

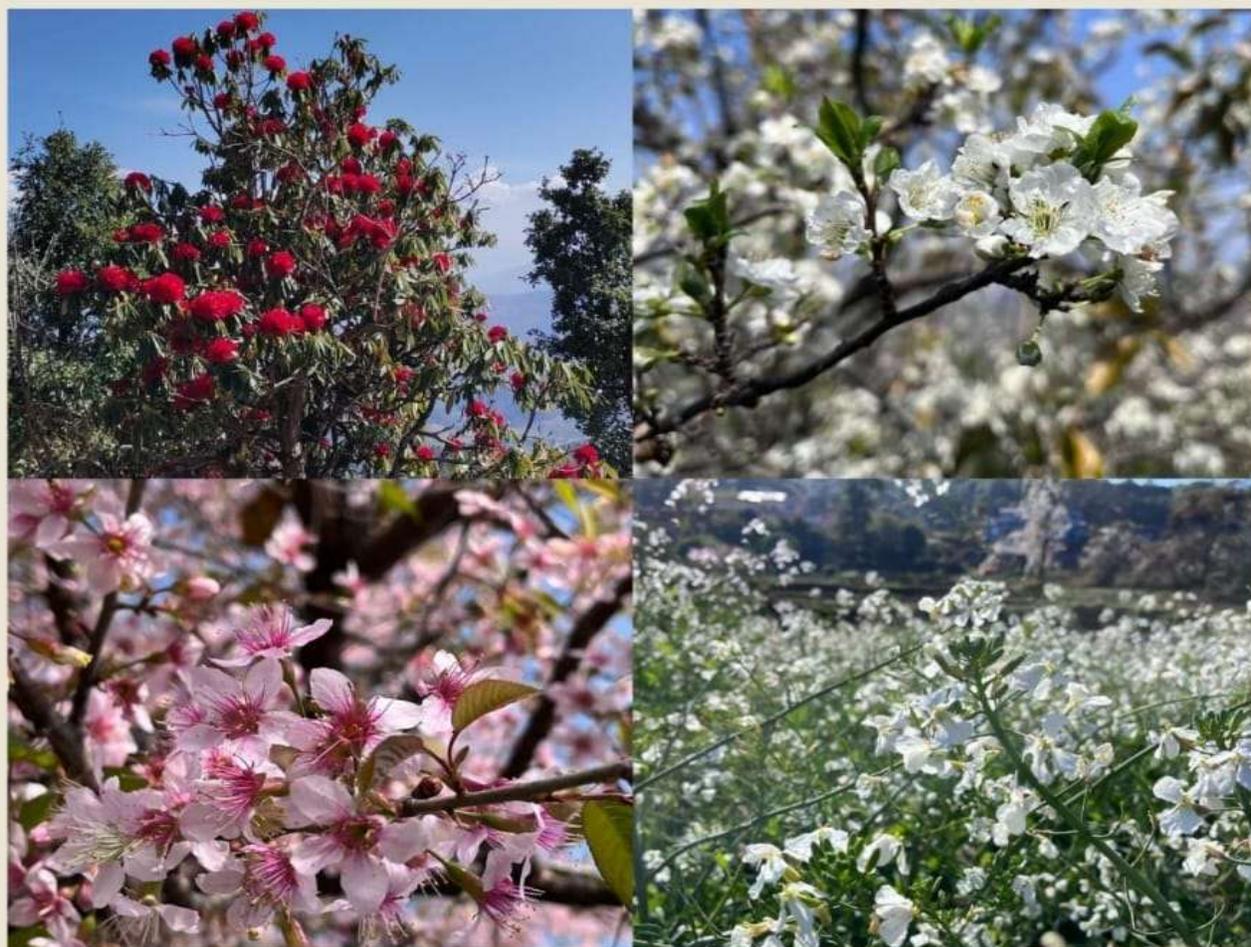
**MARCH
2026**

ISSN : 2583-7869

THE PAHADI AGRICULTURE E- MAGAZINE

Volume- 04

Issue- 03



WWW.PAHADIAGROMAGAZINE.IN

Table of Contents

Blockchain and Artificial Intelligence as Catalysts for Agricultural Modernization 1

Deepali Rawat and Ankush Singh Chauhan

Veer Chandra Singh Garhwali, Uttarakhand University of Horticulture and Forestry Bharsar, Pauri Garhwal

Understanding of Micro-Climates & Their Role in Crop Production .. 3

Moinuddin* Annam Ganesh Reddy*, Shaikh Salma Begum* and F. A. Khan **

**School of Agricultural Sciences, SGRR University, Dehradun

**Division of Basic Sciences and Humanities, SKUAST- Kashmir

गिलोय: स्वास्थ्य और ग्रामीण आजीविका की दिव्य लता 7

डॉ. शिखा भागटा¹, डॉ. उषा शर्मा¹, डॉ. जय पाल शर्मा², डॉ. अजय ब्राह्मण¹, डॉ. नगेंद्र पाल बुटेल¹.

कृषि विज्ञान केंद्र, शिमला (रोहड़ू), कॉलेज ऑफ हॉर्टिकल्चर एंड फॉरेस्ट्री, थुनाग² डॉ. वाई. एस. परमार औद्योगिक एवं वानिकी विश्वविद्यालय, नौणी जिला सोलन, हिमाचल प्रदेश

Plum Dieback: An Emerging Threat to Sustainable Plum Production in Himachal Pradesh 11

Arunesh Kumar, Meenu Gupta, Satish Kumar Sharma, and Pragati Gautam

Department of Plant Pathology

Dr YS Parmar University of Horticulture and Forestry, Nauni, Solan, Himachal Pradesh

The Lifeline of the Hills: Agriculture in Himachal Pradesh 14

Shailja Sharma

Assistant Professor (Genetics and Plant Breeding), CSKHPKV-MAREC Sangla, Kinnaur, H.P.

