साधर्म्य भाष्यम्

SĀDHARMYA BHĀṢYAM

People - Culture - Places

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Himalayan Haven of Flora and Fauna

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"The earth is the Lord's
and all that is in it, the world,
and those who live in it."
Psalm 24:1

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EDITORIAL

NATURE IN DIALOGUE

RENISH MANUVELY

Theories of interpretation have introduced new dimensions of disclosing the reality and understanding it. This perspective suggests that understanding is something that occurs within the context of dialogue. It is not something like a fixed entity embedded in the text nor a mere projection of the interpreter. Gadamer, the renowned thinker of hermeneutics calls such moments of unfolding as an event. "Understanding is not the extraction of a fixed meaning but an event – a fusion of horizons that unfolds through dialogue." (Gadamer, *Truth and Method*)

These meaning making events take place everywhere. It is not confined to anything specific. They occur in everyday life of a person. Every encounter brings forth a new understating whether in rituals, art, challenges, joys, relationships etc. In line with this hermeneutical view, perhaps, the wisdom and heritages are the results of admirable moments of encounters of humanity with the manifold dimensions of reality.

It would be profound to reflect on the dialogue between humanity and nature. Humanity is in a constant encounter with the Nature and its resources. These interactions give rise to new understandings each moment. In the previous issue we reflected the bond that humanity cherished with the nature in the context of Uttarakhand and the profound agrarian wisdom nurtured by the communities of this region. In this hermeneutic perspective, the wisdom and traditions emerged in this land definitely reflects the dynamic encounter of the mountain community .

The present discussion continues by unveiling yet another dimension of the heritage preserved here. Nature has blessed this land with admirable and unique resources. The region is home to distinct life-forms and products that have become integral to its identity. The burans tree and its radiant flowers, the majestic deodar, the resilient oaks, the Kandali plant, native apples, fibre-yielding plant species, and countless other forms of biodiversity reflect the blessings bestowed upon this land. These resources took shape over centuries through the interplay of Himalayan terrain and diverse climatic conditions.

The people of this region remain in constant interaction with these resources. Uttarakhand and the communities that inhabit it cannot be understood apart from these natural gifts. What is encountered daily through lived experience has gradually merged into the very identity of the people. These natural forms have become symbols through which cultural identity is articulated and understood. The burans flower, for instance, cannot be seen merely as a flower for the people of this land; it is woven into their way of life and sense of belonging.

These resources provided by the nature also are not mere the physical commodities that meet material needs, they can be reflected instead as the living scriptures authored by nature. They are not mute. Like sacred texts, they communicate, offering layers of meaning to those who approach them with openness. The blooming burans, vibrant even in harsh climates, expresses creativity, renewal, and resilience. Deodar, whose very name means devadāru (tree of the gods) signifies refuge, sacredness, and protection. The oak varieties here embody endurance and ecological fidelity, binding soil, water, and life together. Apples and Malta fruits testify to the harmonious meeting of climate and human cultivation. Fibre plants express traditions of sustainability, skill, and self-reliance. Taken together, these natural forms

become symbols that reveal deeper dimensions of human existence. In recognizing these natural resources as expressive partners in dialogue, we are invited to rediscover our own existence.

Tagore reminds us, "Nature is not outside us; it is deeply rooted in our consciousness and imagination." (Tagore, *Essays of Nature and Culture*) They embody the region's cultural memory, ecological wisdom, and spiritual imagination.

Hermenuetics reminds us that meaning is never isolated. It emerges only when we allow the world to speak and when we enter into a relationship of listening. The mountains, forests, and resources of Uttarakhand continue to offer such a living conversation, revealing truths that have really influenced in shaping the identity of communities here.

To heed to these meanings today is to reaffirm the wisdom and heritage carried by this land and its people. It is to acknowledge that nature is not a passive backdrop but an active participant in the unfolding of human life. When we cultivate this dialogical relationship, we begin to repair the ruptures caused by forgetfulness, exploitation, and disconnection. The natural resources are the ultimate blessings that the people of this land have attained. It is the responsibility to keep alive the interaction with these resources of nature, which can restore harmony and rhythm of life.

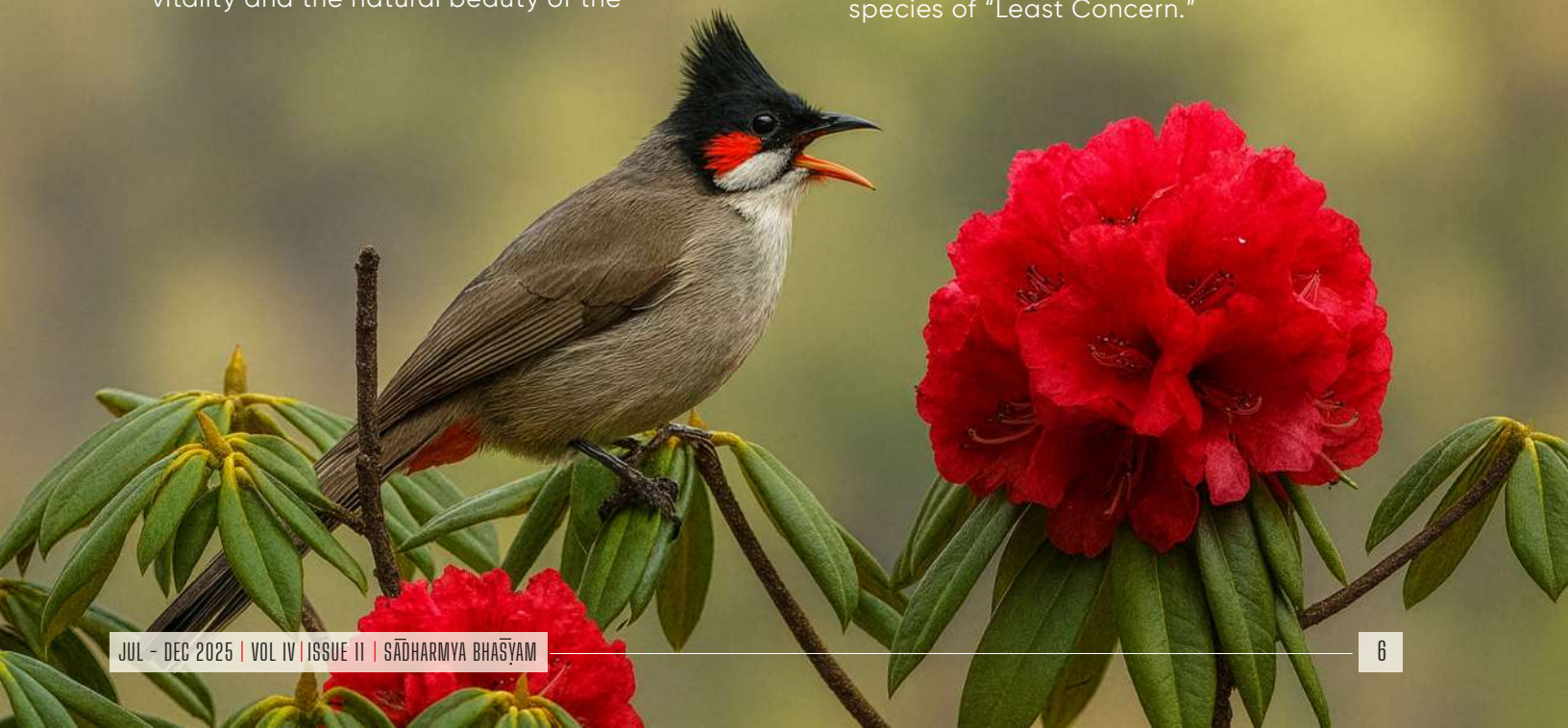
The present issue of *Sadharmya Bhasyam* by highlighting the wonderful living resources of Uttarakhand seeks to acknowledge this responsibility. By reflecting some of the significant resources of this land, the volume highlights their enduring relevance and invites readers to renew their dialogue with nature that can unveil newer dimensions of understanding of one's own existence. ■

BURANS

More than Just a Flower of the Hills

Naveen Tariyal, Arvind Bijalwan and Sumit Tewari
College of Forestry, Ranichauri

Uttarakhand, known as the Land of God (Devbhoomi), is rich in biodiversity and spiritual heritage. Its diverse flora includes numerous timber and non-timber species vital to local communities for food, medicine, fuel, fodder, and farming tools. Among these, Rhododendron arboreum (Burans)—the State Tree of Uttarakhand—holds special ecological and cultural value. R.arboreum is a prominent Himalayan tree found in the mid and high-altitude regions of the state, where it supports local livelihood. Revered as the State Tree of Uttarakhand and Sikkim, the State Flower of Nagaland, and the National Flower of Nepal, it symbolizes vitality and the natural beauty of the Himalayas. In the Western Himalayas, six rhododendron species R. arboreum, R. anthopogon, R. barbatum, R. campanulatum, R. lepidotum, and R. nivale. Of these, R. arboreum is the most widespread, showing great variation in size, color, and resilience. It grows between 4,500 and 10,500 feet, reaching up to 50 feet in height, and blooms from December to May with crimson to pale pink flowers. The leaves are dark green with a silvery underside, and the species holds the Guinness World Record as the largest rhododendron. Ecologically, it dominates Himalayan forests with Quercus, Myrica, Alnus, and Pinus roxburghii and is listed by the IUCN as a species of "Least Concern."



In Uttarakhand, Burans thrives across the Garhwal and Kumaon Himalayas. Major zones include Tehri, Pauri, Rudraprayag, Uttarkashi, Chamoli, and Dehradun in Garhwal; and Pithoragarh, Almora, Bageshwar, and Nainital in Kumaon. Its spectacular blossoms enhance the scenic beauty of the Himalayas and provide livelihood and tourism opportunities, making Burans a living symbol of Uttarakhand's ecological and cultural unity.

Cultural and Religious Significance

Burans is an ancient and dominant flowering plant with immense ecological and economic value. It is admired for its aesthetic beauty as well as its religious and medicinal significance. The blooming of Rhododendron arboreum is a sign of the arrival of the spring bringing freshness and renewed energy to the surroundings. Pink red blooming is more than just a seasonal spectacle, it symbolizes vitality, prosperity and good fortune. Spiritually, the flowers are offered in temples, used for home decoration, weddings, in local fairs and cherished in household rituals as symbol of purity and auspiciousness. In the folk traditions of Uttarakhand, Burans holds a special place.

Its vibrant red blooms are celebrated through songs and poems, often associated to love, hope, and warmth amidst the harsh mountain environment. Renowned folk singer Shri Narendra Singh Negi beautifully captured this imagery, describing how the Burans flowers blooming between Banj and Ayyanar trees appear like a graceful woman wearing a red blouse with a green saree.

Medicinal and Nutritional Value

Rhododendrons have long been valued in traditional medicine for treating ailments such as diarrhea, headache, inflammation, and infections, due to their rich phytochemical content. Across Asia, Europe, and North America, the blossoms are used to address gastrointestinal and related disorders. The extract of Burans flowers is known for strong antioxidant properties that protect against oxidative damage, reduce stroke risk, and support cardiovascular health. Various plant parts serve in folk remedies: young leaves ease headaches; dried flowers treat dysentery and diarrhea; fresh flowers heal wounds; petals and leaves help with nosebleeds, fever, and rheumatism; bark juice is used for coughs, diabetes, liver and skin diseases, and intestinal worms; while a root decoction is believed useful in early cancer stages. Rich in phenolic acids, R. arboreum displays potent antioxidant activity. Burans squash contains vitamin C, phenols, flavonoids, tannins, saponins, anthocyanins, and other bioactive compounds with nutritional and antidiabetic benefits, though its slightly bitter taste limits its appeal to some consumers.

Economic Importance

Non-timber forest products (NTFPs) are vital for sustaining local communities by providing food and income, with nearly 500 million people worldwide depending on them. Among these, the Burans tree (Rhododendron arboreum) holds great economic value, as its flowers are used to prepare squash, beverages, and chutneys that are popular across India. Recognizing

this potential, the first Rhododendron squash unit was set up in 2009 in Arunachal Pradesh by the NGO INSPIRE, producing 4,000–5,000 liters of juice each season. In the Uttarakhand Himalaya, Burans has become an important NTFP, with products like juice, jam, and jelly generating income and reducing out-migration. Research from Garhwal University confirms its economic viability with favorable benefit–cost ratios. Over 80 villages, supported by government and NGOs, are engaged in value-added Burans products. For many hill households, flower processing has become a small-scale enterprise. Individuals earn Rs.500–Rs.700 daily, and about 30% of families harvest 25–350 kg of flowers per season, earning Rs.6,000–Rs.37,000 annually.

Economic Benefits

The rhododendrons are among the first plants to flower after the harsh winter months. Their nectar, pollen, and flowers provide essential food for a variety of birds and insects. During the flowering season, rhododendrons attract both obligate and opportunistic nectar-feeding birds, and the stagged blooming across different elevations enables these birds to migrate from lower to higher altitudes. Beyond supporting avian and insect life, rhododendron forest in the temperate and subalpine Himalayas offer critical habitat for species such as the Himalayan black bear, musk deer, tragopan, blood pheasant, and monal. The trees produce substantial leaf litter, which decomposes slowly due to the toughness of the leaves, enriching the soil organic carbon. On average, an adult Rhododendron arboreum tree can sequester significant amount of carbon annually, contributing to both biomass accumulation and carbon storage.

Threats and Conservation Efforts

Many businesses and entrepreneurial ventures have linked this startup to eco-tourism and have reaped significant

Fig. 2- Cleaning of petals of Burans, boiling of flower for extracting juice, Bottling and marketing of Rhododendron products

financial rewards by marketing their products during the peak tourist season.

Collecting wild edibles and producing related value added product creates a source of income However it increases the risk of exploitation of the species and may lead to its extinction. The climate change is also showing adverse effect on rhododendron. Deforestation and unsustainable extraction of firewood by local people are the two biggest risks to rhododendrons. Therefore, urgent conservation strategies are in demand to restore rhododendron populations in the wild. Major approach was to identify ways to conserve rhododendron populations by mass propagating them and restoring them in the wild. Furthermore, government has initiated strategies to conserve the rhododendron by allowing extraction or use of only 60% flowers per tree, which will help in sustainable management of the species. As the remaining blossoms will mature and develop seeds, it will help in natural regeneration of the species. More awareness and capacity building programs involving Van Panchayats, Gram Sabhas and NGOs are required and a major requirement is to educate the locals about sustainable practices and the importance of preserving floral diversity.

Conclusion

Uttarakhand is rich in biodiversity and culture, which reflects the deep bond between its people and forests. Among the various species of Uttarakhand, Rhododendron arboreum (Burans) is both an ecological keystone and a cultural emblem. It flourishes across the Garhwal and Kumaon, enhances the Himalayan landscape with its blossoms while supporting local communities through food, medicine, and livelihood. Its value extends to rural entrepreneurship, nutrition, and ecological services such as sustaining pollinators, wildlife, improving soil fertility, and carbon sequestration. Beside these benefits, climate change, overharvesting, and deforestation are serious threats to it. Sustainable management through controlled harvesting, propagation, and community participation is essential for conserving rhododendron. Conserving it will preserve a natural and cultural treasure while reinforcing the ecological and economic resilience of Himalayan communities.■

सुनो कथा चीड़ की
हिमालय की शीत-मित्र

Uma Ghildiyal
Writer, Social Activist
Editor of Regional Reporter

उत्तराखंड में विवाह समारोह जीवन की एक पवित्र परम्परा मानी जाती है। इसमें वर–वधू को साधारण नर और नारी न मान कर उन्हें शिव–पार्वती का स्वरूप माना जाता है। कुमारसम्भव में उल्लेख आता है कि शिव–पार्वती के विवाह के अवसर पर ब्राह्मणों ने वेद–पाठ किया और स्थानीय नारियों ने अपनी बोली में मांगल गाये। मांगल का अर्थ है –मंगल गीत। ये गीत गढ़वाली में गाये जाते हैं। यह परम्परा आज भी उत्तराखंड में चली आ रही है। इन मंगल गीतों में पार्वती अपने पिता से कहती है, ''हे पिताजी ! आप मेरे विवाह में क्या–क्या करेंगे''। पिता जिनका नाम हिमवान या हिमालय था, कहते हैं – ''हे, पुत्री ! मैं तेरे विवाह में हीरे–मोतियों की वेदी बनाऊँगा। सोने –चाँदी के स्तम्भ (खम्भे)बनाऊँगा।''

यह सुन कर पार्वती कहती है, ''हे पिताजी ! आप तो

राजा हैं, इसलिये आप इतनी सुन्दर हीरे– मोती और सोने–चाँदी से बनी वेदी में बेटी का विवाह करोगे। परन्तु ऐसे में निर्धनों की बेटियों का विवाह होना कठिन हो जायेगा।'' वह कहती है,''हे पिता जी!

गारा–माटा की तुम वेदी बणावा
केला– कुलाँई का स्तम्भ बणावा।

अर्थात मिट्टी और पत्थरों की आप वेदी बनाइये तथा केला और कुलाँई के आप खम्भे बनाइये। इन पंक्तियों में कुलाँई शब्द आया है, यह गढ़वाली का शब्द है और इसका अर्थ है–चीड़। इसे अंग्रेजी में पाइनस कहते हैं। इन पंक्तियों में कई बातें सामने आती हैं–

1– चीड़ केले की तरह ही पवित्र वृक्ष है तथा केले के समान ही सर्व सुलभ है।

2– शिव और पार्वती उत्तराखंड के प्राचीन देवता और उनकी आस्था के केन्द्र हैं। इसी प्रकार चीड़ भी हजारों साल पुराना वृक्ष है।

3– स्पष्ट है कि चीड़ को अनेक प्रकार से उपयोग में लाया जाता है।

इसे आज भी विवाह समारोहों और धार्मिक समारोहों

में वेदी निर्माण के लिये प्रयुक्त किया जाता है। वैज्ञानिकों के अनुसार चीड़ के पेड़ चालीस हजार से लेकर साठ हजार वर्ष पुराने हैं। ये वृक्ष समस्त विश्व में जलवायु के अनुसार पाये जाते हैं। प्राचीन काल में इनके गोंद का उपयोग पत्थर के औजारों पर लकड़ी का हैंडिल लगाने के लिये किया जाता था। जो मानव इतने वर्ष पूर्व इसका उपयोग करते थे, उन्हें इतिहास में नियंडरथल कहा जाता है।चीड़ की राल की खोज इन्होंने ही की थी। यह इतिहास में बहुत पुराना आविष्कार माना जाता है।

यूरोप में ये लोग इस राल को इकट्ठा करने के लिये अपनी गुफाओं से मीलों दूर की यात्रा करते थे। यह भी पता चलता है कि नियंडरथल के औजारों में ऐसे पालिश किये हुये पत्थर मिले है, जिनसे आग की चिंगारी पैदा की जाती थी और इन पर चीड़ की राल के अंश पाये गये हैं। इस राल को लीसा भी कहा जाता है।

उत्तराखण्ड में चीड़ के जंगल कुल जंगल के 16 प्रतिशत हैं। यह प्रतिशत बताता है कि यहाँ ये वृक्ष बड़ी मात्रा में उगे हुये हैं। कुछ लोग इस वृक्ष को विदेशी बताते हैं और कहते हैं कि अंग्रेज इसे लाये थे। परन्तु वैज्ञानिक शोध यह बताते हैं कि यहाँ की सभी प्रजातियाँ विदेशी नहीं हैं, वरन् निचले हिमालय में पाया जाने वाला रॉक्सवर्गी पाइनस एवं उच्च हिमालय में उगने वाला ब्लूपाइन स्थानीय प्रजातियाँ हैं। पाइनस पटुता, पी ग्रेगी, पी एशियाई कृत्रिम रूप से जंगलों में लायी गयी थी।

चीड़ का पेड़ तीव्र गति से वृद्धि करता है। इसकी लकड़ी विभिन्न प्रकार के निर्माण कार्यों में उपयोगी है। इसकी राल के व्यापार के कारण अंग्रेजी सरकार ने चीड़ के जंगलों का बहुत अधिक विस्तार किया। तीव्र गति से वृद्धि करने के कारण यह तीस से पचास मीटर तक ऊँचा हो जाता है। इसे उगने के लिये अच्छी जल निकासी वाली , रेतीली दोमट मिट्टी चाहिए। देखने में यह वृक्ष बहुत सुन्दर लगता है। तना काफी लम्बा और पेड़ की लम्बाई के लगभग

आधी ऊँचाई तक शाखाओं से रहित होता है। जिससे इस पर चढ़ना और उतरना असम्भव नहीं तो कठिन अवश्य होता है। यह समुद्र तल से चार सौ पचास से तेईस सौ मीटर की ऊँचाई पर उपोष्ण कटिबंधीय देवदार वन की समशीतोष्ण जलवायु में सौ से अधिक वर्ष की आयु को प्राप्त करता है। पिनेसी परिवार का यह वृक्ष हिमाचल प्रदेश, नेपाल, भूटान और म्यांमार में खूब होता है। इसे चीड़ के अलावा सल्ला , चीयर आदि नामों से भी पुकारा जाता है। सबसे सुन्दर नाम इसका लाँग लीफ इंडियन पाइन है।

फ्रेंड ऑफ विंटर कहा जाने वाला यह वृक्ष अपनी अदम्य जिजीविषा से उस समय भी था जब इस धरती पर जीवन की सम्भावनायें कम थीं। अपने उगने की विशेषताओं को लेकर इसे टाइम मशीन भी कहा जाता है। इसके बीज तब तक जमीन में सुरक्षित रहते हैं, जब तक वह पेड़ समाप्त नहीं हो जाता है। उसके समाप्त होते ही नया वृक्ष उगना प्रारम्भ होता है। अपनी नोकदार पत्तियों और भूरे लाल रंग के तने

के साथ ये हजारों वर्ष पूर्व का इतिहास हमारे सामने लाते हैं।

चीड़ के वृक्ष की पत्तियाँ चारे के लिये उपयुक्त नहीं हैं। परन्तु यह वृक्ष आर्थिक और औषधीय दृष्टि से अत्यन्त लाभप्रद है। इसकी राल का उपयोग तारपीन के तेल में किया जाता है। फर्नीचर, दवाओं, पेंट आदि में भी इसका खूब उपयोग होता है। भवाली सेनोटोरियम भी इन्हीं वनों के बीच बना है। चीड़ के वनों के कारण जैव विविधता पर नकारात्मक प्रभाव पड़ता है। चीड़ के नीचे कोई भी वनस्पति उग नहीं पाती है। चीड़ की पत्तियाँ नीचे गिर कर सूख जाती हैं और उनमें आग बहुत जल्दी लग जाती हैं। इससे बहुत नुकसान हो जाता है। चीड़ के बीज दूर–दूर तक फैलते है, जिससे समय आने पर वृक्ष उग आते हैं। इन वृक्षों की जद में अब उपजाऊ खेत भी आ रहे हैं और धीरे–धीरे समस्त जमीन खत्म होती जा रही है। इन सब परेशानियों को रोकने के लिये हमें मिश्रित वनों को बढ़ाने का प्रयास करना चाहिये। चीड़ ने सभी खाली स्थानों को सुसज्जित कर दिया है। इसलिये हमें चाहिये कि हम मध्यम मार्ग को अपना कर चीड़ को नियन्त्रित करने का प्रयास करें। ■

Exploring the Uttarakhand's Herbal Wealth

FOCUSSING KANDALI

Ajay Semalty
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Medicinal plants have served as therapeutic resources for thousands of years, forming the foundation of traditional healing practices across civilizations. Modern medicine continues to benefit from these natural sources, as many clinically utilized drugs originate from plant-derived compounds. Botanical preparations offer not only active phytoconstituents, but also essential micronutrients including minerals, vitamins, and naturally occurring bioactive molecules. Complementary and alternative medicine has gained substantial global acceptance due to limitations in standard treatments for certain chronic or degenerative disorders. Systems such as Ayurveda highlight the importance of plant-based interventions, and contemporary research continues to validate their therapeutic usefulness.

