields and incomes while preserving their unique agro-ecosystem.

intervention, community participation, and policy support, the impact of this devastating disease can be minimized. Sustainable and integrated disease management is the key to safeguarding the future of potato cultivation in the hills of Uttarakhand.