Grow Your Own Food: The Power of Kitchen Gardening 16

Payal Sharma^{1*}, Arshia Prashar^{1*}, Himanshu Thakur^{2*}

¹Department of Vegetable Science and Floriculture, ²Department of Entomology, CoA, CSK Himachal Pradesh Krishi Vishvavidyalaya, Palampur-176 062, India

ऑर्गेनिक बनाम परंपरागत फल: वैज्ञानिक तुलना 20

डॉ. मनुज अवस्थी, शिक्षण सहयोगी

फल विज्ञान विभाग, चंद्र शेखर आज़ाद कृषि एवं प्रौद्योगिक विश्वविद्यालय, कानपुर, उत्तर प्रदेश

**Sustainable Management of Insect Pests in Vegetable and Fruit Crops
for a Resilient Agricultural Future 23**

Payal Sharma^{1*}, Arshia Prashar^{1*}, Himanshu Thakur^{2*}

¹Department of Vegetable Science and Floriculture, ²Department of Entomology, CoA, CSK
Himachal Pradesh Krishi Vishvavidyalaya, Palampur, India

पौष्टिकता युक्त गेहूं के मूल्यवर्धित खाद्य उत्पाद 27

कल्पना आर्य, प्रसार विशेषज्ञ (गृह विज्ञान)

कृषि विज्ञान केन्द्र सुंदरनगर

**Seasonal Vegetables: Why Eating with the Seasons Matters More Than
You Think 31**

Payal Sharma^{1*}, Arshia Prashar^{1*}, Himanshu Thakur^{2*}

¹Department of Vegetable Science and Floriculture, ²Department of Entomology, CoA, CSK
Himachal Pradesh Krishi Vishvavidyalaya, Palampur, India



Blockchain and Artificial Intelligence as Catalysts for Agricultural Modernization

Deepali Rawat and Ankush Singh Chauhan

**Veer Chandra Singh Garhwali, Uttarakhand University of Horticulture and Forestry
Bharsar, Pauri Garhwal**

With the use of the use of blockchain technology and artificial intelligence (AI), the agricultural industry is undergoing a significant technological revolution. These cutting-edge developments are revolutionizing traditional farming practices by boosting operational effectiveness, bolstering supply chain integrity, improving transparency, and facilitating data-driven decision-making. Modern agriculture is moving nearer to a more robust, efficient and sustainable framework for food production by combining powerful analytical tools with secured decentralized record-keeping mechanisms.

Understanding the Technologies

A decentralized digital ledger system called blockchain is intended to safely log transactions over a dispersed network. Reliability and accountability are ensured by the permanent storage of each record, which cannot be changed after verification. Blockchain improves trust in agricultural systems by recording all supply chain movements and transactions. Computational tools that mimic brain functions including comprehension, decision-making, and predictive analysis are referred to as artificial intelligence. AI systems in agriculture analyze vast amounts of operational and environmental data to produce insights that maximize resource use, lower hazards, and increase efficiency. When blockchain and artificial intelligence are combined, they produce a sophisticated agricultural framework that has been referred to as smart or automated agriculture and is characterized by sustainability, automation, and transparency.

Contributions of Blockchain to Agriculture Transparent Supply Chains

Blockchain enables detailed documentation of agricultural products from their origin to the final consumer. This traceable digital pathway strengthens food safety standards and allows stakeholders to verify product authenticity.

Increased Institutional Trust

A shared and secure digital ledger ensures that farmers, distributors, retailers, and consumers access consistent and reliable information. This reduces disputes and enhances cooperation within the agricultural ecosystem.

Prevention of Fraud and Quality Issues

Immutable record-keeping allows for rapid identification of discrepancies, contamination, or counterfeit products. Consequently, risks related to food fraud and supply chain inefficiencies are minimized.

Improved Market Access for Farmers

By reducing dependence on intermediaries, blockchain-based platforms facilitate direct transactions between producers and buyers.

This model supports fairer pricing structures and enhances farmers' income potential.

Applications of Artificial Intelligence in Agriculture

Intelligent Crop Surveillance

AI-enabled tools such as satellite imaging, drones, and smart sensors monitor crop conditions continuously. These systems detect early signs of disease, nutrient deficiency, or pest infestation, allowing timely intervention.

Data-Driven Agricultural Planning

Through analysis of climatic data, soil properties, and historical production trends, AI models assist farmers in determining optimal planting, irrigation, and harvesting schedules.

Automation and Precision Farming

AI-integrated machinery performs tasks such as seeding, fertilizing, and harvesting with high accuracy. Automation reduces labor requirements while increasing operational consistency.

Livestock Health Monitoring

Advanced AI systems track animal behavior, feeding patterns, and health indicators. Early detection of abnormalities enhances animal welfare and productivity while reducing economic losses.

Broader Benefits of Technological Integration

Blockchain technology and artificial intelligence combined in agriculture produce a number of tactical benefits:

- Enhanced accountability and transparency throughout food networks
- Decreased financial losses due to inefficiency and fraud
- Increased output via precision farming
- Increased farmer profitability and financial security
- Encouragement of ecologically conscious and climate-adaptive behaviour

Conclusion

The integration of blockchain and Artificial Intelligence within agricultural systems marks a significant milestone in the evolution of global food production. These technologies address persistent challenges associated with supply chain transparency, operational efficiency, and sustainable resource management. As the global population continues to grow and environmental constraints intensify, technological innovation in agriculture will be essential to safeguarding long-term food security and strengthening economic stability.

Understanding of Micro-Climates & Their Role in Crop Production

Moinuddin* Annam Ganesh Reddy*, Shaikh Salma Begum* and F. A. Khan**

**School of Agricultural Sciences, SGRR University, Dehradun

**Division of Basic Sciences and Humanities, SKUAST- Kashmir

Micro-climate refers to the localized atmospheric conditions prevailing within a small, specific area such as a crop canopy, field plot, greenhouse, orchard, or terrace farm, which may differ significantly from the broader regional climate. These localized variations in temperature, humidity, wind speed, solar radiation, and soil moisture directly influence crop growth, physiological processes, yield formation, and overall productivity. Understanding micro-climatic dynamics is essential for optimizing crop performance, especially under changing climate scenarios. Micro-climates play a critical role in regulating photosynthesis, transpiration, respiration, nutrient uptake, and phenological development. Variations within the crop canopy affect light interception, energy balance, and evapotranspiration rates, thereby influencing water use efficiency and biomass accumulation. Moreover, micro-climatic conditions significantly determine pest and disease incidence, frost occurrence, heat stress, and drought tolerance.