Figure 1: Leaves of Urtica diocia

Urtica dioica (Kandali) is one such example with historic and ongoing application. Uttarakhand is a state rich in medicinal plant wealth. The local community has been using Kandali for generations for various purposes. Kandali or stinging nettle has traditionally been consumed as both a nutritional and medicinal resource. Historically used in foods such as soups and leafy preparations, it is highly accessible and adaptable in growth, making it one of the most common wild edible herbs. While it is recognized for its characteristic stinging hairs, preparations of the plant have also been valued for soothing and cooling effects in conditions such as hemorrhoids. Its role as a general health tonic has contributed to its popularity in herbal beverages. This article presents a detailed examination of the applications of Urtica dioica, emphasizing scientifically evaluated health benefits.

TAXONOMICAL CLASSIFICATION

Kingdom: Plantae
Division: Magnoliophyta
Class: Magnoliopsida
Order: Rosales
Family: Urticaceae
Genus: Urtica
Species: U. dioica
Common names: stinging nettle, common nettle, nettle root, big string nettle, *kandali, bichu ghaas.*

Plant description

Urtica dioica (stinging nettle) and Urtica urens (dwarf nettle) are perennial plants growing world wide in waste land areas. It grows 2–7 feet high with opposite cordate petiolate deeply serrated pointed leaves, which are downy underneath (Figure 1). Urtica prefers wet, rich soil and tends to grow in large patches. Kandali is taller than dwarf nettle and is perennial; dwarf nettle is an annual herb. It bears white to yellowish dioeciously flowers which occur as racemes in the axils of the upper leaves.

Leaves are covered in rigid stinging hairs, which contain an irritating fluid. The stinging sensation from contact with the leaves is caused by the release of formic acid, amines (histamine, serotonin and choline) from these rigid stinging hairs.

A large number of compounds of different polarity and belonging to various chemical classes, including fatty acids, terpenes, phenylpropanes, lignans, coumarins, triterpenes, ceramides, sterols and lectins, have been isolated from U. dioica (Fig. 2).

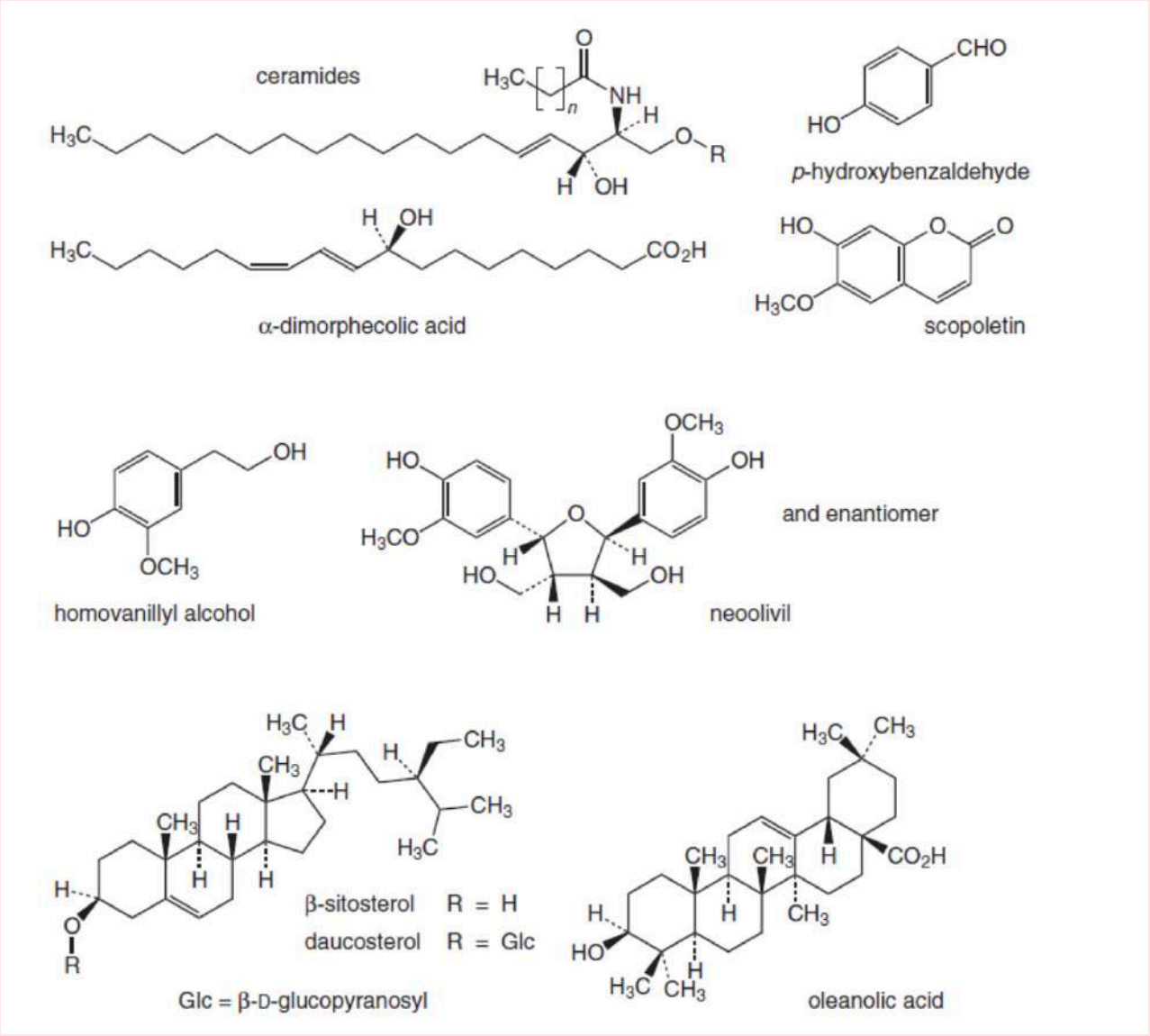

Figure 2: Major phytoconstituents of Kandali

Health Benefits of Kandali

In Diabetes (Hypoglycemic activity)

Kandali is stated to contain or control the blood sugar. The hypoglycaemic component has been termed 'urticin' and nettle has been reported to lower the blood sugar concentration in hyperglycaemic rabbits. It was suggested that the high potassium ion concentration in aqueous decoctions may contribute to the diuretic activity also.

In prostate and arthritis

(Anti-inflammatory and Anti proliferative activity)

Nettle products have been shown to lower body temperature in rats, suppress drug-induced convulsions, and decrease spontaneous activity in both mice and rats. According to studies, the leaf may have anti-inflammatory properties, which could account for its positive effects on prostate health. Nettle is believed to be the cause of this because it inhibits the body's

production of prostaglandins, which are inflammatory substances. Furthermore, the hormones and proteins that transport sex hormones (such as oestrogen or testosterone) inside the human body are impacted by nettle root. Components in the root extract may be the reason for stinging nettle & suggested use in the treatment of inflammation and arthritis. Human leukocyte elastase (HLE) was discovered to be strongly suppressed by an ethanolic extract. In Germany, licensed medications for the treatment of benign prostatic hyperplasia (BPH) contain stinging nettle root. The components in Kandali suppress prostate cell metabolism and growth.

Ethanol Abuse

Chronic ethanol administration is known to promote oxidative stress, which in turn leads to morbidity. Foods that lower oxidative stress on a variety of levels include carbs, honey, organic acids, proteins, amino acids, vitamins, enzymes, minerals, etc. According to reports, Turkish traditional medicine uses Urtica dioica plants to alleviate stomachaches and prevent liver insufficiency.

Kidney/Renal Dysfunction

Serum creatinine values indicate that nettle seed extracts may have a positive impact on impaired glomerular function i.e. kidney functioning. Only when substantial glomerular function has been lost can elevated serum creatinine levels manifest. Nettle leaf is approved by the German Commission for use as supportive therapy in patients with lower urinary tract infections (when used in conjunction with immunological and antibacterial therapy) as well as for the prevention and treatment of urinary gravel formation.

Allergic Reactions

For many years, doctors have recommended and sold an over-the-counter freeze-dried formulation of Urtica dioica to treat allergic rhinitis. To justify the use of nettle in the treatment of allergic rhinitis, clinical trials showing statistical significance over placebo and/or equivalency with other current therapies are required. Nettle leaf's anti-inflammatory properties imply that it could help with all kinds of allergy illnesses.

Antioxidant Activity

In a study, a systematic record of the relative antioxidant activity of Urtica dioica (Urticaceae) extracts
was carried out. The antioxidant activity had been reported in the leaves of U. dioica.

Cardiovascular Disease

Nettle has been shown to cause bradycardia and a strong hypotensive impact in cats, but no effect on mice's blood pressure. Since atropine was found to have no effect on these latter activities, an a-adrenoceptor-based mechanism of action was proposed. According to reports, U. dioica's aqueous extract has a hypolipemic effect, demonstrating its ability to lower cardiovascular risk and protect rats against hepatic damage caused by hyperlipemia. The treatment resulted in a considerable decrease in total cholesterol, triglycerides, and low-density lipoprotein cholesterol (LDL). According to research on animals, Urtica extracts significantly reduce platelet aggregation and enhance lipid profiles.

In Prostate and Hair Loss

The enzyme 5 reductase is believed to play a role in the pathogenesis of benign prostatic hyperplasia as well as alopecia/ baldness. Since the mechanism of action of finasteride is based on a 5 reductase blockade, and it is used in alopecia/ baldness Kandali can also be used in hair loss. In tribal communities it has long been used for washing/cleansing hairs.

In the Department of Pharmaceutical Sciences at Garhwal University, my research group has worked on Kandali for its role in baldness. The formulations have been developed and tested in animals for hair growth activity. We also got two patents on the hair growth activity of Kandali. The research is also undergoing for exploring other health benefits of Kandali.

Antiviral Activity

The (N-acetylglucosamine) n-specific lectin from Urtica dioica (UDA) demonstrated in vitro inhibitory activity against HIV-1-, HIV-2-, CMV-, RSV- and influenza-A virus-induced cytopathicity.

In prostate through Aromatase Activity Inhibition

One important enzyme in the metabolism of steroid hormones is aromatase. It is in charge of converting androgens into oestrogens. The aetiology of benign prostatic hyperplasia (BPH) seems to involve oestrogens. Thus, aromatase suppression may help with prostate disorders.

Nutritional and Food-uses

The young leaves of Kandali are collected, boiled or cooked to remove the stinging hairs, and eaten as a leafy vegetable *(sabzi/saag)* in Uttarakhand. For example *Kandali ka Saag*. Many studies show that stinging nettle leaves are rich in vitamins (A, C, K), minerals such as iron, calcium, magnesium, and contain protein and bioactive compounds (flavonoids, phenolics) with antioxidant potential. In the Uttarakhand context, the dish serves as a locally sourced, nutrient-rich green for hilly areas where fresh greens may be limited in certain seasons. It is often served with local breads (e.g., *mandua roti*) or rice in Kumaon and Garhwal regions.

Miscellaneous Health Benefits

Insect bites, arthritis, neuralgia, gout, joint discomfort, plaque and gingivitis, hair loss, and mild bleeding (especially mild menorrhagia) have all been claimed to benefit from urtica. Fresh nettle leaves have traditionally been used topically to help patients with a variety of pain disorders by acting as a counterirritant. Weiss prescribes applying topical nettle to osteoarthritis, sprains, chronic tendinitis, sciatica, and lumbalgia. If a person is not allergic to nettle, this method is safe.

In Handicraft/Textile Industry

Kandali or nettle fibre is an important natural product of Uttarakhand. Sources indicate that wild nettle yields about 760 kg of fibre per hectare under hill conditions. Similar to flax or hemp, nettle fibre is rich in cellulose and is valued for its strength and durability. Extracted from the bast of Urtica dioica and related Himalayan species, it is a sustainable, low-input material that thrives naturally without pesticides or fertilisers—ideal for hilly regions. Used in hand-woven fabrics like bags, mats, upholstery, and clothing, its tensile strength and flexibility make it versatile. Local extraction and spinning of nettle fibre also provide eco-friendly livelihoods and income opportunities for rural communities.

Kandali's Importance in Uttarakhand's socio environmental context

Kandali has multiple cultural significance in Uttarakhand's socio-environmental setting. Its collecting, preparation, and use are interwoven with traditional knowledge systems and regional identity, strengthening linkages to the region's legacy. Regarding food security, Kandali provides a readily available, nutrient-rich wild vegetable that enhances nutritional diversity in the steep hill agro-ecosystems, where access to fresh market greens may be restricted. It is ecologically suited to the steep environment and the livelihoods of rural communities that depend on foraged plants because of its resilient nature, which allows it to flourish without intensive cultivation. Last but not least, from the standpoint of sustainability and value addition, the nutritional and functional advantages of Kandali create opportunities for processing it into dried greens, herbal powders, or teas, providing hill communities with a calculated way to diversify their revenue streams while adhering to low-input, environmentally friendly methods. ■

RINGAL

A GREEN RESOURCE FOR MULTIFARIOUS USES

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The Uttarakhand Garhwal Himalayas are renowned for their vibrant history, biodiversity, and rich fabric of traditional knowledge, as well as their snow-capped peaks, sacred rivers, and revered temples. Among its myriad natural treasures, one species that stands out is the humble yet extraordinary mountain bamboo, also known as ringal in the local dialect. Ringal is an invisible but essential link connecting people and the environment in the Rudraprayag region, where the sacred rivers Alaknanda and Mandakini flow through steep slopes and terraced villages.

It stabilizes slopes, sustains daily life, sustains livelihoods, and protects culture. This dwarf bamboo has subtly influenced the social cohesion and ecological balance of the region for centuries. This article explores the various applications of ringal (mountain bamboo), in Rudraprayag district, along with its ecological functions, cultural significance, economic value, and the urgent need for sustainable management and conservation.

Rudraprayag Natural Ringal Habitat

In the central Garhwal Himalayas, Rudraprayag district lies between 30°19 and 30°49 north latitude and 78°58 and 79°22 east longitude. The district's elevation ranges from approximately 3,000 meters in the high-altitude grasslands to approximately 800 meters in the valleys. This altitude and climatic diversity provide ideal conditions for the growth of subtropical pine, temperate oak, mixed

rhododendron, and sub-alpine forests, known as ringal or hill bamboo. Common ringal (mountain bamboo) species in the region include Drepanostchyum falcatum (Gadelu Ringal), Siarudineria jaunsarensis (Jumra Ringal), Thamnocalamus spathiflora (Tham Ringal), Arundineria falcate (Saradu Ringal), Arundineria maling (Malinga Ringal) and Trysoleni (Naltura Ringal).

These plants often grow in dense clusters, under canopies of oaks and rhododendrons, and thrive naturally on moist, shady slopes at elevations of 800 to 3,000 meters above sea level. Residents of the Ukhimath, Agastyamuni, and Jakholi blocks collect ringal from the surrounding forests for both domestic and commercial use.

Ecological Importance (Silent Guardian of the Himalayas)

Rudraprayag fragile alpine ecosystem relies heavily on ringal. Its extensive root system stabilizes the soil, preventing surface erosion and landslides, two major problems in this seismically active region.

Soil and Water Conservation

During intense monsoon rains, ringal clusters act as biological barriers to prevent

soil erosion. Fibrous roots protect terraced fields and river catchments, controlling water infiltration and maintaining the topsoil.

Enriched Habitat

Birds, insects, and small animals are among the many microbes that ringal groves support, contributing to the richness of the forest. Livestock and animals, including Himalayan black bears and barking deer, feed on the leaves and twigs.

Carbon Storage and Climate Regulation

Due to its rapid growth and high biomass production, ringal (mountain bamboo), like other bamboo species, absorbs significant amounts of carbon dioxide. It helps mitigate the effects of climate change by acting as a natural carbon sink.

Degraded Land Rehabilitation

In Rudraprayag, ringal is being used in eco-restoration initiatives for degraded forest areas and landslide-prone slopes. Due to its rapid growth and versatility, it is ideal for slope stabilization and greenbelt construction projects. As a result, ringal not only supports livelihoods but also enhances the ecological resilience of the Garhwal Himalayas.

Importance of Culture and Tradition

Mountain bamboo, is deeply ingrained in Garhwal culture. It is an integral part of daily life, festivals, and rituals in the villages of Rudrapraya

Domestic Uses

Villagers make baskets from ringal to transport vegetables and grains. Konda or Dhakola (large grain container), Supa (extraction tray), Kandi (backloading basket), Hathkandi (small basket), trays and covers for Chhaj, Chhathi, and Chapri are produced for ringal. In hill households, these items are essential for daily chores, food storage, and agricultural labor.

Religious and Ritual Uses
Ringal items are used as offerings and decorations during regional festivals such as Makar Sankranti, Basant Panchami, and Nanda Devi Raj Jat. Temple objects and ritual baskets are often made from the revered deity ringal.

Cultural Symbolism
The mountain people's sense of independence and harmony with the natural world is symbolized by ringal weaving. Each object made from ringal tells the story of human ingenuity guided by natural wisdom- a unique fusion of practicality and beauty.

Craftsmanship an Enduring Tradition

One of the Garhwal Himalaya's most ancient handicraft practices is ringal or weaving. In Rudraprayag, especially the surrounding areas, entire families practice this skill.

Harvesting
When the plant's moisture level is low, often between November and February, mature ringal stems are physically collected as the first step in the craft process.

Preparation
Using basic tools like knives like Dathuli, Bheluna or Thamali the stems are cut into strips. It is cut, washed, dried, and then split into thin strips.

Weaving
Craftsmen carefully weave the strips into baskets and other items. Trends vary according to use and location.

Finishing
To improve their appearance, products are polished, sun-dried, and sometimes dyed with natural dyes.

Socio Economic Aspects
Weaving is frequently a secondary source of income for the majority of ringal artisans in Rudraprayag district, Uttarakhand, who are primarily members of Scheduled Castes or underprivileged community groups. Women are crucial because they gather raw materials, make strips, and weave little goods while men handle labor-intensive jobs like cutting and sawing. Weaving ringal is also increasingly seen as a way to empower women. With the help of non-governmental organizations and the Uttarakhand Bamboo and Fibre Development Board (UBFDB), Self-Help Groups (SHGs) in Rudraprayag are revitalizing traditional skills and establishing new sources of income.