Management practices such as mulching, irrigation scheduling, windbreak establishment, agroforestry systems, and protected cultivation (greenhouses, polyhouses, shade nets) are effective tools for modifying micro-climates to create favorable growing environments. Modern technologies including remote sensing, IoT-based sensors, and precision agriculture tools enable real-time monitoring and management of micro-climatic parameters, enhancing climate resilience and sustainable crop production. In the context of climate variability and extreme weather events, micro-climate understanding provides a scientific foundation for adaptive crop management strategies, improved yield stability, and enhanced resource-use efficiency. Therefore, integrating micro-climate knowledge into agronomic planning is crucial for sustainable and climate-smart agriculture.

Keywords: Micro-climate, Crop production, Precision agriculture, Climate-smart agriculture, Sustainable farming. Crop Canopy, Crop Physiology.

Microclimates: Agricultural production is greatly influenced by climatic factors; however, the conditions experienced by crops are often different from the general weather conditions reported at regional meteorological stations. These localized atmospheric conditions, known as micro-climates; exist within small areas such as crop canopies, soil



surfaces, orchards, greenhouses, and even individual plant rows. Micro-climate refers to the variations in temperature, humidity, solar radiation, wind speed, and soil moisture that occur over short distances and time periods. These subtle but significant differences directly affect plant growth, development, and yield.

Within a crop field, the plant canopy modifies the surrounding environment by altering radiation interception, reducing wind velocity, and influencing soil temperature and moisture dynamics. The interaction between soil, plant, and atmosphere creates a unique micro-environment that governs key physiological processes such as photosynthesis, respiration, transpiration, nutrient uptake, and flowering. Even small changes in canopy temperature or humidity can influence crop phenology, stress tolerance, and pest and disease incidence.

Micro-climatic conditions vary depending on factors such as crop type, plant density, irrigation practices, mulching, topography, and management systems. For example, protected cultivation structures like

- Soil surface
- Crop canopy
- Root zone
- Protected structures (greenhouse, polyhouse)
- Orchards and agroforestry systems

These localized variations strongly influence crop growth, yield, quality, and stress tolerance.

1. Components of Micro-Climate

Major Elements:

- **Temperature** – Affects germination, flowering, fruit set, and maturity.
- **Relative Humidity** – Influences transpiration and disease development.

greenhouses and polyhouses allow deliberate manipulation of temperature and humidity, creating optimal growing conditions throughout the year. Similarly, agroforestry systems, windbreaks, and mulches modify the micro-climate to reduce heat stress, conserve moisture, and improve productivity.

In the era of climate change, understanding micro-climate dynamics has become increasingly important. Rising temperatures, irregular rainfall patterns, and extreme weather events require site-specific and adaptive management strategies. By studying and managing micro-climatic conditions, farmers and researchers can enhance resource-use efficiency, reduce crop stress, and improve yield stability. Therefore, micro-climate analysis forms a critical component of modern agronomy, agro-meteorology, and climate-smart agriculture.

Micro-climate refers to the **localized climatic conditions** that exist in a small area within a larger climate zone. In agriculture, crops experience micro-climatic conditions at:

- **Solar Radiation** – Controls photosynthesis and biomass production.
- **Wind Speed** – Affects evapotranspiration and lodging.
- **Soil Moisture & Temperature** – Regulate root growth and nutrient uptake.

2. Micro-Climate within Crop Canopy

Inside a crop canopy:

- Temperature may be lower than open air due to shading.
- Humidity is usually higher because of transpiration.
- Wind speed is reduced.
- Light intensity decreases from top to bottom leaves.

- Effects on Crops:
- Better canopy micro-climate improves photosynthesis efficiency
- Excess humidity increases fungal diseases
- Poor airflow causes pest multiplication
- Dense crops like paddy and wheat create a different micro-climate compared to widely spaced crops like maize.

3. Role in Crop Physiological Processes

Micro-climate directly influences:

- **Photosynthesis:** Light intensity and temperature regulate carbon assimilation.
- **Transpiration:** Humidity and wind speed determine water loss.
- **Respiration:** Higher night temperature increases respiration losses.
- **Phenology:** Flowering and maturity are temperature dependent.

4. Micro-Climate Modification Practices

Farmers can modify micro-climate through

1. Mulching:

- Reduces soil temperature fluctuation
- Conserves moisture
- Controls weeds

2. Windbreaks & Shelterbelts:

- Reduce wind velocity
- Prevent lodging



The Pahadi Agriculture

- Reduce evapotranspiration

3. Shade Nets:

- Reduce heat stress
- Suitable for nursery and vegetable crops

4. Greenhouses / Polyhouses:

- Controlled temperature & humidity
- Year-round production
- Higher yield & quality

5. Micro-Climate and Stress Management

Micro-climate helps in:

- **Heat Stress Reduction** (through mulching, irrigation, shading)
- **Frost Protection** (smoke, irrigation, row covers)
- **Drought Mitigation** (soil moisture conservation)
- **Disease Management** (humidity control, ventilation)

Example: High humidity inside dense canopy increases blast disease in rice.

6. Micro-Climate Monitoring Tools

- Modern technologies include:
- Field weather stations
- IoT-based temperature & humidity sensors
- Infrared thermometers
- Remote sensing & GIS mapping
- Data loggers

These tools help in **precision agriculture** and climate-smart decision-making.

7. Importance in Climate Change Scenario

Due to:

- Rising temperatures
- Irregular rainfall
- Extreme events
- Micro-climate management ensures:
- Yield stability
- Resource-use efficiency
- Reduced crop stress

- Sustainable production

Micro-climate is the actual environment experienced by crops. Even small variations in temperature, humidity, and radiation significantly affect growth, yield, and quality.

Understanding and managing micro-climatic conditions is essential for:

- Sustainable agriculture
- Climate-resilient farming
- Precision crop management
- Higher productivity

गिलोय: स्वास्थ्य और ग्रामीण आजीविका की दिव्य लता

डॉ. शिखा भागटा¹, डॉ. उषा शर्मा¹, डॉ. जय पाल शर्मा², डॉ. अजय ब्रागटा¹, डॉ. नगेंद्र पाल बुटैल¹.