Economic Importance (An Eco-Friendly Source of Income)

Ringal provides a reliable source of additional income in Rudraprayag, where agriculture is often hampered by the region's temperature and topography. Local markets, fairs, and cooperative organizations are some of the places where artisans sell their goods. New markets for ringal products, such as designer baskets, lampshades, furniture, and home decor items, have emerged due to the growing urban demand for handcrafted and eco-friendly goods. Several NGOs are helping artisans gain access to the internet market and national exhibition venues. Furthermore, ringal is being used for purposes other than crafts:

Construction material
In rural dwellings, cut strips of ringal are used for roofing, fencing, and reinforcement.

Mulch and Fodder
The stems are used for soil covering and mulching, while the leaves are used as animal fodder.

Fertilizer and Biofuel
Dried ringal stems can be used as organic fertilizer and biofuel. Ringal is an economically valuable non-timber forest product (NTFP) due to its multipurpose properties. With proper training and value addition, the ringal craft of Rudraprayag has the potential to significantly contribute

to sustainable mountain development and rural income generation.

Difficulties (Threats to a Lasting Heritage)

In Rudraprayag, ringal (mountain bamboo), despite its ecological and cultural importance, suffers from several difficulties:

1. Decreasing Availability
Overharvesting and habitat loss due to road construction, forest fires, and deforestation are resulting in the decline of ringal populations.

2. Lack of Regeneration Efforts
Organized plantations are few and far between, and natural regeneration is slow.

3. Market and Infrastructure Limitations
Fair pricing systems, transportation, and markets are often inaccessible to artisans.

4. Loss of Traditional Skills
Traditional knowledge is being lost due to the migration of younger generations for work and education.

5. Policy Deficiencies
Unlike commercial bamboo species in the lower regions, ringal does not yet receive adequate institutional support.

6. Effective Management
Without effective management, the biodiversity and cultural heritage of ringal could soon be lost.

7. Conservation and Development Efforts
Several initiatives are underway in Rudraprayag and across Uttarakhand to address these issues:

Community-Based Conservation
Local Van Panchayats, or Village Forest Councils, are promoting ringal as a component of forest management plans. Tree plantation campaigns, rotational felling, and controlled harvesting contribute to sustainable harvesting.

Institutional Support
The Uttarakhand Bamboo and Fibre Development Board (UBFDB) encour-

ages the planting of mountain bamboo species and conducts training courses for artisans. Efforts are being made to link government procurement and tourism programs with ringal crafts.

NGO and Academic Partnerships

Groups like the Himalayan Action Research Centre (HARC) and HESCO (Dehradun) have conducted research, skill-building workshops, and awareness campaigns on ringal based businesses.

Skill and Design Enhancement

Design partnerships with organizations like NIFT and NID (National Institute of Design) have helped modernize ringal products to accommodate current priorities while maintaining traditional methods.

Integrating Ecotourism

Ecotourism projects in the Kedarnath and Chopta areas now include demonstrations of ringal crafts. To ensure local communities benefit from income, tourists can visit artisan villages, witness the weaving process, and purchase authentic handcrafted items.

Symbol of Sadharmya (Harmony between Man and Nature)

Beyond its practical use, the ringal has a deep philosophical significance as a symbol of Sadharmya or harmony with nature. The Rudraprayag bamboo is a reflection of the adaptive wisdom of the mountain people of the Himalayas, where life is influenced by both environmental gifts and constraints. It teaches

perseverance and resilience as it grows well on slopes where other plants struggle, it bends but does not break, and regenerates even after being cut down. Its life cycle demonstrates and resilient people can be in the face of adversity. This relationship between humans and ringal is an excellent example of ecological cohabitation, an ancient principle that still resonates in contemporary sustainability ideas.

Future Prospects
A Sustainable Curriculum

Integrating traditional knowledge with contemporary innovation is crucial for the future of ringal in Rudraprayag. Its long-term viability can be ensured by taking several well-considered steps:

1. Plantations and nurseries for ringal (mountain bamboo bamboo) can be developed on both public and private properties.

2. Selective harvesting methods and scientific management processes can be used.

3. Youth entrepreneurship in eco-industries based on ringal (mountain bamboo) should be promoted.

4. GI marking and branding of "Rudraprayag Ringal crafts" should be encouraged.

5. As protectors of the green area, ringal craftsmen should be linked to carbon-credit schemes. By taking these steps, ringal can not only become an example for sustainable mountain livelihood, but also promote women empowerment, cultural preservation, and biodiversity conservation.

Whispering Greenery of the Garhwal Hills

In the quiet villages of Rudraprayag, the sweet rustling of ringal leaves still accompanies the rhythm of mountain life. It is present in the farmer basket, in the artisan workshop, on the pilgrimage path, and even in the child's cradle. The mountain bamboo-the ringal of Garhwal is not just a plant; it symbolizes the continuity and balance of life. It connects the soil beneath our feet and the stories of generations who have lived by its grace. As Uttarakhand moves toward a sustainable future, the wisdom of ringal reminds us that true development lies in nurturing what nature already provides humbly, abundantly, and sustainably. If cared for with respect and foresight, the whispering ringal trees of Rudraprayag will continue to speak of the harmony between mountain and man, tradition and tomorrow. ■

प्रगतिशील किसान पद्म श्री प्रेमचंद शर्मा

माटी से जुड़ी सफलता की कहानी

Padma Sri Premchand Sharmaji, a Progressive Farmer Talks on Agricultural Activities with Dr Arvind Bijalwan

अरविन्द बिजल्वाण
प्रोफेसर (कृषि–वानिकी), वानिकी महाविद्यालय, वी सी एस जी उत्तराखण्ड औद्यानिकी एवं वानिकी विश्वविद्यालय,
रानीचौरी, टिहरी, उत्तराखण्ड

भारत माँ के किसान सपूत जो पूरा पूज रहे इस माटी को।
सोचो मिलकर आज सुरक्षित रखना हिमालय घाटी को।।
हिमालय से जलधारा बहती वह देश की सींचे माटी को।
सारे जहाँ से अच्छा बनाओ देव हिमालय माटी को।।
माटी में ही पैदा हुआ सब माटी ही में मिल जाता है।
माटी से जीव-जन्तु का जन्म-जन्म का नाता है।।
माटी का ही खेल है सारा सब माटी से मिलता है।
सोना, चांदी, लोहा, जस्ता माटी से निकलता है।।
प्यार किया जिसने माटी से वह कभी नही निराश हुआ।
फलता-फूलता वह रहा निरन्तर ईश्वर की रहती उन पर दुआ।।
स्वच्छ रखे हम इस माटी को जिसमें सब जग जीता है।
स्वच्छ पवित्र बनाएं इसको यही पुराण यही गीता है।।
नमन करूँ मैं सब जन-जन से इस माटी का पुण्य करें।
प्रदूषण बढ़ता जिन चीजों से उन चीजों को शून्य करें।।

उक्त कविता के माध्यम से उत्तराखंड के देहरादून जिले के चकराता विकासखण्ड के हटाल गांव के एक प्रतिष्ठित और प्रगतिशील किसान श्री प्रेमचंद शर्मा इस बात का एक प्रेरक उदाहरण बन गए हैं कि कैसे माटी को नमन करते हुये दृढ़ संकल्प, नवाचार और व्यावहारिक ज्ञान उत्तराखण्ड के पिछड़े क्षेत्रों में भी कृषि से क्रांति ला सकता हैं। सुदूर क्षेत्रों में कृषि विविधीकरण और बागवानी विकास में उनके उत्कृष्ट योगदान के लिए उन्हें वर्ष २०२१ में भारत सरकार द्वारा पद्म श्री पुरस्कार से सम्मानित किया गया है। जौनसार-बावर क्षेत्र में एक साधारण किसान परिवार में जन्मे शर्मा जी की औपचारिक शिक्षा कक्षा पांच तक ही

हो पायी, फिर भी उनके गहन अवलोकन और भूमि के साथ गहरे संबंध ने उन्हें एक असाधारण किसान बना दिया। अतः यह महसूस करते हुए कि खेती की यह प्रणाली स्थानीय अर्थव्यवस्था का उत्थान नहीं कर सकती श्री शर्मा जी ने नई और लाभदायक फसलों के साथ प्रयोग करने का फैसला किया। १९९४ में उन्होंने शुरूवाती दौर में जैविक तरीके से अनार की खेती शुरू की। वर्ष २००० तक उन्होंने उच्च उपज वाली और रोग प्रतिरोधी किस्मों का चयन करते हुए अनार के पौधों की एक बड़ी नर्सरी विकसित की। सामूहिक खेती के प्रयासों को और मजबूत करने के लिए शर्मा जी ने २०१३ में एक फल और सब्जी उत्पादन समिति का गठन किया जिसके माध्यम से आस-पास के गांवों और पंचायतों के किसान परिवारों को एक साथ लाया गया। साथ ही उन्होंने जैविक उर्वरकों, प्राकृतिक कीट नियंत्रण और जल संरक्षण विधियों के उपयोग को बढ़ावा दिया। उनके दृष्टिकोण ने आत्मनिर्भरता और समुदाय आधारित शिक्षा पर जोर दिया, जहाँ किसान एक दूसरे के साथ बीज, पौधे और व्यावहारिक तकनीक साझा करेंगे। उनके मार्गदर्शन में क्षेत्र में निम्न उपयोग वाली भूमि को अनार, सेब, प्लम और खुमानी जैसे फलों के उत्पादक बगीचों में बदल दिया गया। उनके विविधीकरण मोडल ने ग्रामीण आय बढ़ाई, युवाओं को गांव में ही अवसर देकर पलायन कम किया और स्थानीय अर्थव्यवस्था को मजबूत किया। साथ ही, जैविक खेती पर उनके जोर ने हिमालय के संवेदनशील पर्यावरण में मिट्टी की उर्वरता और पारिस्थितिक संतुलन बनाए रखने में महत्वपूर्ण योगदान दिया।

श्री प्रेमचंद शर्मा की उपलब्धियों को राज्य एवं राष्ट्रीय स्तर पर मान्यता मिली है। पद्म श्री के साथ-साथ उन्हें अपने नवाचार और टिकाऊ खेती में योगदान के लिए विभिन्न पुरस्कार और सम्मान प्राप्त हुए हैं जिनमें किसान भूषण, किसान सम्मान, कृषक सम्राट सम्मान, प्रगतिशील कृषक सम्मान, विस्मृत नायक सम्मान, जसोदा नवानी सम्मान, जगजीवन राम किसान पुरस्कार एवं नाबार्ड आदि के पुरस्कार प्रमुख हैं। वह युवा किसानों को मार्गदर्शन एवं सलाह देते हैं तथा उनका लाभदायक और पर्यावरण अनुकूल प्रथाओं की ओर मार्गदर्शन करते हैं। आज सुदूर क्षेत्र के एक छोटे किसान से राष्ट्रीय स्तर पर प्रसिद्ध कृषि नवप्रवर्तक तक श्री शर्मा जी की यात्रा ज्ञान, दृढ़ता और दूरदर्शिता की शक्ति के प्रमाण के रूप में खड़ी है। उनके कृषि के कार्य पूरे क्षेत्र तथा हिमालयी राज्यों के किसानों के लिए आशा की किरण बन गए जिससे पता चलता है कि कृषि में सच्ची प्रगति विविधीकरण, नवाचार और सामुदायिक सहयोग से सम्भव है। इसी क्रम में हमनें श्री प्रेम चंद शर्मा जी से बातचीत की-

श्री प्रेमचंद शर्मा जी, आप उत्तराखंड में एक नवाचारी एवं प्रगतिशील किसान के रूप में जाने जाते हैं। कृपया आप हमें अपनी पृष्ठभूमि एवं कार्य के बारे में बतायेगें?

मैं एक दूर दराज क्षेत्र चकराता (देहरादून) के हटाल गांव का रहने वाला हूँ। वही हमारे पूर्वज खेती करते आये लेकिन वे पारम्परिक कृषि किया करते थे। हमने धीरे-धीरे देखा कि विभिन्न प्रदेशों में कृषि की नयी तकनीकी से खेती की जा रही है खासतौर पर बात करे तो हमारे निकटवर्ती प्रदेश हिमाचल में उच्च तकनीकी से सेब की अच्छी पैदावार की जा रही है। हम सोचते थे कि हमारा क्षेत्र तो घाटी का क्षेत्र है किन्तु जब हमने औद्यानिकी का ज्ञान प्राप्त किया तो ज्ञात हुआ आजकल घाटी वाले क्षेत्रों में भी लो चिलिंग वैरायटी (कम ठंड में उगनें वाली प्रजाति) के सेब उगाये जा सकते है तथा हमने यह प्रयास करना आरम्भ कर दिया। यदि मैं आपको शुरूवाती द्वौर का वाकया सुनाऊं तो हमारे पिताजी ने अनार का पेड़ लगाया था तथा उस पर बहुत बडे-बड़े अनार लगते थे किन्तु अनार में कीड़े लग जाते थे। मैंने जब

यह तथ्य कृषि वैज्ञानिकों से साजा किया तो उन्होने कहा कि अनार में कीड़ा फूल लगने के समय ही लग जाता है एवं उसी वक्त उपचार करना पड़ता है। फिर मैंने वैज्ञानिकों से पूछा कि मैं अनार की खेती करना चाहता हूँ तो उन्होंने संतोषजनक उत्तर नहीं दिया। कहा कि इस क्षेत्र में अनार की खेती नहीं हो सकती है। मैंने अपने आप में सोचा कि जब जंगली अनार हो सकता है तो अनार की खेती क्यों नहीं हो सकती तथा मैंने उसी पौधे की कलम से कई सारे अनार के पौधे तैयार कर दिये। देखते ही देखते अनार के पौधे बड़े हो गये एवं फल देने लग गये। उन पर जो अनार लगे वो आकार में काफी बड़े थे। मैंने सोचा कि इतने बड़े अनार बाजार में कैसे बिकेंगे क्योंकि वो आकार में काफी बड़े थे। किन्तु तत्कालीन उत्तराखण्ड के अधिकारी एवं सरकार ने मेरे को प्रोत्साहित किया कि यह तो अत्यन्त सुन्दर है तथा मेरा हौसला बढाया जिससे मुझे आगे कृषि कार्य करने की और भी प्रेरणा मिली और साथ ही यह सब जैविक भी था। इस तरह मैंने एक प्रगतिशील किसान के रूप में कार्य प्रारम्भ किया।

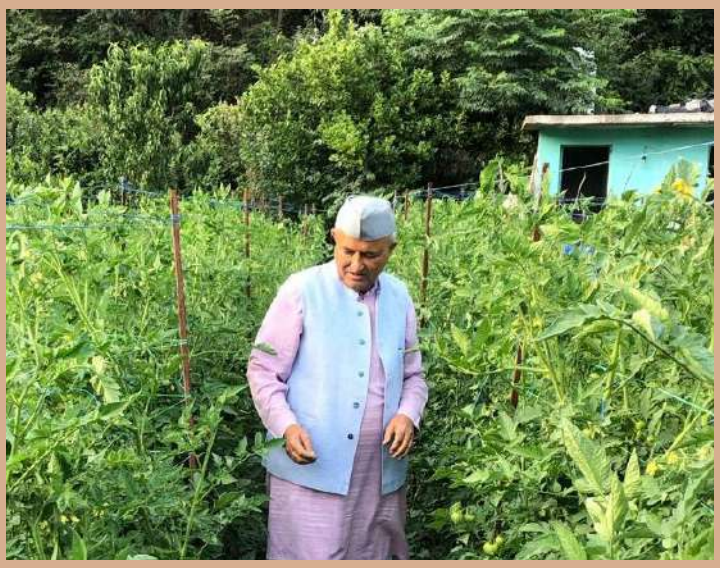
अनार की खेती पर आपने किस तरह के प्रयोग किये तथा आपके क्या अनुभव रहे?

जब मैंने अनार की खेती प्रारम्भ की तो मैंने देखा कि अनार का आकार अत्यधिक बड़ा है। मैने सोचा कि इस अनार को बाजार में उचित बिक्री करने हेतु और प्रयोगों की आवश्यकता है तथा अधिक जानकारी प्राप्त करने हेतु मैं अनार अनुसंधान केन्द्र, शोलापुर, महाराष्ट्र गया। वहाँ के वैज्ञानिकों ने बताया कि वर्तमान में आप उपभोक्ताओं के पसंद के हिसाब से अनार उगायें जिसमें कुछ अच्छी प्रजातियां उपलब्ध है। मेरे लिये अनार उगाना अब प्रतिष्ठा का प्रश्न हो गया था। इस तरह मैं शोलापुर, बजौरा-कुल्लू (हिमांचल प्रदेश) एवं कर्नाटक आदि राज्यो का भ्रमण कर अनार का प्रशिक्षण व नई प्रजातियां प्राप्त की तथा अनार तैयार किया इस प्रकार मुझे क्षेत्र में अनारवाले के नाम से जाने लगा। इस तरह मेरा अनार उगाने एवं बेचने का कृषि कार्य चलने लगा। अनुभव के आधार पर ध ीरे ज्ञात हुआ कि अनार का पौधा १५ से २० साल में उत्पादन कम कर देता है साथ ही जिस स्थान पर

अनार पहले लगा है यह वहां पर पुनः उतना अच्छा नही उगता। अर्थात अनार फसल चक्र में बदलाव चाहने वाला पौधा है। मेरे पास दो प्रकार के अनार के पौधे थे पुराने वाले पौधे तथा नये वाले पौधे, धीरे-धीरे मैने पुराने वाले अनार के पौधों के बदले आड़ू के नये पौधे लगाने शुरू कर दिये जिससे फसल चक्र मे बदलाव हो व भूमि का पूर्ण उपयोग सुनिश्चित किया जा सकें। अतः मैं अन्य फसलों की तरफ भी सोचने का कार्य करने लगा।

श्री शर्मा जी, कृषि में विविधिकरण हेतु आपने क्या प्रयोग किये?

मैंने देखा कि कृषि में एक तरह की फसल करनें से सतत कृषि की ओर नहीं बढा जा सकता तथा भूमि भी उपजाऊ नहीं रहती है और मुनाफा भी कम है। अतः मैं एक नवाचार की प्रक्रिया के अन्तरगत कृषि में परम्परागत कृषि के अलावा नये विविधिकरण करता रहता हूँ। मैंने जब पुराने अनार के पौधे हटाये तो उस जमीन पर मैंने टमाटर की खेती की तथा गोभी आदि नगदी फसलों की खेती की तथा कृषि की नयी वैज्ञानिक पद्यति जैसे टपक सिंचाई, स्प्रिकलर सिंचाई, एवं जैविक पद्धति से सांग-सब्जी उगायी। मैंने कम पानी से खेती कैसे करे तथा पानी के संरक्षण पर उचित प्रयोग कर किसानों को भी प्रशिक्षण दिया। हमारे पास विश्व की विविध जलवायु है तथा यहां पर विविधीकरण और भी उपयुक्त हो जाता है। मेरे द्वारा खेतों पर नवाचारी ढंग से विभिन्न प्रकार के फल, साग-सब्जियां उगायी गयी जिसमें खुमानी, टमाटर आदि के अलावा येलो कैप्सिकम, ब्रोकली, रेड भिन्ड़ी जो कि स्वास्थ्य के लिय भी अत्यन्त लाभप्रद है आदि उगाई गयी है। ज्ञात हो कि मेरे द्वारा उगाये गये फल, साग-सब्जी पूर्णतः जैविक ढंग से उगाये गये हैं। हमारे क्षेत्र में पानी की काफी कमी है। अतः मृदा एवं जल संरक्षण पर भी विषेश ध्यान दिया तथा पानी की उचित व्यवस्था की। साथ ही मक्का को ड्रिप से तैयार किया गया है। मैं प्लास्टिक कचरे के बारे में भी अत्यधिक चिन्तित रहता हूँ कि हमारे शरीर, माटी व पशुओं को आज के समय में प्लास्टिक प्रदूषित कर रहा है जिसके विकल्प को ढूंडने की आवश्यकता है। वर्तमान समय में कृषि में बहुत सारी वैज्ञानिक पद्यति आ गयी है तथा कृषि में रोजगार की अपार संभावनाये है बस आवश्यकता इस बात की है कि कृषि को हमें प्राथमिक दर्जे में समझना होगा न



केवल अन्न एवं खान-पान में बल्कि कृषि करने वालों को पूरा मान-सम्मान मिलना चाहिए जिससे अधिक से अधिक युवक कृषि को सम्मान सहित स्वेच्छा से रोजगार का साधन बनायें।

जैविक खेती क्या है एवं परम्परागत खेती से किस प्रकार भिन्न है?