कृषि विज्ञान केंद्र, शिमला (रोहड़), कॉलेज ऑफ हॉर्टिकल्चर एंड फॉरेस्ट्री, थुनाग²

डॉ. वाई. एस. परमार औद्योगिकी एवं वानिकी विश्वविद्यालय, नौणी जिला सोलन, हिमाचल प्रदेश

भारतीय ग्रामीण जीवन में कुछ पौधे ऐसे हैं जो केवल वनस्पति नहीं, बल्कि परंपरा, विश्वास और स्वास्थ्य का प्रतीक होते हैं। घरों की बाड़, पेड़ों के तनों या खेतों की मेड़ों पर लिपटी हुई एक हरी-भरी लता अक्सर दिखाई देती है। पीढ़ियों से लोग इस पौधे का उपयोग बुखार, कमजोरी और मौसमी बीमारियों के उपचार के लिए करते आए हैं। यह है गिलोय (*टिनोस्पोरा कॉर्डिफोलिया*), जिसे आयुर्वेद में अमृता और गुडूची के नाम से जाना जाता है।

“अमृता” शब्द का अर्थ है—अमरत्व प्रदान करने वाला दिव्य रस। यह नाम स्वयं इस पौधे के औषधीय महत्व को दर्शाता है। गिलोय को आयुर्वेद में एक शक्तिशाली रसायन औषधि माना जाता है, जो शरीर की रोग प्रतिरोधक क्षमता बढ़ाती है, शक्ति प्रदान करती है और संपूर्ण स्वास्थ्य को संतुलित रखने में सहायक होती है।

हाल के वर्षों में, विशेषकर कोविड-19 महामारी के दौरान, गिलोय को एक प्राकृतिक प्रतिरक्षा-वर्धक के रूप में व्यापक पहचान मिली। इसके साथ ही यह पौधा किसानों के लिए आय बढ़ाने वाली औषधीय फसल के रूप में भी उभरकर सामने आया है।

परंपरा से जुड़ा औषधीय पौधा

गिलोय मेनिस्पर्मसी (*Menispermaceae*) कुल का बहुवर्षीय बेलनुमा पौधा है, जो भारत के उष्ण और उपोष्ण क्षेत्रों में स्वाभाविक रूप से पाया जाता है। यह जंगलों, झाड़ियों, बाड़ों और घरों के आसपास आसानी से उग जाता है। इसकी विशेषता यह है कि यह विभिन्न प्रकार की जलवायु और मिट्टी में आसानी से अनुकूलित हो जाता है।

हिमालय की तलहटी से लेकर दक्षिण भारत के मैदानों तक गिलोय का उपयोग सदियों से घरेलू उपचार में होता आया है। भारत के अलावा यह श्रीलंका, म्यांमार, बांग्लादेश, थाईलैंड और अफ्रीका के कुछ हिस्सों में भी पाया जाता है।

ग्रामीण और जनजातीय क्षेत्रों में लोग गिलोय को घरेलू औषधि के रूप में इस्तेमाल करते हैं। इसके तने का काढ़ा बुखार में दिया जाता है, रस पाचन और मधुमेह नियंत्रण के लिए उपयोग किया जाता है, और पत्तों का लेप त्वचा रोगों में लगाया जाता है। कम लागत और आसानी से उपलब्ध होने के कारण इसे गरीबों की औषधि भी कहा जाता है।

वनस्पतिक विशेषताएँ

गिलोय एक बड़ी, पतझड़ी और चढ़ने वाली लता है, जो पेड़ों या सहारे पर चढ़कर बढ़ती है। यह अत्यंत सहनशील पौधा है और विभिन्न परिस्थितियों में जीवित रह सकता है।

इसका तना रसीला, बेलनाकार और हल्का मुड़ा हुआ होता है, जिस पर छोटे-छोटे सफेद धब्बे दिखाई देते हैं।

तने से जड़ें निकलती हैं, जो इसे सहारे से चिपकने में मदद करती हैं। तने की बाहरी परत धूसर या हल्के सफेद रंग की होती है और आसानी से छिल जाती है।

इसके पत्ते दिल के आकार के, साधारण और हरे रंग के होते हैं, जिनकी लंबाई लगभग 5–15 सेंटीमीटर होती है। गर्मियों में छोटे पीले फूल आते हैं और बाद में लाल या नारंगी रंग के छोटे-छोटे फल लगते हैं।



गिलोय का सबसे महत्वपूर्ण औषधीय भाग उसका तना होता है, जिसमें पाया जाने वाला स्टार्च गुडूची सत्व कहलाता है और इसे एक शक्तिवर्धक टॉनिक के रूप में उपयोग किया जाता है।

औषधीय महत्व

गिलोय आयुर्वेद में एक प्रमुख रसायन औषधि के रूप में जानी जाती है, जो शरीर को रोगों से लड़ने की शक्ति प्रदान करती है। इसके सभी भाग—तना, जड़ और पत्ते—औषधीय उपयोग में आते हैं, परंतु तना सबसे अधिक उपयोगी माना जाता है।

परंपरागत रूप से गिलोय का उपयोग निम्न रोगों में किया जाता है:

- बुखार और सर्दी-जुकाम
- मधुमेह
- पीलिया

- गठिया और जोड़ों का दर्द
- पाचन संबंधी विकार
- त्वचा रोग
- अस्थमा
- सामान्य कमजोरी

आधुनिक शोधों में भी इसके कई गुणों की पुष्टि हुई है। गिलोय में:

- प्रतिरक्षा बढ़ाने वाले तत्व
- सूजन कम करने वाले गुण
- एंटीऑक्सीडेंट प्रभाव
- मधुमेह नियंत्रक गुण

यकृत (लिवर) की सुरक्षा करने की क्षमता पाई गई है।

पोषण की दृष्टि से भी गिलोय महत्वपूर्ण है। इसमें रेशा, प्रोटीन, कार्बोहाइड्रेट और कैल्शियम, आयरन, पोटैशियम जैसे आवश्यक खनिज पाए जाते हैं।

गिलोय की वैज्ञानिक खेती

गिलोय की खेती आसान है और इसमें बहुत कम लागत आती है। इसलिए यह छोटे और सीमांत किसानों के लिए उपयुक्त फसल है।

मिट्टी और जलवायु

गिलोय उष्ण और उपोष्ण जलवायु में अच्छी तरह बढ़ती है। इसके लिए:

अच्छी जल निकास वाली बलुई दोमट मिट्टी

- मिट्टी का pH 5.5–7.0
- प्रतिदिन 4–6 घंटे धूप
- 25–30°C तापमान

उपयुक्त माना जाता है। जलभराव से पौधे को नुकसान हो सकता है।

प्रवर्धन (Propagation)