देखिये वर्तमान समय में कृषि में उपज बढाने हेतु विभिन्न प्रकार की रासायनिक खादों, कीटनाशकों आदि का प्रयोग किया जा रहा है। हरित क्रान्ति के समय रासायनिक खादों एवं कीटनाशकों का प्रयोग किया गया जो कि उस समय की मांग थी। किन्तु इस प्रकार की खेती में कुछ समय आपको उत्पादन अच्छा मिलता है तत्पश्चात उत्पादकता घट जाती है एवं मिट्टी खराब, कम उपजाऊ एवं जीवांश विहीन हो जाती है जो प्रकृति व खेती की दृष्टि से उचित नही है। अतः मैंने अपने आप से जैविक खेती, गौ आधारित खेती के प्रयोग किये तथा सफलता भी पायी एवं उत्पादकता भी अच्छी रही। हमने एक देशी गाय के गोबर से ५ से ६ एकड़ में खेती की एवं गाय के गोबर से जीवामृत बनाया जिसमें हमने गोबर के साथ गौ मूत्र, गुड़, बेसन का घोल बनाकर १५ से २० दिन तक छाया मे रखा। तत्पश्चात जीवामृत को पानी के टैंक में डाल दिया तथा टैंक से टपक सिंचाई के माध्यम से खेतों तक पहुंचाया ताकि पूर्णरूप से खेतों में ही उपयोग किया जा सके। हमनें कुछ और प्रयोग किये जिसमें उक्त खाद वाले टैंक में गाजर

घास, नीम के पत्ते, अखरोट के पत्ते एवं कालाबांसा आदि डाले। इस प्रक्रिया में एक तरफ खाद बन रही है एवं दूसरी तरफ यह कीटनाशक का कार्य भी कर रहा है। हमने उक्त जैविक खाद व कीटनाशक को खेत मे टपक सिंचाई (ड्रिप इरिगेषन) के माध्यम से भेजा तथा अपना बनाया हुआ नेचुरल फिल्टर इस कार्य हेतु प्रयोग कियॉ। ये विधियां मेरी अपनी है एवं किसान भाई इस विधि का अधिक से अधिक प्रयोग कर सकतें है। यह जैविक खाद एवं कीटनाशक सभी प्रकार की सब्जियों फलों के लिये लाभदायक है। हमारे पास नेचुरल जैविक फिल्टर है जिससे मैं अपने खेतों में टपक सिंचाई एवं स्प्रिंकलर के माध्यम से सिंचाई कर रहा हूँ।

श्री शर्मा जी, आप युवाओं को क्या मार्गदर्शन देना चाहते है तथा आपकी आगामी क्या योजनायें हैं?

श्री प्रेमचन्द्र शर्मा जी उत्तराखण्ड़ की जलवायु, पानी, आबो-हवा की प्रशंसा करते हुये कहतें है कि प्रकृति ने हमें ये सबकुछ दियॉ। बस थोड़ा कोशिष करे तो कृषि में चमत्कार किया जा सकता है। उन्होने शिक्षा को विकास की रीड़ बताते हुये कहा कि प्रत्येक नागरिक को शिक्षित होना जरूरी है जबकि वे अपने को पढ़ा-लिखा नही बताते है। कृषि से रोजगार अर्जित किया जा सकता है पलायन कम किया जा सकता है, तथा प्रदेश व देश को समृद्ध किया जा सकता है। मेरा कहना है कि हर किसी को कृषि करनी चाहिये कम से कम अपने किचन गार्डन में तो कार्य किया ही जा सकता है। हमें युवाओं को प्रोत्साहित करना है कि कृषि करे और मैं हमेशा सहायता करने के लिये तैयार हूँ। वर्तमान में रोजगार के कारण पलायन हो रहा हैं। अतः मैंने नवयुवकों को ग्राम स्वरोजगार मार्गदर्शन एवं पलायन को रोकने हेतु ये कविता लिखी है-

ग्राम स्वराज आयेगा कैसे हम सबको अलख जगाना है।
रूकेगा किस तरह पलायन हर गहराई तक हमें जाना है।।
रोजगार के चक्कर में पलायन हो रहा आज।
रोजगार है बहुत यहाँ पर समझे नही समाज।।
काम सब्जी और बागवानी का गजब निराला है।
दुग्ध, मत्स्य, पशुपालन, जड़ी-बूटी सभी कैश कोप वाला है।।
पर्यटन में प्रदेश की देश में अलग पहचान ।
देवभूमि है उत्तराखण्ड़ यही हमारी शान।।
यही हमारी शान यहां दर्शन को करोड़ों आतें है।
भाग्यशाली वो समझे अपने को जो यहां दर्शन कर जाते है।।
लूट-खसोट करे जो यहाँ पर वो ज्यादा नहीं चल पाते हैं।
जीवन के जो लक्ष्य है उनके सब अधूरे रह जाते है।।
उत्तराखण्ड़ में जो करे सच्चे मन से काम।
मनोकामना पूर्ण करेगें उनके चारों धाम।।

श्री प्रेमचंद शर्मा जी कहते हैं कि कार्य ही पूजा है यदि सच्चे मन से मेहनत करें तो सबकुछ अर्जित किया जा सकता हैं। उन्होंने मेहनत के भावार्थ को इस कविता के माध्यम से पिरोया है-

मेहनत का वो फूल जगत में जो धीरे-धीरे खिलता है।
किस्मत से जो मिल न सका वो मेहनत से मिलता है।।
बिन मेहनत के इस दुनिया में बना न कोई पुरूष महान।
ऐसा जतन करो जीवन में अलग आपकी हो पहचान।।
ऊंचाई को पाने का हर व्यक्ति का सपना रहता है।
मंजिल उसी को मिलती है जो जीवन में मेहनत करता है।।

मैं सभी युवाओं एवं कृषक भाइयों से यह कहना चाहता हूँ कि सरकार पूर्णतः सहयोग कर रही, बस आवश्यकता है तो किसानों को सकारात्मक ढ़ग से उन योजनाओं के फायदा लेने की अधिकतर नौयुवक आज कृषि को सहर्श नही अपनाना चाहतें जबकि कृषि से जग जीता जा सकता है। मैं भविष्य में अपने क्षेत्र, प्रदेश एवं देश में कृषि का जो भी ज्ञान मेरे पास है उसे आगामी पीड़ी तक पहुँचाना चाहता हूँ तथा सतत कृषि हेतु नये-नये प्रयोगों को जारी रखना चाहता हूँ। आज के वैज्ञानिकी युग में किसानों को खेती करना काफी आसान हो गया है, आज विभिन्न प्रकार की वैज्ञानिक विधियाँ उपलब्ध है। आज तकनीकि का प्रयोग भी कृषि में किया जा रहा है जिसे सभी कृषक भाई अपना सकतें हैं।■

KEEDA-JADI

The Miracle Fungus of the Himalayas

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Ophiocordyceps sinensis commonly known as Keeda-Jadi in Uttarakhand, Yarsagumba in Nepal, Yarchaguma in Tibbet, Dong Chong Xia Cao in China is a parasitic association of a fungus and insect that belongs to the family of Ophiocordyciticeae. It is an endemic species to central Himalya (Chamoli, Rudraprayag, Uttarkashi and Pithoragarh of Uttarakhand, Nepal and Tibbet) and occurs in difficult terrain from 2500m amsl to 5000m amsl in moronic soil.

Ophiocordyceps sinensis was first described in 1843 by Miles Joseph Berkeley, who classified it as Cordyceps sinensis based on its club-shaped stroma. This name remained in use for over 150 years. Early 2000s molecular studies showed that Cordyceps was not a single lineage,

prompting taxonomic revision. In 2007, G.H. Sung, J.M. Sung, N. Hywel-Jones, and J.W. Spatafora placed the species in the new genus Ophiocordyceps. Its updated name reflects Berkeley's original description and their DNA-based reclassification. The revised scientific name, Ophiocordyceps sinensis (Berk.) G.H. Sung, J.M. Sung, Hywel-Jones & Spatafora, reflects both its taxonomic history and the scientists responsible for its reclassification.

Morphological Features and Lifecycle

Ophiocordyceps sinensis consists of two parts, a fungal endo-sclerotium (within the caterpillar) and stroma. The stroma is the upper fungal part and is dark green or brown, club-shaped fruiting body and tempers downwards from slightly swollen,

fertile head while caterpillar crimson or orange in colour. The fertile part of the stroma is the head. The head is granular because of the ostioles of the embedded perithecia. The perithecia are ordinally arranged and ovoid. As life-cycle is concerned the fruiting body of fungus emerges out as snow melts and grows up to 3 to 9 cm tall 5 mm thick. It can be picked up in the early stage of emergence or at complete mature stage from April to June.

Ecology

The whole fungus remains inactive in winter emerge out as snow starts to melt. Before the rainy season begins, the spores of the Cordyceps fungus spread and comes in contact with larvae of insect called Hapialus armoricanus of Hapialidae family and settle on the heads or back of the caterpillar that lives underground during the winter. The mycelium of the fungus enters so much into body of the caterpillar that it grows out through its head. The fungus takes all food material from the insect and uses it as a medium for further growth and reproduction in which insect ultimately dies. It remains under the soil in inactive state during winter. But when snow melts the mycelium of fungus makes a

fruiting body and out from the head of the insect. Population wise, it does not appear profusely at one spot in population, it emerges in scattered form. Generally, it is found in pairs of 2, 4, 6 or 8 in a population. Collection requires sharp eye vision or intensive look at field.

Utilization

Due to its wide popularity for healthcare monetarily high valued fungus is becoming high income generating source for the local inhabitants of higher mountain region of Garhwal since 2000, whose livelihood is very dependent on the forest and subsistence and horticultural crops. The fruiting body is highly valued for curing and treating different diseases in traditional medicare system and aphrodisiac as well. Owing to its medicinal importance, several studies have been made on its chemical composition by different workers as Cordycepic acid, d-mannitol, Amino acids, Steal acid, Mycose, Ergosterol, Uresil, Adenine, Adenosine, Palmitic acid. Chinese scientist J Zhu, G Helpern and K Jones (1998) and VP Bhatt (2009) found that the fungus (Keeda-Jadi) has various helpful effects in different disordes as it improves the physical performance, useful in cold, fatigue, dizziness and hyposexuality. It enhances reproductive function, improve sperm count, improve survival rate of spermatozoa and endocrine system. It is helpful in cardiovascular system and circulatory functions and is effective in reducing heart rate. with its help hyperlipidemia can be controlled, and total cholesterol and triglycerides reduced.

It is good for respiratory system, kidney and renal function and cancer. As per Zhu You-Ping the fungus is described as a potential immunologic, antineoplastic, antiarrhythmic hypoglycemic and was erythropoietic effect.

Recommendations

On the basis of my own experience of 20 years with the fungus, I recommend the intake of Ophiocordyceps, 3 to 9 grams twice a day as liquid extract as food or as powdered extract with water, milk or honey. ■

उत्तराखण्ड के पर्वतीय क्षेत्रों का बहुउपयोगी वृक्ष–बांज

विशेषताएँ, चुनौतियाँ, एवं संभावित समाधान

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बांज जिसे सामान्यतया अंग्रेजी में ओक (White Oak) कहते हैं एवं इसका वैज्ञानिक नाम *Quercus leucotrichophora* है, यह फैगियेसी परिवार का सदस्य है तथा उत्तराखण्ड का एक बहुउपयोगी वृक्ष है जो सामान्यतया 1400 मीटर से 2400 मीटर की ऊँचाई वाले क्षेत्रों में पाया जाता है। बांज का अत्यधिक सामाजिक एवं पारिस्थितिक महत्व है। यह विभिन्न प्रकार की सामाजिक एवं पारिस्थितिक सेवाएँ (इकोसिस्टम सर्विसेज) प्रदान करता है। यह पेड़ पहाड़ी क्षेत्रों केलिए वरदान प्रजाती है क्योंकि पहाड़ों में पानी की अत्यधिक कमी रहती है तथा बांज की जड़ें इस प्रकार की होती है कि यह मृदा एवं जल को संरक्षित रखती है। बांज के वृक्ष अत्यधिक ढालदार पहाड़ों पर भी आसानी से खड़े रहते है एवं पारिस्थितिकी को अपनी सेवाएँ निरंतर देते रहते हैं। बांज जमीन पर अपनी पत्तीयों द्वारा इस तरह का बिछौना बना देता है कि जिसमें विभिन्न प्रकार के सूक्ष्म जीवाणु, कीट–पतंगें व अन्य प्रकार के रेंगने वाले जन्तु अपना घर बना देते हैं एवं विभिन्न प्रकार के प्राकृतिक चक्रों का सत्त रूप से संचालन करते हैं। बांज की पत्तियों की परतों में पानी को संरक्षित

कर जमीन के नीचे पहुंचाने की अभूतपूर्व क्षमता होती है जिससे भूमि जल का स्तर निरंतर स्थाई बना रहता है। बांज की लकड़ी एक अच्छी जलाऊ लकड़ी है अतः इसका घनत्व अधिक होता है जिससे हम यह भी कह सकते हैं कि ये बांज के घने जंगल कार्बन को शोषण करने की अधिक क्षमता रखते हैं। बांज के वृक्ष वर्तमान में जलवायु परिवर्तन की भाषा में कार्बन के अच्छे अवशोषक हैं, जिसे हम आज कल प्रचलन की भाषा में कार्बन सिक्वेस्ट्रेशन कहते हैं। बांज अच्छी चारा प्रजाती होने के कारण इसे ग्रामीण किसान भाई–बन्धु अपने खेत की मेड़ों में भी संरक्षित रखते है। ऐसा करने से ग्रामीणों को जंगलों के साथ–साथ अपने खेतो में खड़े बांज के पेड़ों से समय–समय पर हरी चारा पत्ती एवं जलाऊ लकड़ी प्राप्त होती रहती है। किसानों के खेतों पर बांज के अलावा भीमल (*Grewia optiva*), खड़ीक (*Celtis australis*), गुरियाल (बहूनिया प्रजाति) आदि के पेड़ भी किसानों द्वारा हरे चारे हेतु अपने खेतों में संरक्षित किये जाते हैं। बांज का वृक्ष इतना महत्वपूर्ण है कि गांव वाले यह कहते हैं कि हमारा बांज से इस तरह का नाता है कि हम बांज के वृक्ष के बिना जीने की कल्पना नहीं कर सकते यह हमारा

बांज के पेड का नजदीकी दृश्य

कल्प वृक्ष है। बांज इतना वरदाई वृक्ष है कि इसमें विभिन्न प्रकार के सूक्ष्म पौधे (lower plants) भी अपना घर बना लेते हैं, जैसे लाइकेन, ब्रायोफाइटस, टेरीडोफाइटस आदि। बांज अपने चारों तरफ इस तरह का सौहार्दपूर्ण एवं अति सुखमय वातावरण बना देता है कि हर प्रकार की वनस्पति बांज के साथ उगना चाहती है।

जहाँ तक इसके साथ उगने वाले सहयोगी पेड़ हैं, तो उत्तराखण्ड के निचले एवं मध्य क्षेत्रों में बांज के साथ चीड़ (*Pinus rouburghii*) उगता है एवं धीरे–धीरे पर्वतीय क्षेत्रों में ऊँचाई की ओर बढ़ने पर इसके साथ ब्लू पाइन जिसे स्थानीय भाषा में कैल कहते हैं एवं जिसका वानस्पतिक नाम (*Pinus wallichian*) है, उगता है। इसके अलावा पहाड़ों में ऊँचाई की ओर बढ़ते हुए देवदार (*Cedrus deodar*), बुरांस (*Rhododendron arboreum*), स्प्रूस *(Picea smithian)*, पईया या पदम (*Prunus cerasoidè*), काफल, भमोरा आदि इसके सहायक वृक्ष हैं। और अधिक ऊँचाई की तरफ बढ़ने पर इसके साथ बांज की अन्य प्रजातियाँ जैसे मोरू ओक/मोरू बांज (*Quercus floribunda*) तथा और ऊँचाई बढ़ने के साथ बांज की ही अन्य प्रजाति खर्सू ओक/खर्सू बांज (*Quercus semecarpifoli*) देखी गई हैं। इसके अलावा रई/मुरेडा (*Abies pindro*), थुनेर (T*aus baccat*) तथा उतीस (*Alnus nepalensi*) भी इसकी सहायक प्रजातियों के रूप में पायी जाती हैं।

अपने स्थायित्व के लिये संघर्षरत बांज

पिछले कुछ दशकों से देखा जा रहा है कि बांज के जंगल अपने स्थायित्व के लिये संघर्षरत है जिसका मुख्य कारण बांज एवं चीड़ के मध्य संघर्ष है। ज्ञात हो कि सामान्यतया बांज के जंगल चीड़ के जंगलों की तुलना में अधिक ऊँचाई पर पाये जाते हैं किन्तु अधिकतर स्थानों पर बांज एवं चीड़ के जंगल साथ–साथ ही पाये जाते हैं। देखा जा रहा है कि बांज के जंगलों को चीड़ तेज गति से घेर रहा है एवं चीड़ के जंगल बांज का स्थान लेते जा रहे है। चीड़ के पेड़ पहले बांज की कम ऊँचाई वाले क्षेत्रों में अतिक्रमण कर रहे है तथा धीरे–धीरे बांज के अधिक ऊँचाई वाले क्षेत्रों में उपर की तरफ अतिक्रमण करते हुए बढ़ रहे हैं। जिससे ऐंसा प्रतीत होता है कि धीरे–धीरे बांज के जंगल कम या समाप्त हो जायेंगे एवं चीड़ के जंगल उनका स्थान ले लेंगे और भविष्य में सम्पूर्ण क्षेत्र चीड़मय हो जायेगा।

चीड़ जिसका वैज्ञानिक नाम पाइनस रौक्सबर्गाई है, एक प्रकार का शंकूधारी वृक्ष है। यदि मात्र उतराखण्ड प्रदेश के जंगलों की ही बात करें तो यह कुल जंगल के लगभग सोलह प्रतिशत भू–भाग पर उपस्थित है। चीड़ का वृक्ष मुख्य रूप से 600 मीटर से लेकर 2000 मीटर तक की ऊँचाई वाले क्षेत्रों में पाया जाता है किन्तु वर्तमान में यह और अधिक ऊँचाई वाले क्षेत्रों में भी पहुँच रहा है। चीड़ की पत्तियाँ निडिल रूपी होती हैं एवं सूखने के पश्चात जमीन के उपर गिर जाती हैं तथा चीड़ की पत्तियों की एक ऊँची एवं मोटी परत बन जाती है। ध्यान रहे ये चीड़ की पत्तियां गर्मियो के मौसम में सूखने के कारण अत्यन्त ज्वलनशील हो जाती है जो कि चीड़ के जंगलों में वनाग्नि का मुख्य कारण बनती है। प्रकृति का खेल

देखिये कि यह चीड़ का वृक्ष जंगल में लगी अत्यन्त भयावह वनाग्नि के समय भी पूर्णतः सुरक्षित रहता है जिसका मुख्य कारण इस वृक्ष की बाहरी खाल/छिक्कल का मोटा होना भी है।

सर्व विदित है कि पिछले कुछ वर्षो में उतराखण्ड के पहाड़ी गांवों से शहरी तथा मैदानी क्षेत्रों की ओर अत्यधिक पलायन हुआ है। पहले ग्रामीण लोग जंगलों से चीड़ की पत्तियों को इकट्ठा कर अपने पशुओं के नीचे बिछाने के लिये ले जाया करते थे, जिससे जंगलों में आग लगने की समस्या कम हो जाती थी। अब जब गांवों से लोग पलायन कर रहे है तो इन सूखी चीड़ की पत्तियों को उठाने वाले ही कम रह गये हैं। अतः इन चीड़ की सूखी पत्तियों के कारण अनेक प्रकार की वृक्ष प्रजातियां चीड़ के प्रकोप में आ रही है जिनमें मुख्य रूप से बांज है। चीड़ की सूखी पत्तीयां हवा के माध्यम से उडकर दूर–दूर तक आग लगा देती है एवं बांज के जंगलों को बुरी तरह से क्षतिग्रस्त एवं नष्ट कर देती है। पिछले कुछ दशकों से देखा जा रहा हैं कि तापमान में असामान्य वृद्धि व मौसम परिवर्तन हो रहा है जिसे वर्तमान की प्रचलित भाषा में जलवायु परिवर्तन का नाम दिया गया है। चीड़ का पेड़ तो सूखी एवं खुष्क मिट्टी एवं जलवायु में उग जाता है किन्तु अन्य प्रजातिया नही उगतीं। चीड़ के बीज पंख वाले होते हैं जिससे यह दूर–दूर तक उड़कर फैल जाते हैं एवं बांज के जंगलों में अपना बिजाव कर देते हैं एवं धीरे–धीरे अपना स्थान सुरक्षित कर बांज पर घेरा डाल देते है। यह देखा गया है कि बांज के जंगल में नजदीक के गावों से मवेसी व पालतू जानवर बांज के जंगल में आकार इसकी पत्तियों की चराई करते है तथा बांज की छोटी–छोटी पौधों को भी कुचल देते हैं जिससे इसके पुनरूद्भवन (regeneration) पर प्रभाव पड़ता हैं। इन सबके अलावा बांज के जंगलों पर मानवीय दबाव अत्यधिक है क्योंकि यह एक बहुउपयोगी वृक्ष है जिसको चारा, जलाऊ लकड़ी, कृषि यन्त्र बनाने, लतादार फसलों की स्टैकिंग आदि में मुख्य रूप से प्रयोग किया जाता है। बांज की लकड़ी का प्रयोग जलाऊ लकड़ी के रूप में अत्यन्त महत्वपूर्ण माना जाता है क्योंकि इसकी कैलोरिफिक वैल्यू काफी अच्छी मानी जाती है। गांव के रसोईयों का यहां तक कहना है कि बांज की लकड़ी से बनाया गया खाना एवं रोटियां अत्यन्त स्वादिष्ट होती है।

बांज का जंगल

बांज वृक्ष को बचाने के लिए संभावित सुझाव

जैसा की ज्ञात है, यह बांज का वृक्ष अपने अस्तित्व के लिये संघर्षरत है एवं इसके संरक्षण एवं समवर्धन की नितान्त अवश्यकता है जिसमें सरकार एवं वन विभाग काफी हद तक प्रयासरत भी है। सर्वविदित् है कि किसी भी वृक्ष एवं जंगल को वहां के स्थानीय लोगों एवं ग्रामीणों की सहायता के बिना नही बचाया जा सकता अतः स्थानीय लोगों को इस कल्प वृक्ष

को बचाने के लिए आगे आने को नितान्त आवश्यक महसूस हो रही है। यह भी आवश्यक है कि इस वृक्ष को बचाने के लिए स्थानीय एवं व्यापक स्तर पर शोध किये जाए। साथ ही इसके साथ उगने वाले वृक्षों मुख्यतः चीड़ को बढावा न दिया जाय एवं इसकी सहायक वृक्ष प्रजातियां जो पर्यावरणीय संतुलन बनाये रखनें के अनुकूल हैं जैसे काफल, उतीस, बुरांस, देवदार, कैल, भमोंरा आदि को बढावा दिया जाए।

पहाड़ों में पलायन दिन–प्रतिदिन अत्यधिक बढ रहा है एवं सुविधा के अभाव में पहाड़ी लोग मैदानी क्षेत्रों में पलायन कर रहे हैं। अतः स्थानीय लोगों को उनके यथास्थान पर रोकने की अति आवश्यकता है जिससे सम्पूर्ण चक्र में बदलाव न आये। यदि स्थानीय लोग नही रहेंगे तो पशुपालन नही होगा, पशुपालन नही होगा तो लोग पशुओं के बिछाने के लिए चीड़ का पिरूल इकट्ठा नही करेंगे, चीड़ का पिरूल इकट्ठा नही करेंगे तो जंगलों में पिरूल से आग लगेगी। इसके अलावा चीड़ की पत्तियों (पिरूल) को ग्रामीणों के माध्यम से इकट्ठा करा कर विभिन्न प्रकार से प्रयोग किया जा सकता है जैसे जैविक ऊर्जा, जैविक ईंट, कागज एवं वर्मीकम्पोष्ट आदि बनाया जा सकता है। वर्तमान में राज्य सरकार द्वारा पिरूल लाओ पैसा पाओ योजना के अन्तर्गत पिरूल का मूल्य सम्मानित स्तर तक बढाया है किन्तु जन–सामान्य को जागरूक होने की आवश्यकता है। सरकार को वनाग्नि को रोकने के लिए आधुनिक एवं अत्याधुनिक तकनीकों को अपनाने की भी जरूरत है जिसके लिए पर्याप्त मात्रा में धन उपलब्ध कराने की आवश्यकता है। कुछ आधुनिक वनाग्नि से लड़ने वाली तकनीकें जैसे सेंसर प्रणाली, अर्ली फोरेस्ट फायर डिटेक्शन यूजिंग रेडियोएकोस्टिक साउंडिंग सिस्टम, डौप्लर राडार आदि महत्वपूर्ण हैं।

यदि स्थानीय लोगों को सम्बन्धित सरकारी संस्थानों एवं गैर सरकारी संस्थाओं के माध्यम से व्यवहारिक जानकारी दी जाए कि चीड़ के कुप्रभावों को किस तरह से सुप्रभावों में परिवर्तित किया जा सकता है तो यह एक उचित कदम होगा। उत्तराखण्ड में वन पंचायत आदिकाल से एक अति विशिष्ट मॉडल है। इन वन पंचायतों के माध्यम से इन बांज के जंगलों

वनाग्नि से तबाह बांज का जंगल

बांज युक्त कृषि–वानिकी

का संरक्षण एवं सम्वर्धन किया जा सकता है। जरूरत इस बात की है कि वन पंचायत के सदस्यों को समय–समय पर उचित प्रशिक्षण दिया जाए, जिसमें उन्हें प्रशिक्षित किया जाए कि चीड़ को किस प्रकार से प्रयोग किया जा सकता है। इसके अलावा वन स्वं सहायता समूह बना कर एवं इस हेतु स्पेशियल परपज वेहिकल बना कर भी चीड पर नियंत्रण किया जा सकता है।

वन विभाग द्वारा पहले जंगलों को आग से बचाने के लिए फायर लाइनें बनाई जाती थी और यह फायर लाइनें गर्मी शुरू होने से पहले ही बनाना शुरू कर दी जाती थी। विगत कुछ वर्षो से फायर लाइनें कम बनाई जा रही हैं, जिसका मुख्य कारण वन विभाग के पास कर्मचारियों की कमी होना भी है। यद्यपि वनाग्नि के सीजन में वन–विभाग द्वारा फारेस्ट फायर नियन्त्रण स्टॉफ नियुक्त किया जाता है, किन्तु पूर्ण तकनीकी ज्ञान एवं पैसे के अभाव के चलते इसमें भी सुधार की आवश्यकता है। यदि बांज को बढ़ाना है तो चीड़ को हतोत्साहित करना होगा, एवं ऊँचाई वाले क्षेत्रों में काफल, उतीस, बुरांस, देवदार, फर, स्प्रूस आदि वृक्ष प्रजातियों को बढ़ावा देना होगा। निचले क्षेत्र के जंगलों में आंवला, साल, खैर, हरड़ा, बहेड़ा, अर्जुन, शीशम इत्यादि प्रजातियों को बढ़ावा देना होगा। बांज की महत्ता को समझते हुए एवं वनाग्नि से हुई क्षति का मूल्यांकन एवं आंकलन करनं के लिए स्थानीय लोगों को विभिन्न माध्यमों से अवगत कराने की जरूरत है। यह माध्यम मीड़िया, सामाजिक मीड़िया, कम्यूनिटी रेडीयो, इ–चौपाल, दूरदर्शन आदि हो सकते है।

विदित हो कि 1000 मीटर से अधिक ऊँचाई वाले क्षेत्रों में हरे वृक्षों की कटाई प्रतिबन्धित है अतः केन्द्र एवं सक्षम स्तर से वार्ता कर जन एवं पर्यावरण के हित में नियमों में कुछ समय तक या आवश्यकतानुसार नियमों में शिथिलता की जरूरत है जिससे उचित सिल्वीकल्चर पद्वति का प्रयोग कर चीड़ की सेलक्टिव फैलिंग की जा सके। जो अत्यन्त महत्वपूर्ण वृक्ष है उनके लिये ट्री इंन्योरेन्स नीति बनाने की भी आवश्यकता है। यह भी सराहनीय कदम है कि उत्तरखण्ड सरकार एनर्जी डेवलपमेन्ट फ्राम पाइन नीडिल्स नीति के रूप में ग्रामीण क्षेत्रों में ऊर्जा प्रदान करने, वनाग्नि कम करने एवं रोजगार की दृष्टि से अति सराहनीय कदम है। यह भी देखा गया है कि चीड़ के पेड़ों एवं बांज के पेड़ों में पारस्परिक सम्बन्ध है इस संदर्भ में जटिल शोध करने की आवश्यकता है।

यदि बांज को बचाना है तो किसानों को बांज के पेड़ो को अपने खेतों में लगाने हेतु बढ़ावा देना चाहिए। किन्तु जरूरत इसको बढ़ावा देने की है, ताकि बांज के जंगलों में मानव का हस्ताक्षेप एवं दबाव घट सकें एवं बांज युक्त पारम्परिक कृषि–वानिकी वैज्ञानिक विधा से किसानों के खेतों में पुनः स्थापित की जा सके। इसके अलावा खेतों में चारा प्रजाति के अन्य वृक्षों जैसे भीमल, खडीक, गुरियाल आदि को भी कृषि–वानिकी के अन्तर्गत बढ़ावा देने की नितांत आवश्यकता है। राष्ट्रीय कृषि–वानिकी नीति 2014 में वर्णित तथ्यों को भली–भांति किसानों के खेतों में लागू करवाने की जरूरत है।

हिमालयी क्षेत्रों में अधिकतर प्राकृतिक जल श्रोत सूख रहे है जिसका मुख्य कारण बांज के जंगलों का कम होना बताया जा रहा है। अतः वाटर रिचार्ज एवं बांज के महत्व पर गहन शोध करने की आवश्यकता है। पेड़–पौधों का अपना समाज होता हैं, जिसे हम फाइटोसोसियोलोजी कहते है इस क्षेत्र में विशेष अध्ययन करने की जरूरत है।

यदि हम वास्तव में इस क्षेत्र के कल्पवृक्ष बांज को बचाना चाहते हैं तो हमें खासतौर पर बांज के बचाव के बारे में सोचना होगा। इस हेतु बांज या ओक बोर्ड बनाने की जरूरत है जो कि मात्र बांज जैसे महत्वपूर्ण वृक्ष के संरक्षण एवं संवर्धन के लिए कार्य करेगा। ■

THE STORY OF UTTARAKHAND APPLES

Where Ancient Vedas Meet Orchards

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The Scent of Snow and Incense

The high mountains of Uttarakhand can be defined through two scents. One smells of snow-fed rivers and sharp pine resin, then the incense of some temple that has burned it for a thousand years. The aroma of Devbhoomi, the land of the gods, a sacred geography nestled in the bosom of the Himalayas, the abode of great Ganges and Yamuna rivers and, the place where, the Vedas were first revealed to man. The second scent is sweet, fresh, and unexpectedly modern. In spring, the apple blossoms are crisp with sugary fragrance. The white and pink flowers dust the terraced slopes. In late summer, the fragrance is that of heavy wine or ripe fruit. This is the smell of the *seb,* the apple, a fruit not from this soil but quite likely

the valley's most valuable cash crop, the economic lifeblood of tens of thousands of families. Modern Uttarakhand is a land of ancient heritage, now suffering due to the fortunes from a foreign fruit. How did the apple, which originated in the mountains of Kazakhstan, end up in the very valleys where oracle used to meditate on existence? This is not just a story of horticulture. This is the tale of colonialism, American inventiveness, physical adaptability, and the continuous resistance of the Pahari community. This is the story of where the Vedas meet the orchards. We must look at every parameter of its success and current vulnerability to make sense of this journey. From the chilling hours needed by its buds to the price dictated by the market, from the colonial legacy that sowed its seeds to the climate crisis that threatens its very reality.

Ancient Vedic Times: Before the Cultivation of Apples

Uttarakhand's identity was shaped before the first apple tree was planted. This is the landscape of the epics. The area, then called Kedarkhand and Manaskhand, was the legendary theatre for a large part of the Mahabharata. The Pandavas are said to have travelled these mountains on their final journey to heaven. The farming methods practised here have existed for centuries and adapted well to the region's harsh, vertical terrain. The crops consisted of hardy grains like mandua, jhangora, and chaulai. Lentils, gourds, and greens were cultivated in the small terrace fields, or *khet*. The fruits were wild and local: hisalu, kaphal, and apricot (chullu). This was a system built on sustainability and diversity. It was not a high-income model, but it was resilient. It fed families and required fewer input. The Vedas and other scriptures mention grains, milk, ghee, and soma, not apple. Its arrival marked a significant economic and ecological graft, joining global commerce to the rootstock of the ancient.

Colonial Challenges: Wilson's Wonder and Britain's Craving for Home

The apple came to the Himalayas with the advent of colonialism. British officers and civil servants stationed in hill stations like Mussoorie, Nainital, and Ranikhet sought to recreate the English countryside, and nothing symbolised it better than the apple. Early attempts to introduce it were many but uncoordinated. The first major success is attributed to Frederick "Pahari" Wilson, a British Army deserter who, after the 1857 Mutiny, escaped into the isolated valley of Harsil near the source of the Ganges. Wilson, an adventurer, married a local woman, set up a timber trade, and virtually ran the valley. Local legend credits him with bringing the apple to Harsil in the 1860s. He planted a small orchard, and the trees thrived in the cold air and rich soil. The "Wilson" apple, a large reddish-green variety, produced juicy, tart fruit ideal for the cider and pies the British loved. At the same time, the British created "Company Gardens" or botanical gardens. The Chaubattia garden near Ranikhet, established in 1869, became a research station for temperate fruits. Missionaries and teachers also planted English varieties like Blenheim Orange and Cox's Orange

Pippin, mostly as hobby orchards. The apples tasted good but lacked sweetness and shelf life for a larger market. An American would later begin the revolution that transformed the apple from a colonial curiosity into a commercial force.

The American Missionary and the Delicious Revolution

The most crucial incident in the history of the Indian apple took place in Himachal Pradesh, not Uttarakhand. Samuel Evans Stokes is central to this story. In 1904, Stokes came to India as a missionary to work in a leper colony. He soon embraced India's spiritual traditions, became a Hindu named Satyananda Stokes, and married a local Pahari woman. Setling in Kotgarh near Shimla, he saw the poverty of hill farmers and believed that secure livelihood was essential for dignity. On a trip to the USA in 1914, Stokes visited the Stark Brothers' Nurseries in Missouri. There he found a new variety gaining popularity: the Delicious. The fruit was bright red, well-shaped, sweet, and durable—a marketer's dream. In 1916 he purchased a few saplings of this "Red Delicious" and planted them in Kotgarh. The results were transformative. Red Delicious and Golden Delicious thrived in the Himalayan climate and quickly became favourites among growers and consumers. News of Stokes success spread rapidly. Farmers from Chakrata and Uttarkashi travelled to Kotgarh for grafts, and the British administration at Chaubattia began officially introducing these American varieties. The old Wilson and English apples faded from cultivation. With this single horticultural choice, the ecology and economy of the Uttarakhand Himalayas changed dramatically over the next fifty years.

Parameters of an Apple Empire: Deconstructing the Orchard

The success of the apple in Uttarakhand was not a coincidence. The particular environmental, horticultural and economic conditions of a region were just right. We need to analyze these "parameters" that shape apple's story to understand the apple.

The Importance of Geography in Determining History

Not all of Uttarakhand can grow apples. The fruit is a temperate crop with a biological need for cold. Altitude and chilling hours are crucial. Apple trees require a period of dormancy when temperatures fall below 7°C (45°F), allowing buds to flower together in spring. Most varieties need 800 to 1200 chilling hours, and this requirement determines where apples can grow. The ideal "apple belt" in Uttarakhand lies between 1500 metres (about 5000 feet) and 2700 metres (about 9000 feet). Below this, winters are too warm; above this, the growing season is too short and frost damage increases. Hence, high-altitude districts form the state's apple heartlands—Uttarkashi (Harsil–Gangotri valley), Almora (Ramgarh, Mukteshwar), Nainital (Dhari, Nathuakhan), and parts of Chamoli and Pithoragarh. Apple trees grow best in well-drained loamy soils and cannot tolerate waterlogging, making terraced mountain slopes ideal. The aspect of the slope also matters: north-facing slopes are preferred because they are cooler, retain moisture longer, and protect trees from harsh afternoon sun. Trees rely on deep soil moisture from winter snowfall. The monsoon (July–September) helps fruit swelling but can disturb flowering if it arrives too early or late. A dry, sunny spring is ideal for pollination.

The Horticultural Mandate Explained: The Basics

Growing apples is not like growing millet. It is a high-science, high-labor, and high-risk endeavor. The "Delicious" group of apples includes noted varieties namely Red Delicious, Royal Delicious, and Starking Delicious. Because they are reasonably priced, the consumer mostly prefers them. Furthermore due to their high yield, these account for more than 70 percent of the production. They are also able to transport with ease. Other older varieties are Golden Delicious (a main pollinator) and McIntosh. Additionally, this monoculture poses a major risk and makes the orchards vulnerable to certain pests and market failures. Rootstock is the hidden foundation of nut and fruit orchards. Apple trees are not grown from seed. A cutting – a "scion" – (from the variety desired like Red Delicious) is grafted onto a "rootstock." For decades, farmers in Uttarakhand have been using seedling rootstocks which grow into huge, wild trees that take 8-10 years to yield and are hard to prune and harvest. Nowadays, clonal rootstocks (for example, the M9 or MM111 series) are used to create smaller "dwarf" or "semi-dwarf" trees. You can plant these trees much closer in HDP (High-Density Planting) system which gives fruits by 3-4 years and gives a much higher yield per acre.

The Labor Schedule in Orchard Management

Winter (Dec–Feb): Pruning is done to manage the tree's shape and allow sunlight to reach every branch, affecting fruit colour and flavour. New trees are planted, and fertilizer is added. Spring (March–April): Blossoms appear, making this the most beautiful yet anxious season. The entire crop depends on these weeks. A late frost

or hailstorm can destroy flowers. Pollination happens now; since apples are not self-pollinating, orchards need pollinator varieties and a strong bee population. Summer (May–July): Fruit development takes place. Farmers manage pests and diseases such as apple scab and powdery mildew. "Thinning" is carried out, removing small fruits so the remaining ones grow better. Harvest (Aug–Oct): After months of work, the fruit is manually plucked, sorted by size and colour, packed in boxes, and sent to markets.

The Socio-Economic Reality

The apple is not just a fruit; it is a cash-based economy. It is the ATM of the high-altitude village. Shifting from subsistence millet farming to commercial apple orchard farming transformed lives in rural Uttarakhand. It brought unprecedented cash income into remote villages. It funded cement houses better education for children modern goods to the people. Villages in the Ramgarh-Mukteshwar belt transformed into "apple economies" in which fortunes depended on the quality of the harvest. The Middleman: The bottleneck supply chain farmer is always at the losing end. More often than not, he sells his entire orchard in advance to a contractor or "laddani" who picks it and takes it away. Farmers would get cash using pledge or mortgage of property at a fraction of market price. Transportation of the fruit must take place on dangerous mountain roads which are landslide prone or blocked. A single delay can cause the fruit to spoil. The huge boxes arrive at a big market at the foothills, Haldwani, or are sent to Azadpur Mandi in Delhi. The auctioneers charge the price and often the farmer pays the cartel's point. Uttarakhand has a serious problem with cold storage facilities. Because the market for crops is flooded at harvest time, farmers have to sell their entire crop at that time only. At this time, prices are at the lowest. They can't keep their crop in storage to sell later at a better price.

The Uttarakhand apple is generallypicked early to make it to the first market. Himachal Pradesh and Kashmir are larger producers. The apples that you see at supermarkets from Washington, New Zealand and China are cheap and wax-coated.

The Great Ecological Unweaving: Climate Crisis and Environmental Transformation

For decades, the apple empire seemed secure, but today the orchards are in crisis. Climate change is undoing the conditions that created the Great Green Wall. The apple's main vulnerability is its need for chilling hours, and with warmer winters and reduced snowfall, trees are not getting sufficient dormancy. This leads to delayed and sparse blossoming, weak blooms, poor pollination, and low fruit set. Spring has become unpredictable early warmth can trigger premature flowering, only for late frost or hail to destroy it. Unseasonal rains further reduce blossoms and ground the bees. Warmer, damper weather has also triggered a rise in pests and fungi. Apple scab, once manageable, is now widespread, and new pests like woolly aphid attack the roots. With increasing resistance, farmers must use more chemicals, raising costs

and health risks. As a result, the "apple belt" is shrinking and shifting upward. Traditional apple areas such as Ramgarh (1,700 m) are becoming less viable, pushing farmers toward peaches, plums, apricots, and kiwi. Apple cultivation is moving above 2,500 metres into previously remote villages, but there is a natural limit—orchards cannot keep climbing indefinitely.

The Future - High-Tech, High-Density, High-Hopes

The story of the Uttarakhand apple is not over; it is again being forced to adapt. Its future may lie in a blend of high-tech methods and a return to basics. The government and progressive farmers promote High-Density Planting (HDP), where small trees on modern rootstocks are grown like grapevines. An orchard can hold 1,000 trees per acre instead of 100, making pruning, spraying, and harvesting easier, with far higher yields. New varieties like being tried—low-chill or scab-resistant types like Gala, Fuji, and Honeycrisp are being tried—as Red Delicious is increasingly questioned. A small organic movement resists chemical-intensive farming, using natural inputs like *jeevamrut* and herbal insecticides. Organic apples fetch premiums from urban buyers. Agri-tourism has also emerged old orchards in Ramgarh and elsewhere are becoming tourist spots where visitors enjoy apple picking. This provides farmers a new income source, allowing them to sell the orchard experience rather than just the fruit.

Conclusion: The Story of *Seb* and the Sage

The mandir emitted incense, and the *baghaan* emitted blossoms. As we move toward the garden, the two spaces no longer seem in opposition. Apples have been here for over a century and a half, tended by generations of Pahari farmers. The fruit has educated their children and built their homes; it has become part of the land. The Vedas and Uttarakhand's traditions speak of *Rta,* cosmic order, and Dharma, living in harmony with it. The original polyculture of mandua and jhangora expressed that balance. The apple, a monoculture cash crop, breaks from that past. It is a story of commerce and ambition, yet it has brought wealth and empowerment to hill communities.