- गिलोय मुख्यतः तने की कलमों से उगाई जाती है, जो सबसे सरल और सफल विधि है।
- परिपक्व तनों से 20–30 सेमी लंबी कलमों लें।
- इनमें गाँठें (nodes) होनी चाहिए।
- इन्हें वर्षा ऋतु में लगाया जाता है।
- एक हेक्टेयर में लगभग 2500 कलमों लगाई जाती हैं।
- बीज से भी पौधे उगाए जा सकते हैं, परंतु यह विधि कम प्रचलित है।

खेत की तैयारी और रोपाई

खेत को अच्छी तरह जोतकर खरपतवार मुक्त करना चाहिए। जैविक खाद जैसे गोबर की खाद या वर्मी कम्पोस्ट का प्रयोग पर्याप्त होता है।

- पौधों की दूरी: 3 मीटर × 3 मीटर
- पौधों को सहारा देने के लिए पेड़, लकड़ी की बल्लियाँ या जाली का उपयोग करें।
- गिलोय को खेत की मेड़ों, बाड़ों या बागानों में आसानी से लगाया जा सकता है।



सिंचाई और देखभाल

गिलोय सामान्यतः वर्षा पर निर्भर फसल है। आवश्यकता पड़ने पर हल्की सिंचाई की जा सकती है। प्रारंभिक अवस्था में निराई-गुड़ाई करने से पौधे का विकास अच्छा होता है। इस फसल में रासायनिक खाद और कीटनाशकों की आवश्यकता बहुत कम होती है, इसलिए इसे जैविक खेती के लिए उपयुक्त माना जाता है। कटाई और उत्पादन

रोपाई के 2–3 वर्ष बाद तनों की कटाई की जा सकती है।

- तने को जमीन से लगभग 30 सेमी ऊपर काटें।
- इससे पौधा फिर से बढ़ता रहता है।
- कटे हुए तनों को छोटे टुकड़ों में काटकर छाया में सुखाएँ।
- सूखे तनों को हवादार स्थान पर संग्रहित करें।

गिलोय की औसत उपज लगभग 10–15 क्विंटल प्रति हेक्टेयर सूखा तना होती है।

इस फसल में कीट या रोग की समस्या बहुत कम होती है, जिससे इसकी खेती सरल और कम जोखिम वाली बन जाती है।

किसानों के लिए आर्थिक अवसर

भारत और विश्व में हर्बल उत्पादों की मांग तेजी से बढ़ रही है। गिलोय का उपयोग निम्न उत्पादों में होता है:

- आयुर्वेदिक दवाइयाँ
- हर्बल सप्लीमेंट
- इम्युनिटी ड्रिंक
- जूस और पाउडर

चूंकि इसे खेत की मेड़ों, बाड़ों और खाली जमीन पर उगाया जा सकता है, इसलिए यह मुख्य फसल को प्रभावित किए बिना अतिरिक्त आय प्रदान करती है।

पहाड़ी क्षेत्रों के लिए उपयुक्त फसल

गिलोय विशेष रूप से पहाड़ी क्षेत्रों के लिए उपयुक्त है। इसे आसानी से निम्न प्रणालियों में शामिल किया जा सकता है:

- सेब के बागान
- एग्रोफॉरेस्ट्री मॉडल
- रसोई बगीचे
- सामुदायिक रोपण

छोटे किसानों, महिला स्वयं सहायता समूहों और ग्रामीण युवाओं के लिए यह कम लागत में अधिक लाभ देने वाली फसल साबित हो सकती है।

निष्कर्ष

गिलोय वास्तव में अपने नाम के अनुरूप “अमृता” है— एक ऐसा पौधा जो स्वास्थ्य और आजीविका दोनों प्रदान करता है। सदियों से यह ग्रामीण परिवारों के लिए प्राकृतिक औषधि के रूप में उपयोग में आता रहा है और आज यह व्यावसायिक औषधीय फसल के रूप में भी उभर रहा है।

कम लागत, कम देखभाल और बढ़ती बाजार मांग के कारण गिलोय किसानों के लिए एक लाभकारी विकल्प बन सकती है, विशेषकर पहाड़ी और सीमांत क्षेत्रों में। इसके व्यापक प्रचार और मूल्य संवर्धन से ग्रामीण आय बढ़ाने और स्वास्थ्य सुरक्षा सुनिश्चित करने में महत्वपूर्ण योगदान मिल सकता है।

गिलोय की यह साधारण-सी लता परंपरागत ज्ञान और आधुनिक अवसरों के बीच एक हरित सेतु बन सकती है।



Plum Dieback: An Emerging Threat to Sustainable Plum Production in Himachal Pradesh

Arunesh Kumar, Meenu Gupta, Satish Kumar Sharma, and Pragati Gautam

Department of Plant Pathology

Dr YS Parmar University of Horticulture and Forestry, Nauni, Solan, Himachal Pradesh

Plum (*Prunus domestica* L.) is among the most important temperate stone fruit crops cultivated in Himachal Pradesh. The state's wide range of agro-climatic conditions particularly in the mid and high-hill regions, provides an ideal environment for plum production. Its orchards are extensively distributed across districts such as Shimla, Kullu, Kinnaur, Mandi, Solan, and Sirmaur. Despite its economic importance, its productivity and fruit quality in the state are frequently limited by several biotic and abiotic stresses. Among these, diseases especially dieback pose a major threat to sustainable plum cultivation and it is one of the most destructive diseases affecting plum orchards in Himachal Pradesh. It is characterized by the gradual drying and death of twigs and branches and, in severe cases, leads to the complete decline of trees. The disease leads to substantial yield losses and reduced orchard longevity. This disease has emerged as a serious constraint in both mid-hill and high-hill regions, where prevailing climatic conditions favor disease development and spread. In Himachal Pradesh, plum dieback is commonly associated with fungal pathogens such as *Botryodiplodia theobromae*, *Cytospora* spp., and *Phomopsis* spp. These pathogens typically gain entry

through wounds caused by pruning, frost injury, insect infestation, hail damage, or mechanical operations. Disease severity is usually higher in older orchards, poorly managed plantations, and trees subjected to abiotic stresses such as drought, nutrient imbalance, and frost. The widespread occurrence of dieback results in reduced tree vigour, inferior fruit quality, and considerable economic losses to growers. Therefore, a clear understanding of the disease, its causes, and its behavior under local agro-climatic conditions is essential for developing effective and sustainable management strategies.

Symptoms

Drying of Twigs and Branches: The disease initially manifests as wilting and drying of young twigs and shoots from the tip downward. Affected twigs gradually turn brown and dry.

Progressive Backward Death (Dieback): Drying advances from the terminal ends toward the base of the branch. In severe infections, entire branches or scaffold limbs may die.

Leaf Symptoms: Leaves on infected branches exhibit yellowing, wilting, and premature drying. In many cases, dried leaves remain attached to the twigs for some time.

Bark Discoloration and Canker Formation:

Sunken, discolored, and cracked patches develop on the bark. These cankers may expand and eventually girdle branches.

Gum Exudation (Gummosis): Amber-colored gum often oozes from infected branches and trunks, particularly around cankered areas.

**Symptoms of dieback on Plum twigs**

Internal Tissue Discoloration: On cutting affected twigs or branches, brown to dark brown discoloration of the vascular tissues is observed, indicating internal infection.

Poor Flowering and Fruit Set: Diseased trees show reduced flowering, poor fruit set, and smaller fruits due to weakened vigour.

Tree Decline: Repeated infections over successive years result in gradual decline and, in advanced stages, complete death of the tree.

Causal Organism (s)

Plum dieback in Himachal Pradesh is primarily caused by fungal pathogens, either individually or in combination, depending on environmental and orchard conditions. The major causal organisms include *Botryodiplodia theobromae* (Pat.) Griffon &

Maubl., *Cytospora* spp. (syn. *Valsa* spp.) and *Phomopsis* spp.

Botryodiplodia theobromae is the most aggressive and destructive pathogen associated with plum dieback in the state. It causes twig blight, branch cankers, gummosis, and rapid dieback, especially in stressed or wounded trees. *Cytospora* spp. (syn. *Valsa* spp.) are commonly associated with canker formation and slow dieback of branches. Disease severity increases during cold winters followed by warm and moist conditions. *Phomopsis* spp. are responsible for twig blight and branch dieback, particularly affecting young shoots and nursery plants.

Favourable Conditions

The incidence and severity of plum dieback are influenced by several environmental, cultural, and host-related factors such as:

Tree Wounds: Pruning cuts, frost injury, hail damage, insect feeding, and mechanical injuries facilitate pathogen entry

Cool Winters Followed by Warm, Humid Weather: Cold winters weaken trees, while warm and humid spring conditions promote fungal growth and infection.

High Relative Humidity and Rainfall: Prolonged humidity, fog, and intermittent rainfall enhance spore germination and disease spread.

Tree Stress: Drought, nutrient imbalance, waterlogging, and poor soil fertility reduce tree resistance to infection.

Old and Poorly Managed Orchards: Dense canopies, improper pruning, and lack of sanitation increase disease severity.

Improper Pruning Practices: Pruning during unfavorable weather, leaving large unprotected cuts, and using unsterilized tools promote infection.

Temperature Fluctuations: Sudden day–night temperature variations predispose trees to disease.

Insect Infestation: Bark borers and other insects create wounds that facilitate fungal invasion.

Management

Effective management of plum dieback in Himachal Pradesh requires an integrated approach combining cultural, sanitary, and chemical measures.

1. Sanitation and Pruning

- Prune infected twigs and branches at least 15–20 cm below the affected portion during dry weather.
- Remove and destroy infected plant material to reduce inoculum levels.
- Avoid pruning during rainy or highly humid periods.
- Disinfect pruning tools with 1% bleaching powder solution or 70% alcohol after each cut.

2. Wound Protection

- Apply Bordeaux paste (10:10:100) or copper oxychloride paste (3 g/litre) on pruning cuts and wounds immediately after pruning to prevent pathogen entry.

3. Chemical Control

- Spray affected trees with copper oxychloride (3 g/litre) or carbendazim (1 g/litre) after pruning.

- Apply two to three sprays at 15–20 days intervals during disease-prone periods.

- In severe cases, alternate systemic and contact fungicides to minimize the risk of resistance.

4. Orchard Management

- Maintain proper spacing and canopy management to improve aeration and light penetration.

- Ensure balanced nutrition, with adequate supply of nitrogen, potassium, and essential micronutrients.

- Provide timely irrigation and proper drainage to prevent drought or waterlogging stress.

5. Management of Insects and Abiotic Stresses

- Control bark borers and other insect pests that create entry points for pathogens.
- Adopt suitable practices to protect trees from frost injury.

6. Use of Healthy Planting Material

- Plant only disease-free, certified nursery stock.
- Avoid establishing orchards in poorly drained or highly stressed sites



The Lifeline of the Hills: Agriculture in Himachal Pradesh

Shailja Sharma

Assistant Professor (Genetics and Plant Breeding), CSKHPKV-MAREC Sangla,
Kinnaur, H.P.

Agriculture is more than just a sector in Himachal Pradesh; it is the heartbeat of the state. For centuries, the people of this mountainous region have carved out a living from the steep slopes and fertile valleys of the Himalayas. Today, while the world moves rapidly toward urbanization, Himachal remains a state where nearly 90% of the population lives in rural areas, with the majority directly or indirectly dependent on the land for their survival.

A Unique Geography for Diverse Crops

The geography of Himachal Pradesh is both a blessing and a challenge. With altitudes ranging from 350 meters to nearly 7,000 meters, the state is divided into distinct agro-climatic zones. This diversity allows farmers to grow everything from tropical fruits in the lower foothills to temperate crops in the high-altitude alpine regions.

- **Cereals and Grains:** In the lower and mid-hills, traditional crops like maize, wheat, and paddy are the staples. Maize is particularly significant as a rainfed crop during the monsoon season.
- **Off-Season Vegetables:** Himachal has carved a niche for itself as the "Vegetable Bowl of India." Because the hills remain cool when the plains are scorching, farmers grow peas, cauliflower, tomatoes, and cabbage during the summer months. These "off-season" vegetables fetch high prices in markets like Delhi and Chandigarh.

The Apple Revolution and Horticulture

If agriculture is the heartbeat, then horticulture is the pride of Himachal. The state is famously known as the "Apple State

of India." The apple industry alone is a multi-billion-rupee economy, providing a livelihood to over 300,000 families. Districts like Shimla, Kullu, and Kinnaur are the primary producers, contributing to about 26% of India's total apple production.

However, the state isn't just about apples. The varied climate supports a wide range of fruits including:

Temperate Fruits: Pears, peaches, plums, and apricots.