Today, Uttarakhand's apple story reads like a parable. Success built on fragile environmental conditions is short-lived. The dominance of a single commodity creates vulnerability. The future depends on whether farmers, scientists, and policymakers can discover a new Dharma—a sustainable path that blends the resilience of older practices with newer organic and water-smart methods. The Rishis once sought eternal truth in these valleys; apple farmers now must adapt to rapid change. The survival of the orchards—and of Uttarakhand's apple economy—rests on this ability to adjust. In proving its resilience, the seb has earned its place in the land of the gods. ■

DEODAR

The Sacred Himalayan Cedar of the High Forests of Uttarakhand

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The Himalayan mountains sustain immense biodiversity and support both wildlife and human communities. As the world's highest range, they regulate climate and serve as a crucial water source for the Indian subcontinent. The Himalayan cedar (Cedrus deodara), or "Tree of the Gods," thrives in temperate forests of the Western Himalaya between 1200–3500 m, from Afghanistan to India. It commonly grows on well-drained slopes, often mixed with oaks and other conifers, forming characteristic oak–deodar forests in Uttarakhand's Central Himalaya.

Himalayan Cedar: The Sacred Sentinel of the Mountains

Cedrus deodara is a tall evergreen Himalayan conifer reaching up to 50 m, with bluish-green needle clusters and drooping mature branches. It bears solitary or paired barrel-shaped cones and elongated male flowers that turn yellowish at maturity. The germination capacity of seeds declines after three months of storage. Among all the provenances tested, seeds from Kandoliya, Dhanaulti, and Dandachalli exhibited the highest vigor and viability. The Himalayan cedar, a monotypic genus of Pinaceae native to the Western Himalayas, is a keystone species revered in sacred groves. Its distribution and diversity vary with elevation, which shapes vegetation structure and habitat conditions. Such vegetation–environment relationships are vital indicators of ecosystem quality and key to ecological research.

Himalayan Cedar in Uttarakhand Ecology, Heritage, and Climate Significance

The Himalayan cedar is a commercially valuable timber species covering about 203,263 hectares in India, mainly across Uttarakhand, Himachal Pradesh and Jammu Kashmir. In Uttarakhand, regions such as Gangotri, Govind Pashu Vihar, Harshil, Kedarnath, Munsiyari, Panchachuli, Pindari, Sunderdhunga and Tungnath host significant deodar populations in the Western Himalayas, though the exact area remains unspecified. The Garhwal Himalayas encompass diverse forest types distributed across varying altitudes, geological formations and soil types (Champion Seth, 1968). In contrast, this species is not native to Kumaun but was introduced centuries ago with the establishment of religious shrines (Kumar et al., 2023; Digvijay et al., 2020). The Kumaon Western Himalaya, a biodiversity hotspot, supports rich plant diversity, yet climate change is driving major ecological shifts, altering species ranges, forest growth, phenology and ecosystem boundaries (Singh et al., 2017; Zheng et al., 2021). It offers vital ecosystem services and exhibits notable medicinal, ethnobotanical, phytochemical and taxonomic characteristics. In recent decades, growing research has focused on its ecological role in climate change studies, as it possesses the highest biomass and carbon sequestration capacity among Himalayan conifers.

The Deodar forest in Champawat

Ethnobotanical and Cultural Significance

In the Garhwal, Kumaon and wider Western Himalayas, Cedrus deodara is revered as a sacred tree central to religious ceremonies. Its name, derived from Sanskrit, deva (god) and daru (tree), means "wood of the gods," reflecting its divine association with Lord Shiva. Traditionally, sages performed intense meditation *(tapasya)* in deodar forests to seek spiritual power, and the Skanda Purana describes the tree as Shiva's divine sentinel. Today, deodars are planted near temples in Himachal Pradesh and Uttarakhand, where devotees and pilgrims believe prayers beneath them promote spiritual growth and remove obstacles.

Deodar is traditionally used to treat fever, diarrhea and dysentery, while alcohol bark extracts have proven anti-inflammatory effective in both acute and chronic conditions. Its wood supports respiratory and urinary health and exhibits diaphoretic, diuretic, and carminative properties.

Ancient Indian texts cite deodar for rituals and temple construction, with its wood valued for idols and incense. Symbolizing longevity and resilience, the tree holds deep spiritual significance in Kumaon and Kullu, locals offer iron pieces to deodars, believing gods reside within them.

Regional uses of Deodar

S. No.	Region Local	Name	Uses
1	Almora District Kumaun	Devdar	The fumes of bark and trees are used as snake repellent.
2	Bhagirathi Valley	–	The timber is used for construction, fuel, and the leaves for fodder.
3	Champawat and Pithoragarh Districts	–	Oil extracted from wood is used to cure skin disease (Makku disease) of sheep and goats.
4	Jakholi Block	Devdaar	Bark powder is used for abdominal problems. Leaves and resin paste are applied to boils, cuts, and wounds.
5	Kalimath Valley	Deodar	The wood oil is used for arthritis, joint pain, cracks, and body aches.
6	Narendra Nagar Block	Devdar	The heartwood extract is used for the treatment of piles.
7	Niti Valley, Chamoli District		The bark oil is used to cure itching, dermatitis, and to relieve stomach worms.
8	Pauri Garhwal	–	The plant is used for bowel complaints, piles, lumbago, rheumatic arthritis, and urticaria.
9	Rawain Valley	Devdaar	Bark cures rheumatism and back pain. Oil is used for wounds and cuts.
10	Surkanda Devi Hills, Narendra Nagar, District Tehri Garhwal	Deodara	Used by local people for medicinal purposes.
11	Tehri Garhwal	Deodar	The wood oil cures intermittent fever, diarrhea, dysentery, ulcer, and skin disorders.
12	Tons watershed		Stem and bark are used for skin diseases, itching, and ulcers.

Sacred grooves (Deodar-dominated): Path to spirituality

Several researchers have traversed the wilderness of Uttarakhand in search of such sacred groves. Some documented sacred groves in Uttarakhand are dominated by cedar species such as:

Hariyali: Located in Rudraprayag district, it is one of the largest sacred groves in India.
Padiyar Devta: A revered forest patch in Auli, dedicated to the protector of herds.
Chiplakedar: Found in the Askot wildlife sanctuary in Pithoragarh district.
Other examples include those dedicated to Kotgadi Ki Kokila Mata, Pravasi Pavasu Devata, Devrada, and Saimyar.

Tourists flock to the Himalayan sacred forests and temple complexes to experience the spiritual aura of ancient deodar trees. These sites serve as both botanical attractions and active pilgrimage routes. At Kedarnath Temple, groves of deodar line the trekking path, where pilgrims pause to meditate, believing the trees embody Shiva's energy. In Jageshwar Dham, Almora, over 100 ancient temples sit amid dense deodar forests, where visitors report a serene, almost mystical atmosphere as temple bells resonate through the cedar-scented woods.

Chiplakedar sacred grove is located within the Askot wildlife sanctuary in Pithoragarh district. Travelers and spiritual seekers often describe mystical experiences in deodar forests—hearing whispers in the wind or sensing sudden chills as if entering another realm. Eco-spiritual tourism now includes guided walks, temple pilgrimages, and night meditation camps in these groves. In Dharamshala and Pauri, "Walks with the Deodar" treks offer storytelling experiences where local priests share mythological tales, with some trees believed to have grown from the staffs of sages like Agastya and Markandeya. Devdaru wood is so sacred that temples in Uttarakhand, such as Dhari Devi and Mahasu Devta, are built entirely from it. Visitors are drawn not only to the architecture but also to the wood's aroma and texture, believed to carry divine vibrations. Folklore dictates that carpenters perform rituals before cutting deodar, as ignoring this is thought to bring misfortune, a tradition recounted by temple priests. These forests hold both ecological and spiritual significance, attracting tourists while gaining partial protection despite potential disturbances.

Raksha Sutra: A Sacred Pledge to Protect Deodar Trees at Jageshwar Dham

Recently, hundreds of devotees gathered at Jageshwar Dham in Almora, Uttarakhand, to tie *raksha sutra* (protective threads) around the region's ancient Himalayan cedar trees. Many of these trees, some over 500 years old, surround one of the world's largest temple clusters of 125 shrines at 1,870 m above sea level. Over 1,000 trees slated for felling under the state's road-widening project as part of the 'Manas Khand Mandir Mala Mission' aimed at improving access to around 50 temples, were protected through this symbolic ritual.

Conclusion

The Himalayan cedar is a sacred and ecologically pivotal species in the high

forests of Uttarakhand, contributing significantly to carbon sequestration, soil fertility, and forest biodiversity. Its growth and regeneration are strongly influenced by climate, elevation, soil and anthropogenic pressures, with monsoon-dominated regions facing greater vulnerability under future warming scenarios. Older, undisturbed cedar forests demonstrate the highest soil organic carbon and nutrient storage, highlighting the importance of preserving mature trees. Sustainable management requires a combination of regulated timber extraction, community-based conservation, ecotourism and strict protection of sacred and pristine forest areas. Integrating traditional knowledge, scientific monitoring, and policy measures is essential to safeguard this sacred Himalayan treasure for future generations.

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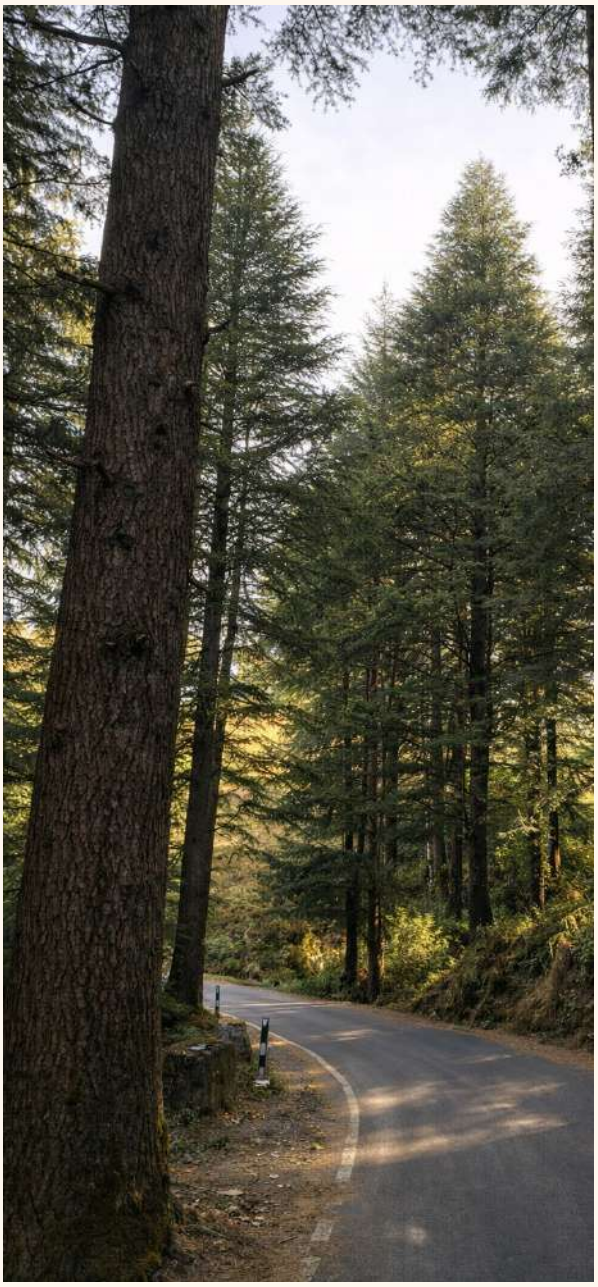

HIMALAYAN HARMONY

THE STORY OF VAN PANCHAYATS IN UTTARAKHAND

"And into the forest I go, to lose my mind and find my soul" John Muir

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Artist: Joy E

Trees emerged on this planet millions of years ago, before humans, and long before civilisations took root; forests had become the silent architects of life. In ancient times, forests provided humans with sustenance, firewood, medicinal resources, and shelter. Forests did not merely support human evolution; they shaped it.

In the Himalayan state of Uttarakhand, forests have always been more than just a source of sustenance. For centuries, hill societies depended on forests for grazing land, fodder for cattle, fuelwood, timber, and medicinal plants. Forests were an important part of the social, economic, and cultural life of the predominantly agro-pastoral communities. But this relationship was not one-sided. Forests in the early societies of Uttarakhand were respected, managed and protected through a deep sense of ecological wisdom. This bond between people and forests was guided by customs, traditions, and indigenous

Collecting wood from Jungle

institutions that collectively formed a community-based forest management system. There existed a highly sophisticated system of conservancy that took various forms. Often, hilltops were dedicated to local deities, and the trees around the spot were regarded with great respect. Commonly known as Dev van or Sacred groves, these forests were not only spiritual spaces but also ecological reservoirs that conserved biodiversity and helped maintain water sources. The huge, forested regions spanning the mountain ranges and hills attest to the meticulous stewardship of successive generations of Uttarakhandis. Villages typically located midway up the spur relied on sacred groves to stabilise water flows and mitigate landslides. Customs served as powerful management tools. Villagers followed unwritten but universally accepted rules on how much wood could be collected, when grazing was permitted and which forests were to remain untouched for regeneration. Violating these predetermined rules was considered a serious offence, and the offender often faced social boycott or temporary exclusion from forest use. In the absence of state control or any kind of formal bureaucracy, communities took the responsibility of forest management and the sustainable use of forest products.

Colonial Takeover of Forests and People's Reaction

However, this harmonious relationship began to deteriorate with the arrival of the British colonial administration in the nineteenth century. Unlike the local people, who saw forests as a shared resource and a sacred trust, the British viewed them as a source of commercial fulfilment. The growing demand for railway sleepers, wood for public and military construction and revenue led to the inauguration of scientific forestry in Uttarakhand, which centralised forest resources and placed them under strict state control with the passing of the Forest Acts of 1865, 1878 and 1927. Large tracts of forests utilised and managed by the local communities were suddenly declared reserved or protected forests. Traditional practices of forest usage were declared primitive and illegal, and what were considered the rights of communities were declared concessions granted by the government. This drastic shift disrupted the ecological balance and social structure of

the hills. Commercial exploitation replaced community conservation.

The sudden change in the forest use rights under the colonial rule came as a profound shock to the local communities of Uttarakhand, who had long relied on forests as an essential part of their subsistence and cultural life. The colonial government relentlessly continued to declare vast stretches of unmeasured land as reserved forests. A major turning point came with Notification no 869F/638-44 dated 17 th October 1893 which is regarded as a red letter day in the forest history of Uttarakhand, as all the forests and waste lands of British Kumaun not forming part of the measured areas of villages or of the reserved forests were declared to be protected forests under section 28 of the Indian Forest Act.

The simple and confiding Kumaon villager had so far quietly borne the steady encroachment into his sacred rights, but these violent shocks coming in quick succession, as Pt Govind Ballabh Pant had rightly put, proved too much even for him to give vent to his anguish. These policies triggered widespread resentment and paved the way for organised resistance in the Himalayan region.

The rising dissatisfaction culminated in a mass meeting held at Almora in 1907, presided over by Major General Wheeler. During this historic gathering, an emphatic protest was lodged against the forest policy by Rai Bahadur Pt. Badri Datt Joshi, who dealt with the subject with great ability and restraint. In response to that, Sir John Hewett made a declaration at the Darbar held at Bareilly on 2nd November 1908, affirming that, "the government had no desire to make money out of the forests in Kumaon, the amount by which the receipts exceed the expenses." He further asserted that regulations were necessary to check the reckless destruction of forests that was happening in the Himalaya region.

Local women with collected wood branches.

However, Hewett's assurances proved hollow. Contrary to his declaration, the colonial government intensified its control over the forests and made further alterations in their forest administration, which imposed stricter control and appointed two new forest officers to oversee the settlement. The pace of forest reservation

A Van Panchayat meeting in progress in the village.

increased significantly during the First World War as the British required huge quantities of timber for military purposes, including railway sleepers and construction material. It is no exaggeration to say that almost all of the forests were somehow reserved under strict colonial control, leaving village communities with only negligible forest lands. The Forest Movement of 1921 and the Establishment of KFGC Inspired and motivated by the Satyagraha movement of Mahatma Gandhi, the nationalists of Uttarakhand started movements against social disparity and forest policies. Badri Dutt Pandey understood the pulse of the people and encouraged by the success of the Coolie Utar movement, inspired them to take direct action to regain their lost rights to the forests. The people of Uttarakhand, who had been considered peaceful and had lived in harmony for years, became extremely agitated over their rights to the forests. As a result, people started setting fire to the forests. In 1921, when the forests were already dry due to a lack of rain, they became the target of public anger, and millions of acres of forest across Uttarakhand were reduced to ashes. Setting fire to the forests symbolised the centuries-old tradition of people setting seasonal fires to assert their rights over the forests. Alarmed by the scale of unrest and its potential to escalate further, the colonial government was compelled to respond and formed the Kumaon Forest Grievance Committee under the chairmanship of P Wyndham in 1921 to reform the forest management system in Uttarakhand. What the KFGC recommended paved the way for the establishment of Van Panchayats in India.

Establishment and Functioning of Van Panchayats in Uttarakhand

The Kumaon Forest Grievance Committee recommended the formation of village communities or Van Panchayats. The formation of van panchayats took place in 1931, when the Van Panchayat Regulation was constituted under the District Schedule Act of 1874. This was the first formal inauguration of community forest management in colonial Uttarakhand.

The idea of community forest management was not new. However when the colonial government drafted the forest management policies, Dietrich Brandis, the father of Indian forestry, advocated for the participation of locals in forest management. However, the

colonial government did not approve of his suggestions and stuck to complete state control of the forests.
Another event that shaped the community forest management in India took place in the Madras Presidency, where members of the Madras Legislative Council demanded that forests near the villages be returned to local people for their sustenance use. A landmark resolution was passed urging that all reserved and protected forests within one mile of village areas be disafforested and restored to villagers. Council member M N Reddi argued that forest policies must serve the welfare of the peasant, who is completely dependent upon forest resources for his daily needs.

Van Panchayats were established to empower village communities in the management of local forests outside Reserved or Protected categories, designated as Class I (non-commercial) by the 1921 Forest Grievances Committee. Initiated by the Gram Sabha, a Van Panchayat is formed through a resolution passed by village members, traditionally requiring a two-thirds approval of adults, later reduced to one-third, with eligibility limited to long-term residents. Once formed, the Van Panchayat oversees the sustainable use and protection of village forests, creating local rules for resource extraction, ensuring equitable access, and monitoring against encroachments and degradation.

Van Panchayats: Past, Present and Future

Van Panchayats in Uttarakhand are vital for community-driven forest management, overseeing 5,23,000 hectares, or nearly 14% of the state forest land. Established mainly over civil-soyam forests in 1931, their performance is inconsistently effective. These Van Panchayats played a significant role during the Chipko Movement, which emphasised environmental justice and community rights over the forests. Leaders of Van Panchayats actively participated, held meetings and agitated against the state monopoly over the forests. The Chipko slogan "Jangal Hamara Hai" (the forest is ours) echoed the same claim to customary rights and local participation that had led to the creation of Van Panchayats a few decades earlier. While some committees excel in forest conservation and community engagement, many face significant challenges, including inadequate funding, leading to illegal activities such as grazing and deforestation.

Revenue generated from forest products largely remains inaccessible as it is directed to government treasuries. Additionally, these Panchayats struggle with overlapping jurisdictions from the Revenue and Forest Departments, which complicates administration. Community participation has waned due to migration and reduced cohesion, and women, who are primary forest resource users, are often excluded from decision-making. Factors like water scarcity, poor regeneration of broadleaf species, and increased pine dominance further degrade forest quality. The lack of enforcement of local regulations undermines institutional effectiveness. Overall, while Van Panchayats are critical in linking communities with forest governance, their capabilities are hindered by various structural, administrative, ecological, and participatory issues. ■

TRADITIONAL FIBRE-YIELDING PLANTS OF UTTARAKHAND

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Figure 1. a - Betula utilis, b- Bombax ceiba, c- Daphne Papyracea, d- Grewia asiatica, e-Butea monosperma, f - Stellera chamaejasme

Uttarakhand boasts diverse biogeographic and eco-climatic features and is renowned for its rich biological resources and indigenous cultural groups, which coexist in harmony with its natural surroundings. The unique practices of resource use and management developed by these groups, over time, have ensured the long-term sustenance of natural resources. Among others, products made from plant-based fibres form a natural resource for meeting needs, particularly in areas with limited access to alternative materials. The combination of strength with flexibility, inherent in many of the natural fibres, had attracted the attention of people for a long time. The fibre production contributes significantly to the economy of the region in various ways, including agricultural implements, clothing and products for other household operations. The natural fibres constitute a class of material that possesses continuous filaments or are arranged in discrete, elongated pieces, similar to lengths of the thread, and play a very important role in plants in holding tissues together. Human dependence on plant fibres is manifested in a diverse range of products. This includes fibres spun into filaments string or rope fibres forming a component of composite materials fibres matted into sheets to make products such as paper or felt. Compared to synthetic fibres, which can be produced very cheaply and in large quantities, natural fibres enjoy major benefits, such as comfort and biodegradability in nature, as well as eco-friendliness. In recent years, the plant-based fibre has been replaced by nylon, polyester, etc. These synthetic fibres are low-cost and are produced in large quantities generally from petrochemicals to uniform strengths, lengths and colours, as well as easily customised to specific applications. Although realising the long-term problems of synthetic polythene-related products, the natural fibres can play a key role in the emerging 'green' economy.

Jute craft products of Uttarakhand

In the mountain ecosystem, the fibre-based products constitute a vital component in village culture, albeit generating limited income opportunities to the local communities. However, considering that plant-based natural fibre products are eco-friendly and durable, these products have the potential for promoting local income and sustenance towards natural plant-based fibre products for indigenous communities.

Fibre-yielding plants of Uttarakhand

Abbreviations: B – Bamboo; Cl – Climber; G – Grass; H – Herb; S – Shrub; Se – Sedges; T – Tree; US – Undershrub

S.No.	Scientific name	Vernacular / local name	Habit	Altitude (m asl)	Part used	Uses of Fibres
1.	Abelmoschus esculentus	Bhindi	H	Upto 1800	Stem	Rope
2.	Abelmoschus moschatus	Muskdana	US	Upto 2000	Stem	Rope
3.	Abrus precatorius	Ratti, Ratigiri, Gaunchhi, Kamboji	Cl	500-1100	Bark	Rope
4.	Abutilon indicum	Kangiyo, Atibalu, Atibalaa, Soma ratsa	US	Upto 1200	Stem	Rope, Twine, Cordage
5.	Abutilon persicum	Tepari	US	Upto 1100	Bark	Rope
6.	Abutilon ramosum	Kanghe, Atibala	US	Upto 1200	Stem	Rope
7.	Agave americana	Ram bans, Bans Keora, Kantala	S	Upto 1300	Leaf	Rope
8.	Anaphalis busua	Bugla, Buglya	H	600-1500	Stem	Rope
9.	Artocarpus lacucha	Dhau, Barhal, Lakuchi	T	Upto 1200	Stem	Rope, Cordage
10.	Arundo donax	Tina, Nar,Baranal, Narsal	G	Upto 400	Culm	Mat, Basket
11.	Azanza lampas	Ban kapasi, Jangli Bhindi	S	Upto 1200	Stem Bark	Rope
12.	Betula alnoides	Saur, Kath-bhuj	T	2000-3000	Stem	Traditional paper
13.	Betula utilis	Bhojpatra	T	2800-4300	Stem	Traditional paper
14.	Boehmeria penduliflora	Bara, Siauru, Kamli, Pua	H	600-3000	Stem	Rope

The natural fibres are an important source of livelihood for the people in the mountain region. Realizing its importance and limited knowledge, the institute has documented, which contains information on 84 species of fibre-yielding plants a few important species and their descriptions are presented in the table above.

Analysis across various habit/life form categories reveals Shrubs (26), trees (18), climbers (13), herbs and undershrubs (09), grasses (07), and bamboo and sedges are represented by single species namely, Dendrocalamus strictus, Erioscirpus comosus respectively. While considering the direct use values, a total of 24 use categories were recorded for these 84 species. Amongst listed species, 70 are used for rope; 12 for cordage; 6 for mat, 4 each for paper and fishing net; 3 each for basket, thread and net; 2 each for twine, mattress, rope for thatching, and the remaining are for single use. The paper-like fibre obtained from the stem of Betula alnoides and B. utilis was traditionally used for writing scriptures and important texts, like preparing horoscopes.

Despite huge diversity (84 species enumerated here), only a limited species have been identified and evaluated for their true economic potential. Therefore, further studies should be conducted on other species to determine the potential of commercial production so that actual benefits can reach the rural inhabitants. In view of the importance as well as the need for natural plant products, concerted efforts are also needed for the creation of awareness, dissemination of knowledge for multiplication and plantation, and subsequent linking up with the potential markets so as to accrue long-term benefits.

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MALTA

A DELICIOUS FRUIT THAT BRIDGES THE HEALTH AND CULTURE OF UTTARAKHAND

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In the mid-Himalayan region of Uttarakhand, the bright orange fruit locally known as Malta is grown in kitchen gardens and symbolizes the heritage of the hills. It is more than just a seasonal treat and is deeply connected to the roots and culture of the Garhwali and Kumaoni people. The aroma, flavour and multiple properties of this fruit have an emotion that is a living emblem of the region's biodiversity and cultural heritage. Sweet orange (Citrus sinensis), a key species in the Rutaceae family, is believed to have originated in the tropical and subtropical regions of Southeast Asia, particularly in China, India, and the surrounding areas. It has high vitamin C content, sugar, amino acids, and other nutrients, and is known as a healthy dietary choice (Sharma et al., 2012). It takes 5-6 years to reach the fruiting phase after planting, and flowering occurs from March to May, and fruits are harvested from November to December. This fruit is also consumed

Fig 1: Malta tree during the fruiting stage

and utilized in various forms, including juice, squash, candy, jam, essential oil, and peel powder (Goswami et al., 2020). Juice of Malta contains total soluble solids, protein, carbohydrates, fibres, and water. Malta also contains bioactive compounds like flavonoids (hesperidin, naringin), carotenoids (cryptoxanthin, lutein), and essential oils (limonene, citral). These substances possess notable antioxidant, anti-inflammatory, and antimicrobial activities. The production of one single tree gives around one to two tons of fruit per year. The dried Malta fruit is used in candies and jam, prepared under controlled temperature and moisture conditions. Additionally, the essential oil extracted from Malta fruit peels holds significant therapeutic and cosmetic value. The powdered peels are also incorporated into various cosmetic products.

Traditional and Ethnobotanical Significance

In the hills of Uttarakhand, Malta is more than just a fruit; it is integral to seasonal celebrations and rural livelihood. It is often seen that each household will have at least one tree of Malta around their home. The fruit ripens from November to February, aligning with festivals like Makar Sankranti and Basant Panchami. Locals commonly offer Malta to visitors as a gesture of warmth and hospitality. People can be seen consuming slices of Malta fruit marinated with homemade salt, sugar, honey, or sometimes cream during the sunny winters (Figure 2). Traditionally, Malta juice is believed to soothe sore throats and colds,

Fig 2: Slices of Malta fruit marinated with Garhwali salt

dried peels are kept as natural flavouring, and they are even burned to keep insects away. It also helps to maintain normal blood pressure and glucose levels. Malta's cultural significance is reflected in folk songs and local sayings. In Kumaoni folklore, a girl's cheeks are often compared to the orange hue of Malta, symbolizing health and beauty. During village fairs and melas, children often buy Malta squash and Malta toffees, produced by local women's self-help groups. This tradition maintains a strong connection between cultural heritage and entrepreneurship.

Malta and Climate Resilience

With changing climatic conditions threatening traditional crops like mandua (finger millet) and rajma (kidney beans), Malta emerges as a climate-smart fruit. Its deep root system stabilizes fragile mountain soils, while its relatively low water requirement makes it ideal for semi-arid hill slopes. It also has good carbon sequestration potential along

Fig 3

with ecological significance. Integrating Malta into agroforestry systems can improve microclimate regulation, enhance pollinator activity, and support biodiversity conservation.

Challenges in Cultivation

Despite the huge potential of Malta, it faces various challenges. Major threats include competition with other citrus species, a weak market channel, and diseases like citrus canker, tristeza virus, and fruit fly infestations, which are often worsened by inadequate orchard management and the lack of quality planting material. Factors such as irregular rainfall and frost during flowering periods also diminish yields. Adopting integrated pest management strategies and quality plant material represents another move toward sustainable Malta cultivation. Further support through farmer training in pruning, nutrient management, and scientific orchard design could help enhance productivity.

Value Addition, Innovation, and Future Prospects

Innovation around Malta is transforming it from a humble hill fruit into a symbol of Uttarakhand's bio-cultural identity. The value addition, including essential oil, wine and vinegar, solar-dried peels and branding

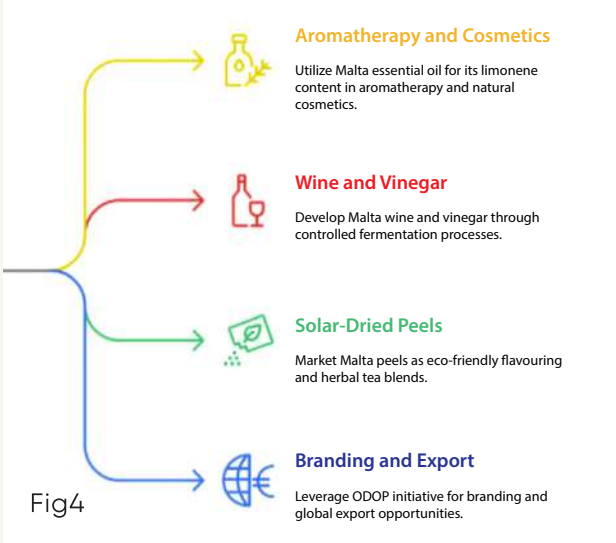

Fig4

and export of fruit, can leverage Malta as a signature product of Uttarakhand. It can become a marketable product of the state worldwide, like the apple of Jammu and Kashmir and Himachal Pradesh, through the integrated intervention of the government and intergovernmental organisations.

Symbol of Heritage and Sustainability

Malta reflects the spirit of the state resilient, rooted, and shining. Its cultivation maintains traditional knowledge, supports biodiversity, and strengthens locals. As the world seeks sustainable food approaches amid climate uncertainty, Malta serves as a local solution associated with traditional practices. Promoting Malta is more than conserving a fruit; it is an act of protecting the entire culture. This fruit has the potential to serve as a seasonal livelihood for communities, but it needs enabling policies, a strong market structure, and quality plant material.

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Fig5

BHOJPATRA

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Leaves of Bhojpatra

Betula is a genus of trees and shrubs of plant family Betulaceae, distributed in various habitats like bogs, highlands, tundra and forests. In genus Betula, Betula utilis D. Don (Bhojpatra) is a cultural, ecological and economic important tree species, largely distributed in the Himalayas. It is commonly known as Himalayan Birch and Fir in English, Bhojpatra, Bhojpatri and Bujpatri in Hindi and Bhurja in Sanskrit. It has smooth, glossy, reddish-white bark that may or may not have lenticels, with many thin, papery layers in the outer bark.

Wood is extremely fragile, hard, and overwhelming. The bark strips are frequently flat, broad, and appropriate for writing. Its bark was utilised as a paper substitute in antiquity. Natural populations of B. utilis are under pressure because of its historical usage and the overharvesting that followed to satisfy community and commercial demands.

Bark of Bhojpatra

Distribution of Bhojpatra

Betula utilis is generally considered to be native to Afghanistan, Bhutan, China, Nepal, Kazakhstan, Tajikistan, Uzbekistan and India. In Indian Himalayas, it is commonly and rarely distributed in alpine regions, between an altitude 2400 to 4300 m including areas in Jammu and Kashmir, Himachal Pradesh, Uttarakhand and Sikkim and Nepal, as it is adapted well to cold climate. The distributional range of B. utilis in Himalaya is primarily associated with temperature and precipitation related factors. In lower altitudes, it is distributed sporadically but in the higher elevation, it has dense and gregarious strands either in pure masses or often with undergrowth of Rhododendron campanulatum (Semru) or with Himalayan Fir species like Abies pindrow and Abies spectabilis and sometimes with Junipers.

Bhojpatra: Heritage of the Himalaya

The Betula forest is generally considered as the climax vegetation of the Himalayas, which covers enormous areas in the sub-alpine and alpine zones. Growing at high altitudes, often on steep slopes with thin soils or under heavy snow pressure, these trees frequently display a distinctive curved or saber growth.

Beyond their ecological role, Betula trees hold immense cultural and historical importance. According to the IUCN criteria, Betula utilis has been classified as Critically Endangered in the Indian Himalayan Region. Betula forest, which spans a sizable region in the sub-alpine and alpine zones, is typically regarded as the Himalaya climax forest. It typically exhibits "sabre" growth because it grows at high elevations, usually

on soil-slopes or in conditions of heavy snow pressure. It has long been utilised for writing sacred scriptures, as a medium for creative and commercial endeavours, and for its therapeutic qualities in traditional medicine, making it an important part of the Himalayan cultural and historical legacy. These trees grow like that is partially on the ground in avalanche tracks.

A Tree with Ancient Roots

The name Bhojpatra is derived from Sanskrit: "Bhoja" referring to Lord Brahma or sometimes King Bhoja (a great patron of learning), and "Patra" meaning leaf or paper. True to its name, Bhojpatra' s bark was widely used in ancient India as a durable surface for writing scriptures, mantras, and texts before the advent of palm leaves and paper. Manuscripts of the Vedas, Upanishads, and tantric texts were inscribed on thin sheets of its bark using natural ink. Many such manuscripts have survived the test of time, a testament to the tree's resilience and sacredness. In Uttarakhand, Bhojpatra holds a revered place in local traditions. The tree is considered a divine gift, and its bark is still used in religious rituals. Strips of Bhojpatra are often inscribed with sacred verses and worn as protective talismans.

In some Himalayan households, pieces of bark are placed in prayer rooms as a symbol of purity and divine connection. The tree is also associated with Goddess Parvati and Lord Shiva, especially in regions near Kedarnath and Badrinath, where Bhojpatra groves stand. It is believed that Sri Maha Mrityunjaya Yantra prepared from the bark of birch is more powerful. During Nanda Devi Raj Yaat Yatra in Chamoli district of Uttarakhand, an umbrella is made to cover the idol of goddess Nanda Devi, this umbrella is locally known as Nanda's Chhatoli *(Jhuank dh Narksyh).*

Uses of Bhojpatra

Betula utilis is used by the Himalayan community for medicine, lopped for forage/ fodder and for making agricultural tools. It is an ecologically important and long-lived

species which survives for more than 400 years. Especially in the Himalayan Region, it helps to control soil erosion and forms an integral part of the day-today life of the Himalayan people, as it is deeply associated with the culture of these people. Since ancient times, it was used as a substitute for paper especially for writing religious inscriptions. Even today in higher Himalayas, bark of the tree is used as a pipe and as packaging material, butter wrapper, for roof construction, for making umbrella covers, as a bandage, as cigarette paper, to line the inside of hookah tube, for wrapping amulets and for various religious ceremonies.

Additionally, three to five Bhojpatra sheets (12 × 10 cm of papery bark) cost about 200 to 300 on Amazon due to its religious significant. Betula wood is used for construction, the branches are used to make poles and bridges, and trees are frequently cut down. Its wood is used to make agricultural tools, firewood, lumber, and traditional kitchenware, including spoons and cutlery. In the upper Himalayas, it is also used as bio-fencing material. It helps prevent soil erosion and serves as an effective soil binder. Additionally, it has spiritual and cultural significance, particularly for Hindus. Different parts of B. utilis are used in many religious rituals; for example, its bark is used for writing scriptures and texts, especially in Sanskrit, and is still used for writing mantras and yantras.

Medicinal uses of Bhojpatra

Betula utilis is a source of numerous phytoconstituents that are commonly used for various purposes. Its bark is used ethnomedically to treat earaches, gout, malaria, rheumatism, and jaundice. Resinous portions of B. utilis are used as contraceptives in the Kumaun region of Uttarakhand and Nepal. Plant resin of B. utilis is also used to treat colds and coughs, and the tea made with its leaves is used to treat hepatitis, dysentery, and colds. Birch leaves are used to prevent dandruff and hair loss. In the Ayurvedic medical system, the bark and leaves are also used to treat burns, ocular issues, wound healing, hysteria, jaundice, obesity, urinary difficulties, and other conditions. The tree possesses carminative, antibacterial, and contraceptive properties. One type of triterpenoid isolated from B. utilis that suppresses HIV-1 replication is betulinic acid. As several of its derivatives have been shown to suppress HIV-1 at an extremely early stage of infection, these substances may be used in HIV therapy. Tree methanol and ethanol extracts shown substantial antibacterial activity against all test pathogens and against fourteen human pathogenic microorganisms. In a one-dose study on streptozotocin-induced diabetic rats, the stem wood of B. utilis exhibited antihyperglycemic properties and a 9.2% decrease in blood glucose levels. SR Bassay in vitro cytotoxic activity against nine distinct human cancer cell lines.

The Sacred Bhojpatra of Alpine Forests

Betula utilis (Bhojpatra) grows in the subalpine and alpine zones of the Himalayas, forming the natural treeline—the uppermost limit where trees can mature. These treeline zones are crucial ecological indicators, especially vulnerable to global warming. Temperature largely governs the distribution of Bhojpatra in the Himalayas,

where it occupies extensive areas. The alpine treeline marks the highest altitude for woody vegetation; beyond it, plants survive only as stunted shrubs. In the Himalayas—home to some of the world's highest and most diverse treelines—these zones reveal the effects of climate change as species migrate upward. B.utilis is widespread along Himalayan treelines and serves as a key indicator of climate-driven ecological shifts. The presence of young individuals above existing treelines suggests its potential for further upslope migration. In Uttarakhand, its niche is already crowded by other vegetation, showing a patchy distribution. Bhojpatra-dominated treelines are increasingly threatened, losing ground to faster-growing spruce and pine in warm conditions.

Conclusion

The Bhojpatra is revered as the sacred paper tree of the Himalayas. It embodies the deep interconnection between nature, culture, and spirituality in Uttarakhand. Once used as a medium for writing sacred texts and knowledge, Bhojpatra continues to symbolize heritage and ecological resilience. Growing along fragile alpine treelines and often shaped by harsh conditions into unique forms, it plays a vital role in stabilizing ecosystems while also serving as a cultural icon. However, with climate change and human pressures threatening its survival, the species now faces critical endangerment. Protecting Bhojpatra is therefore not only an act of biodiversity conservation but also a commitment to safeguarding the cultural and spiritual legacy of the Himalayas.

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UTTARAKHAND'S KAAFAL TREE

A Wild Fruit with Cultural and Nutritional Value

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The Kaafal tree (Myrica esculenta) thrives across the mid-Himalayan belt from Jammu and Kashmir to Bhutan and parts of Nepal, northeastern India, and southern China. In India, it occurs naturally in Himachal Pradesh, Uttarakhand, Sikkim, West Bengal (Darjeeling), and northeastern hill states. Uttarakhand, however, remains its ecological and cultural heartland. Found between 900–2,100 m asl (occasionally up to 2,400 m), Kaafal prefers well-drained, slightly acidic loamy soils and temperate climates. In Uttarakhand, it grows abundantly across Nainital, Almora, Chamoli, Pauri, Rudraprayag, Bageshwar, Pithoragarh, and Tehri, thriving along oak–pine–rhododendron forest margins and Van Panchayat lands. Kaafal provides not only seasonal nutrition but also ecological stability—supporting biodiversity and preventing soil erosion. It is officially the State Fruit of Uttarakhand, celebrated in local folklore ("Kaafal pako, mina chakho") and valued as a symbol of mountain identity. Traditionally sold fresh with rock salt and chili, Kaafal is now drawing attention for its nutraceutical potential and value-chain opportunities for rural women's groups.

Botanical Identity & Morphology

Myrica esculenta Buch.-Ham. ex D. Don, family Myricaceae, is an evergreen to semi-evergreen dioecious species reaching 6–18 m in height. Its leaves are leathery, lanceolate, and glossy, while male and female flowers occur on separate trees—male in catkins, female in spikes. In Uttarakhand, flowering occurs from January–March and fruiting from April–June. The globose drupes (1–1.5 cm) turn crimson red or deep purple at maturity and are highly perishable, lasting barely 48 hours at room temperature. Phenologically, Kaafal signals the transition from winter dormancy to summer abundance—an ecological marker in Himalayan life cycles.

Nutritional and Culinary Value

Kaafal fruits are rich in vitamin C (25–80 mg/100 g), antioxidants (polyphenols, anthocyanins, tannins), and dietary fiber (2–4 g/100 g). They supply essential minerals like potassium, calcium, magnesium, and iron. Traditionally eaten fresh with salt and chili, Kaafal offers a sweet-tart flavor and digestive benefits. Though highly perishable, it is used for homemade chutneys, squashes, jams, syrups, and fruit-leathers.

Its anthocyanin pigments also make it a candidate for natural food colorants and nutraceuticals. Typical composition per 100 g fresh pulp: Energy 45–65 kcal; Moisture 78–85 g; Carbohydrates 10–15 g; Vitamin C 25–80 mg; Total phenolics 150–400 mg; Minerals (K, Ca, Mg, Fe).

Ecological & Environmental Role

Kaafal contributes to soil stabilization, biodiversity, and ecosystem resilience in Uttarakhand's fragile hills. Its deep roots prevent erosion on steep slopes, while dense canopies moderate microclimates. Flowering and fruiting provide sustenance for pollinators, birds, and mammals, ensuring seed dispersal and forest regeneration. Its resinous bark deters pests, supporting forest health. Thriving on degraded slopes and village commons, Kaafal serves as a buffer species between human settlements and natural forests. Its adaptability to diverse microclimates and soil types makes it an important climate-resilient tree in the Himalayan ecosystem.