Sub-Tropical Fruits: Mangoes, litchis, and citrus fruits in the lower regions of Kangra and Una.

Dry Fruits: Walnuts and almonds, especially in the cold-desert regions of Lahaul-Spiti and Kinnaur.

The Changing Face: Natural and Organic Farming

In recent years, there has been a significant shift toward Natural Farming. Recognizing the harmful effects of chemical fertilizers on the fragile mountain ecology, the state government has been aggressively promoting the *Prakritik Kheti Khushhal Kisan Yojana*.

Thousands of farmers are now returning to traditional methods, using cow urine and

fungicide-based formulations instead of synthetic pesticides. This move is not just about health; it's about sustainability. Organic and natural produce from the hills is increasingly in demand by health-conscious consumers in urban centers, offering farmers better profit margins.

Challenges on the Steep Slopes

Despite its beauty and productivity, farming in Himachal is fraught with difficulties.

Fragmented Landholdings: Most farmers are small or marginal, owning less than one hectare of land. These tiny, scattered plots make it difficult to use modern machinery or achieve "economies of scale."

Rain-Dependent Irrigation: Surprisingly, only about 19% of the cultivated area is irrigated. The rest depends entirely on the vagaries of the monsoon and winter snow. A delayed monsoon or a winter without snow can ruin an entire year's effort.

Climate Change: This is perhaps the biggest threat. Rising temperatures are pushing the "apple belt" to higher altitudes. Glaciers are receding, and unpredictable hailstorms frequently destroy standing crops.

The Menace of Wild Animals: Monkeys and wild boars are a constant threat to crops. In

many areas, farmers have been forced to abandon their land because of the heavy losses caused by animal raids.

Government Initiatives and the Path Ahead

To tackle these issues, the government has introduced several schemes. The "Him Unnati" scheme aims to create clusters of farmers to improve production and marketing. There is also a heavy focus on Solar Fencing to protect crops from wild animals and the construction of "Check Dams" to store rainwater for irrigation.

Furthermore, the "Digital Agriculture" initiative is helping farmers get real-time weather updates and market prices on their mobile phones, bridging the gap between the remote village and the big city.

Conclusion

Agriculture in Himachal Pradesh is a story of resilience. It is about the farmer who climbs a steep hill every morning to tend to his orchard and the woman who carries heavy baskets of vegetables to the nearest road-head. While the challenges of climate change and small landholdings are real, the shift toward high-value horticulture and natural farming offers a glimmer of hope.



Grow Your Own Food: The Power of Kitchen Gardening

Payal Sharma^{1*}, Arshia Prashar^{1*}, Himanshu Thakur^{2*}

¹Department of Vegetable Science and Floriculture, ²Department of Entomology, CoA, CSK Himachal Pradesh Krishi Vishvavidyalaya, Palampur-176 062, India

Kitchen gardening has emerged as one of the most practical and sustainable solutions to many challenges faced by modern households, including food safety concerns, rising prices of vegetables, declining nutritional quality, and increasing environmental stress. Kitchen gardening refers to the cultivation of vegetables, herbs, and sometimes fruits in small spaces around the home, such as backyards, terraces, rooftops, balconies, courtyards, or even window areas. Though it may appear to be a recent trend driven by urban lifestyles, kitchen gardening is deeply rooted in traditional agricultural practices, where families routinely grew their own vegetables for daily consumption. In the present era of industrial agriculture and market dependence, the revival of kitchen gardening represents a return to self-reliance, health consciousness, and harmony with nature. One of the strongest reasons for the growing interest in kitchen gardening is concern about the quality and safety of vegetables available in markets. To meet the increasing demand for food, commercial vegetable production often relies heavily on chemical fertilizers, pesticides, and growth regulators. While these inputs help increase yield and ensure uniformity, they also raise serious concerns about pesticide residues, soil degradation, and long-term health risks. Consumers are becoming increasingly aware of these issues and are seeking safer alternatives. Kitchen gardening provides an opportunity to grow vegetables using organic or minimal chemical inputs, ensuring that the produce consumed by the family is fresh, safe, and free from harmful residues.

Kitchen gardens play a vital role in improving household nutrition. Fresh vegetables harvested directly from the garden retain their natural vitamins, minerals, antioxidants, and dietary fiber. Unlike market vegetables, which may spend several days in storage or transportation, home-grown vegetables are consumed at peak freshness. Leafy vegetables such as spinach, fenugreek, coriander, amaranthus, and lettuce can be harvested regularly, providing a continuous supply of micronutrients essential for maintaining good health. Root vegetables, fruit vegetables, and herbs grown in kitchen gardens contribute to dietary diversity, which is a key component of balanced nutrition. The importance of kitchen

gardening becomes even more evident when considering vulnerable groups such as children, pregnant women, elderly people, and individuals with compromised immunity. Regular consumption of fresh vegetables helps improve immunity, supports growth and development, and prevents nutritional deficiencies. Children who grow vegetables at home are more likely to develop healthy eating habits and show greater acceptance of vegetables in their diet. For elderly individuals, access to fresh, easily digestible vegetables helps maintain digestive health and overall well-being. Kitchen gardening also enhances food security at the household level. Even a small garden can supply a significant

portion of a family's daily vegetable requirement, reducing dependence on market purchases. During times of price fluctuations, supply disruptions, natural calamities, or emergencies, kitchen gardens act as a reliable source of food. This aspect became particularly evident during periods when access to markets was limited, highlighting the importance of local and self-sustained food systems. For low- and middle-income households, kitchen gardening provides a cost-effective means of meeting nutritional needs without placing additional financial burden on the family. Economic benefits form another important dimension of kitchen gardening. Although setting up a kitchen garden may require some initial investment in pots, grow bags, seeds, soil, compost, or simple tools, the long-term savings are substantial. Vegetables such as tomatoes, chilies, brinjal, okra, cucumbers, and leafy greens are frequently used in daily cooking and can be harvested repeatedly from home gardens. This reduces recurring expenses on vegetables and provides fresh produce throughout the season. Additionally, kitchen waste such as vegetable peels, fruit waste, and leftover food can be composted and reused as organic manure, reducing the need to purchase fertilizers and contributing to waste management.