Ethnobotanical and Cultural Importance

Deeply embedded in Uttarakhand's folk culture, Kaafal's ripening marks seasonal change and renewal. The proverb "Kaafal pako, mina chakho" captures its ephemeral availability and emotional significance. Beyond food, Kaafal plays a role in traditional medicine—its fruits aid digestion and alleviate fatigue; bark decoctions treat cough, asthma, diarrhea, and fever; leaf infusions relieve pain and fevers; and powdered bark or leaf pastes are applied to wounds and ulcers. Phytochemical studies confirm its antimicrobial and anti-inflammatory properties, validating its use in Himalayan ethnomedicine.

Ayurvedic Formulation	Uses	Part Used	Example Manufacturers
Katphaladi Churna	Cough, cold, fever	Bark	VHCA Ayurveda
Pushyanuga Churna	Gynecological issues	Bark	Baidyanath, AVN
Khadiradi Vati	Oral ulcers, sore throat	Bark	Zandu, Zeelab
Arimedadi Taila	Dental/oral care	Bark	Kottakkal AVS
Katphala Taila	Joint pain	Bark	VHCA Ayurveda
Chyawanprash	Immunity tonic	Bark	Dabur, Patanjali

Harvesting, Postharvest & Quality Management

Harvest occurs between April–June when fruits ripen. Because the berries bruise easily, they are handpicked or shaken gently onto nets. Sorting, shade-keeping, and ventilated crates help maintain quality. Without refrigeration, fruits perish within two days; at 4–5 °C, shelf life extends to 5–7 days. Light sprinkling, evaporative cooling, and hygienic washing reduce spoilage. Linking women's Self-Help Groups (SHGs) to small cold-storage or processing units can prevent losses and increase income.

Processing & Value Addition

Value addition is key to overcoming perishability. Traditional uses—chutney, sherbet, squash—can evolve into organized products like RTS beverages, jams, jellies, syrups, and fruit-leathers. Solar drying or pasteurized pulp storage allows longer shelf life. Kaafal's anthocyanins lend themselves to functional foods and natural colorants. Entrepreneurial SHGs are developing "Himalayan Kaafal" jams and squashes for niche eco-friendly markets. Blends with burans and hisalu enhance product diversity. Modern packaging (vacuum- sealed pouches, PET bottles) and branding can convert this wild fruit into a year-round rural enterprise driver and promote women-led agro-processing.

Livelihood, Markets & Economics

Kaafal collection—largely by women and children—provides seasonal income during April–June. Sold in roadside stalls and local markets, it commands premium prices due to rarity and cultural demand. However, perishability restricts trade to nearby towns like Almora, Nainital, and Dehradun. With support for cold-chain logistics, small-scale processing, and branding, returns could multiply. Processed Kaafal products can fetch 3–4 times more than raw fruits. Linking Kaafal with eco-tourism (fruit festivals, forest walks) and origin-based branding ("Himalayan Kaafal") can integrate conservation with livelihood enhancement—demonstrating sustainable use of Non-Timber Forest Products (NTFPs).

Conservation, Domestication & Climate Resilience

Wild Kaafal populations face threats from fire, grazing, and deforestation. Conservation efforts emphasize community-led forest management and assisted natural regeneration. Domestication trials through seed pretreatment, cuttings, grafting, and air-layering are being refined to establish orchards. Because the species is dioecious, maintaining male–female ratios is vital for fruiting.

Kaafal's resilience to degraded soils and variable rainfall makes it ideal for climate-smart agroforestry. Integrating it into farm boundaries stabilizes slopes and diversifies farm income. To sustain regeneration and productivity, management should focus on:

- Retaining mother trees and ensuring pollinator diversity.
- Managing grazing and controlling pre-summer fires.
- Promoting nursery propagation from elite female trees.
- Linking conservation with livelihood through value addition and eco-tourism.

Safety, Standards Policy Pointers

Ensuring food safety and standardization is crucial as Kaafal transitions into commercial processing. Fresh fruits should be handled hygienically with potable water, clean crates, and food-grade liners. Processed items (jam, syrup, leather) must follow FSSAI guidelines on °Brix, preservatives, and labeling. Policy support should simplify NTFP collection and transit rules, ensuring equitable community benefits. Integration into horticulture and agroforestry programs, coupled with GI tagging and branding, can elevate Kaafal's market position. Government agencies and research bodies should develop Good Agricultural and Collection Practices (GACP) and quality protocols tailored to Kaafal's unique characteristics.

Challenges & Constraints

Major constraints include:

- Short harvest period and extreme perishability.
- Lack of cold storage, packaging, and processing infrastructure.
- Habitat degradation from fire, grazing, and land-use change.
- Unorganized marketing, leading to low returns for collectors.
- Climate stress (frost, erratic rainfall) affecting fruit set.
- Knowledge gaps in propagation, improved varieties, and agronomic management.

To unlock its potential, integrated action—combining conservation, infrastructure, research, and value-chain development—is required.

Conservation & Future Prospects

Kaafal's future lies in merging scientific innovation with traditional stewardship. Protecting wild through Van Panchayats, establishing nurseries, and integrating Kaafal into agroforestry systems can ensure long-term sustainability. Ex situ propagation using cuttings or grafting can conserve elite genotypes with superior

sweetness and yield.
Developing standardized processed products under "Himalayan Kaafal" branding and pursuing GI registration will enhance market visibility. Linking Kaafal with eco-tourism (fruit festivals, forest trails) can promote conservation awareness while generating income. Research institutions must advance climate-resilient cultivation models, documenting phenological responses to changing temperature and rainfall patterns. Through coordinated efforts among communities, scientists, and policymakers, Kaafal can evolve from a fragile wild delicacy into a flagship of sustainable mountain development—embodying ecological integrity, rural prosperity, and Himalayan cultural pride.

Conclusion

The Kaafal tree, Uttarakhand's state fruit, embodies the soul of the Himalayas—combining nutrition, culture, and livelihood. Though its harvest is fleeting, its impact is lasting: enriching diets, forests, and folklore. Challenges of perishability, habitat loss, and weak market integration persist, yet with conservation, domestication, value addition, and branding, Kaafal can become a model of green entrepreneurship and climate resilience.
By bridging traditional wisdom with modern innovation, Uttarakhand can transform Kaafal into a sustainable emblem of biodiversity, women-led rural enterprise, and cultural heritage.

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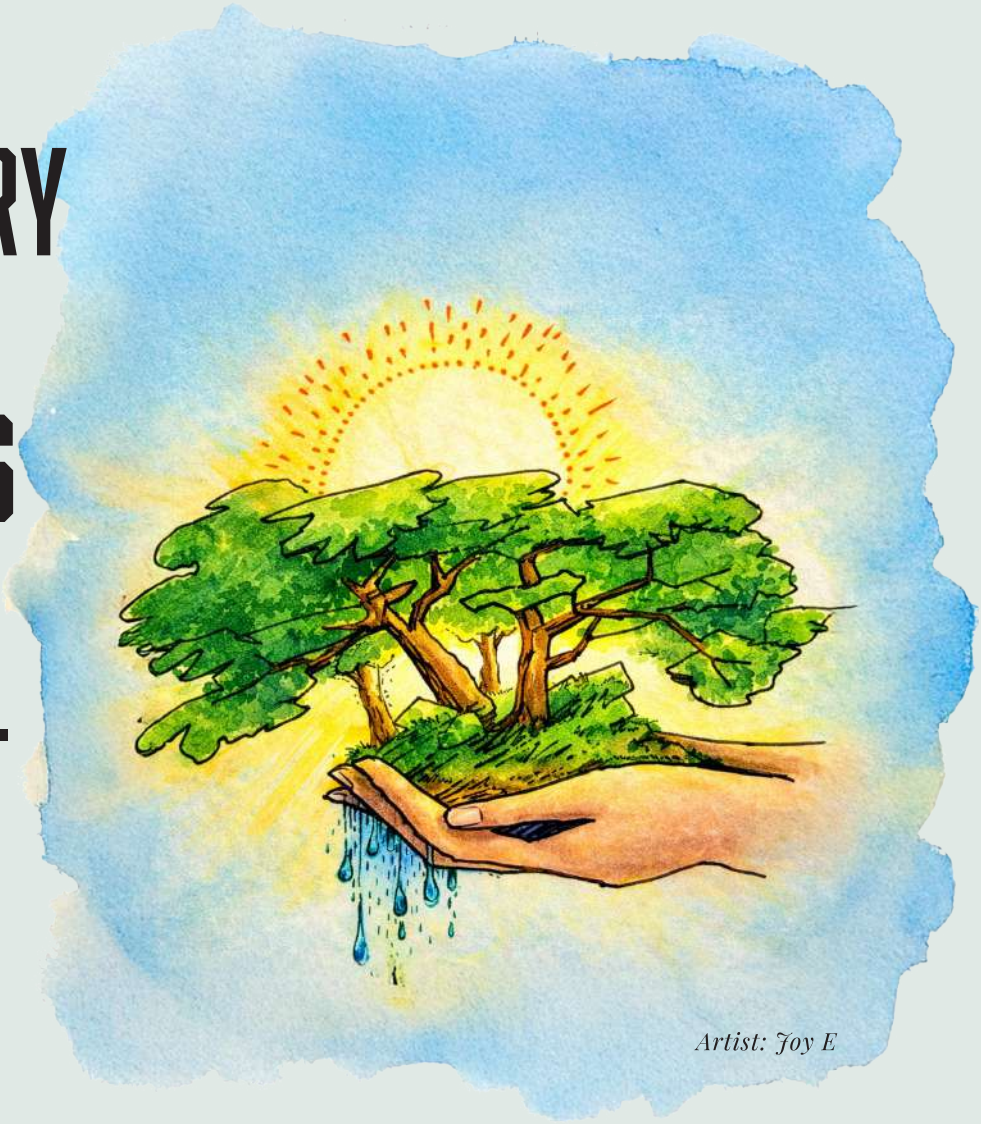
CMI MISSIONARY AGRARIAN INITIATIVES IN TARAI-GARHWAL-KUMAON REGIONS

Joy Elamkunnapuzha



Artist: Joy E

It is estimated that some 45% of the Indian population depends on agriculture and allied industries for sustenance. It is said that the percentage of the people in rural India goes as high as 80 who depend, directly or indirectly, on agriculture. Some 55% of the gross available land in this country is used for farming purposes. The rest is forest land, small and big water bodies, marshy land, arid dry land, etc. Maximum of the land available is made use of for agriculture purposes, and the Indians by and large depend on it for their survival and sustenance. That was why perhaps, Gandhi said, 'the soul of India lives in her villages.' This is true of India of the contemporary times too. Indian people and their culture are agrarian in

essence. Many cultures and civilizations have emerged, stayed and some gone, yet the perennial agricultural characteristic of the Indian society has prevailed. Many agencies have influenced the Indian society and life style in modern times. One among them is the Christian missionaries from the West. Their contribution to education, health care etc sectors are well known and widely recognized. Perhaps a lesser-known area is their contribution to the agriculture sector. Among the many contributions of the missionaries to the agriculture sector of India, it is worth mentioning the names of at least three monumental volumes that hold their head high. One is "Hortus Malabaricus" (The Garden of Malabar), the 17 th century book which has popularized the treasure of knowledge about the Flora and Fauna of the Malabar Coast and the parallel strip of the Western Ghats. Missionaries like Fr Matheus of St Joseph (who was himself a botanist) helped Hendrik Adriaan van Rheede in documenting the wealth of knowledge of the plants. The second is the SHUATS (Sam Higginbottom University of Agriculture, Technology and Sciences) based at Prayagraj (Allahabad). The third is the Engineering College at Roorkee, Uttarakhand which was intrinsically related to the agricultural development of India.

The missionaries, as they got engaged with the life situations of the people in many corners of this vast land, taught them how to do farming systematically, going for diverse crops. Our focus in this paper is the contributions of the CMI (Carmelites of Mary Immaculate) missionaries from Kerala to the foot hills of the Himalayas, and the Tarai region, i.e., the present Bijnor Mission and the surrounding areas.

Inspiration from Ambikapur and Chanda Missions

CMI missionary activities in North India gathered momentum in the 1950s. In the two decades long presence of the CMIs in Chhattisgarh, the tribal heartland, Ambikapur was the epicentre of their activities. They integrated evangelization with the day-to-day life of the tribal people. The CMIs transformed the 14-acre plot of land in Ambikapur into a lush green garden. There was agriculture, horticulture, and what not. The people called the missionaries garden as Kelapara ("garden of bananas") for the rich collection of banana plants along with the other fruit trees and medicinal plants which they had first brought from Kerala.

In the mission methodology of the CMIs, farming and farmers were central. It was manifest in each of the steps taken in the development of Chanda in Maharashtra, the first territory entrusted to the CMIs' care independently. Bishop Januarius, inspired his missionaries to help the people of the villages through farming. With this aim in mind, he purchased farm land, a minimum of five acres on the peripheries of the villages. These small land holdings would turn out to be beautiful gardens with plenty of vegetation, even as new agricultural information and techniques were passed on to the people around. Fatherji ka bagicha was often oasis in the deserts! At the silver jubilee celebrations of

Chanda in 1987-88, Archbishop Eugene D Souza exclaimed: 'Truly the desert has bloomed!' was in fact an endorsement of the greenery in the Mission compound, and the missionaries' connectivity (primarily through farming activities) to the people around.[1]

This methodology - farming in small agriculture holdings in the rural areas – was applied in all the later Missions which were guided by the CMIs – Sagar, Jagdalpur, Rajkot and Bijnor.

Arrival of CMIs in Bijnor

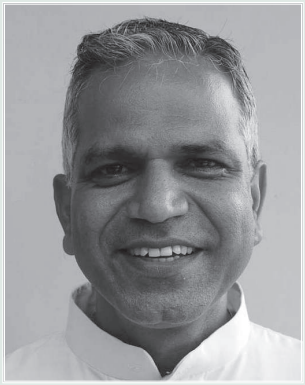
The focus of this paper is Bijnor – how the CMI missionaries have contributed to the agriculture and greenery in the Kumaon and Garhwal regions – the foothills of the Himalayas, and also in the Tarai.

The Himalayas are the youngest among all the mountain ranges of the world. The soil which has plenty of stones and pebbles cannot be said to the best for cultivation. Thorough preparation of the land was needed before any agriculture activity was taken up. CMI missionaries reached the region in 1972. They purchased agricultural land not very close to the towns. The new missionaries who hailed from Kerala themselves were from agriculture background. Farming was in their blood. Even as they got engaged in agricultural activities in the new Mission area, they extended a helping hand, through their social work programmes, to the poor farmers around: in land levelling, sinking wells and water bodies, making approach roads to the fields and the villages, etc.

1 It was but natural for the vast majority of the 2000 plus strong CMIs who belonged to agricultural families in Central Kerala, the High Ranges and the Malabar region. No wonder, we find these missionaries often moving with some plants, saplings, seeds and seedlings of vegetables, fruit trees and shade trees for one another's gardens and farms.

2 Of course, poor finances would have been a factor which prompted them to opt for larger holdings on the peripheries than, costlier but smaller ones closer to the city centres.

Fr. Anto Pudussery, CMI, and Fr. Zacharias Moorkkattil, CMI, are two well-known CMI agricultural enthusiasts who have made immense contributions to the field of agriculture.



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[2] Of course, poor finances would have been a factor which prompted them to opt for larger holdings on the peripheries than, costlier but smaller ones closer to the city centres. Our focus here is on their developmental activities in a few centres of the Mission.

Najibabad

Seven acres of land that was purchased 1 kilo meter away from the town. It was an vita Bhatti, which people had considered a waste land as far as agriculture was concerned. It was also in the vicinity of a Muslim kabristan, where there were a few tombs. Waste management was the top priority. Using the broken and abandoned bricks they constructed a humble dwelling place for themselves – the first CMI Ashram there. They also purchased cattle for agriculture development. The marshy land was converted eucalyptus trees were planted. The pits were converted into fishponds. Fruits – locally grown as well as those brought from outside – were planted in the land. In a few years' time, the land, hitherto considered as wasteland, turned out to be a model farm for the nearby villages. In the ashram premises today, one finds a beautiful orchid – with varieties of mango trees, leechi, guava, jackfruit trees, etc. In the compound, there are different kinds of shade trees and perennial trees. A model milk diary and a
beautiful flower garden are found around the church.

Timarpur

Timarpur, near Bijnor, used to be a remote area, unreached by ordinary people as there were very few travel facilities to the village. The pioneering missionaries purchased a plot of land there and developed a mango grove – with plenty of mango trees of the dasheri variety. The mission is surrounded by many trees in the lush green compound. This is the first land that was purchased by the missionaries for the Bijnor Mission.

Padampur and Pauri

Padampur is at the Himalayan foothills at the banks of River Sukhro and Pauri is 100 Kilometers from Padampur which is the district headquarters at an altitude of 3116 meters. The land that the mission procured was initially uncultivable, as there were plenty of stones, big and small. The first task was to remove them, and level the land, making it cultivable. Many apple trees were

planted there making it a fine orchard which has also many other varieties of fruit trees in it. So also, there are varieties of flower plants grown there, many of which are new to the place, thus making the garden a place of attraction for the visitors.

Kotdwar

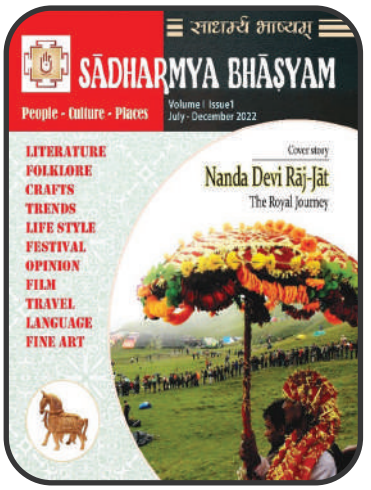
Kotdwar is on the shores of River Malini of the Epic Mahabharata repute. It also is known as Kanva Nagari. Across the river, there begins the Shivalik hills and mountains of the great Himalayas, thus literally making Kotdwar, the "Gateway to the Hills". The first missionaries purchased land, removed all the big stones and started with farming. Later they planted fruit trees and perennial trees in the land. With their hard work, the missionaries converted the land into a land mark of the locality. It was the CMI Missionaries who made the first tube well in the Kotdwar- Padampur region which is also known as Bhabar Ghatti where such a source of water was unimaginable for the locals and the government. This tube well supplied drinking water to the entire Kotdwar township that was facing severe water scarcity.

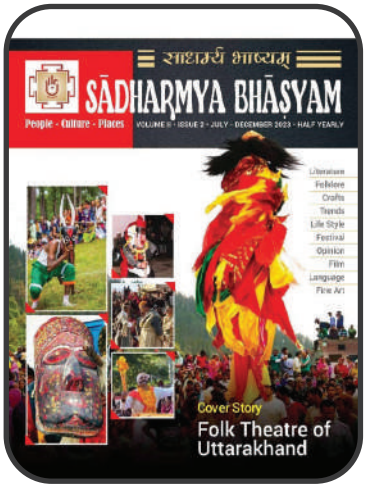
Bikkawala

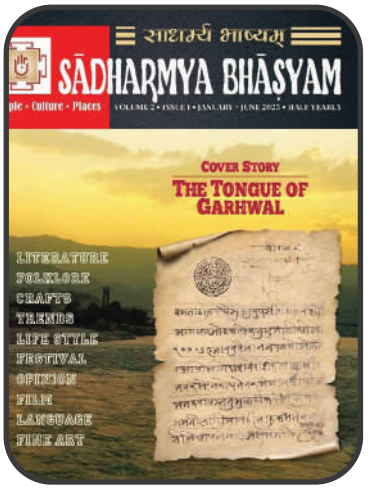
Bikkawala is situated near to the Kalagarh dam at Kalagarh site. The land purchased by the missionaries was agricultural land which had the irrigation facilities from the dam. Even to this day, we find there a beautiful orchard which was first developed by the pioneering CMI missionaries. The Mission compound has many varieties of plants, including plantains, tapioca, etc which were first brought from Kerala. The noticeable feature of farming is that these typical southern varieties were introduced to the villagers there who gradually took to their production and consumption. The missionaries also introduced the idea of fish ponds to the people of the area and encouraged them to follow suit, specially making use of the water available.

Conclusion

As years passed and the Mission gradually grew, one observes a parallel growth in perspectives too. The missionaries first took care of the land, conserving it in the best possible ways, making them most convenient to the human beings who are the "Crown of the Creation." The ambassadors of Christ who came to the Himalayan Mission land, simultaneously tried to reach out to the fellow human beings, trying to make their lives better. They were really rooted in the soil and they bloomed and blossomed where they were planted. They undertook welfare programmes, established healthcare institutions and imparted education to the young generations and went about doing good in manifold ways after the example of the Lord of the Gospels. The late Rev Fr Anto Puthussery CMI, a veteran Bijnor missionary, perhaps rightly observed the early Bijnor Missionaries' methodology: "land (environment), trees (vegetation), animals (living beings), human beings and God." ■







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