From an environmental perspective, kitchen gardening supports sustainable living and resource conservation. Locally grown vegetables require minimal transportation, packaging, and refrigeration, thereby reducing fuel consumption and carbon emissions. The practice of composting organic household waste helps reduce the burden on landfills and improves soil fertility. Kitchen gardens also promote biodiversity by encouraging the cultivation of a variety of crops, herbs, and flowers in a small area. This diversity creates

a favourable environment for beneficial insects such as pollinators and natural enemies of pests, contributing to ecological balance. Kitchen gardening also offers significant physical and mental health benefits. Gardening activities such as soil preparation, sowing, watering, weeding, and harvesting involve moderate physical exercise, which helps improve flexibility, strength, and overall fitness. These activities are particularly beneficial for elderly individuals, enabling them to remain active and engaged. Gardening has also been shown to reduce stress, anxiety, and mental fatigue. Spending time with plants provides a sense of relaxation and satisfaction, helping individuals cope with the pressures of modern life. The act of nurturing plants and witnessing their growth fosters a sense of purpose and emotional well-being.

The educational value of kitchen gardening is especially important in today's context, where many children grow up disconnected from food production systems. Involving children in gardening activities helps them understand the source of food and the effort involved in growing it. This practical learning experience enhances their knowledge of plant growth, seasons, and environmental responsibility. Gardening encourages curiosity, patience, and responsibility, while also instilling respect for nature. Children who participate in kitchen gardening are more likely to value food, reduce wastage, and develop sustainable habits from an early age. One of the greatest strengths of kitchen gardening is its adaptability to different living conditions. In rural areas, backyard gardens can be established using available open land, while in urban environments, innovative approaches such as container gardening, rooftop gardening, vertical gardens, and balcony gardening are widely practiced. Containers,

grow bags, recycled buckets, and wooden boxes can be effectively used to grow vegetables in limited spaces. Crops such as leafy greens, radish, carrot, tomato, chili, beans, cucumber, and herbs perform well under container cultivation when provided with adequate sunlight, water, and nutrients. This flexibility ensures that kitchen gardening is accessible to people from diverse socio-economic backgrounds. Seasonality is a key factor influencing the success of kitchen gardens. Growing vegetables in their natural season ensures better germination, growth, and yield while reducing pest and disease incidence. Seasonal crops require fewer inputs and adapt better to prevailing climatic conditions. Kitchen gardeners who follow seasonal planting schedules gain a deeper understanding of natural cycles and develop more sustainable gardening practices. This awareness also encourages seasonal eating habits, which further enhance nutritional and environmental benefits. Efficient water management is essential for successful kitchen gardening, particularly in regions facing water scarcity. Since the scale of cultivation is small, water-saving techniques can be easily adopted. Practices such as mulching with dry leaves or straw help conserve soil moisture, regulate temperature, and suppress weed growth. Drip irrigation systems, simple watering cans, or reuse of household wastewater can meet the water requirements of kitchen gardens effectively. These practices not only reduce water consumption but also improve soil structure and plant health.

Pest and disease management is often perceived as a challenge by beginners in kitchen gardening. However, small-scale gardens can be managed effectively using simple and eco-friendly methods. Regular monitoring of plants, hand removal of pests,

maintaining plant diversity, and encouraging beneficial insects help keep pest populations under control. Natural products such as neem-based formulations, soap solutions, and botanical extracts can be used when necessary. By avoiding excessive chemical use, kitchen gardeners protect their health, soil quality, and surrounding environment. Despite its numerous advantages, kitchen gardening faces certain challenges that limit its widespread adoption. Lack of awareness, time constraints, limited space, and lack of technical knowledge are common barriers. Many people hesitate to start gardening due to fear of failure or lack of confidence. These challenges can be addressed through proper guidance, training programs, and community support. Demonstration gardens, workshops, online resources, and extension services can play a crucial role in building confidence and encouraging participation.

Government initiatives, urban gardening movements, and non-governmental organizations are increasingly promoting kitchen gardening as a tool for nutritional security, waste management, and sustainable living. Distribution of seed kits, training programs, and awareness campaigns have encouraged many households to adopt kitchen gardening. In urban areas, community gardens and rooftop gardening initiatives have also emerged as platforms for collective learning and social interaction. Such initiatives not only promote food production but also strengthen community bonds and shared responsibility toward environmental conservation. In the context of climate change and increasing pressure on agricultural resources, kitchen gardening represents a small yet meaningful contribution toward sustainable food systems. While it may not replace large-scale agriculture, it complements it by reducing pressure on

markets and promoting responsible consumption. Kitchen gardens enhance resilience at the household level by ensuring access to fresh food and reducing vulnerability to external disruptions. They empower individuals to take control of their food choices and actively participate in sustainable practices. Kitchen gardening also aligns well with the principles of organic and natural farming. By relying on compost, organic inputs, and biological pest control, kitchen gardens help improve soil health and reduce environmental pollution. This practice encourages a shift away from chemical-intensive agriculture and promotes ecological balance. Over time, kitchen gardeners develop a deeper appreciation for natural processes and become more conscious consumers and citizens. In conclusion, kitchen gardening is

much more than a leisure activity or hobby; it is a comprehensive approach to healthy living, food security, environmental sustainability, and community well-being. By providing fresh, safe, and nutritious vegetables, kitchen gardens improve dietary quality and reduce household expenditure. They promote physical activity, mental well-being, and family involvement while fostering environmental awareness and responsibility. In an era marked by lifestyle-related health issues, environmental degradation, and food insecurity, kitchen gardening offers a simple, practical, and effective solution. Encouraging and adopting kitchen gardening can lead to healthier individuals, resilient households, and a more sustainable future for society as a whole.

ऑर्गेनिक बनाम परंपरागत फल: वैज्ञानिक तुलना

डॉ. मनुज अवस्थी, शिक्षण सहयोगी

फल विज्ञान विभाग, चंद्र शेखर आज़ाद कृषि एवं प्रौद्योगिक विश्वविद्यालय, कानपुर, उत्तर प्रदेश

फल हमारी सेहत के लिए अनमोल हैं। विटामिन, खनिज, फाइबर और एंटीऑक्सिडेंट से भरपूर होने के कारण फल हमें रोगों से लड़ने में मदद करते हैं। लेकिन आजकल एक बड़ा सवाल यह है कि ऑर्गेनिक फल और पारंपरिक/रासायनिक फल में क्या फर्क है,

आजकल हेल्दी लाइफस्टाइल की बात आती है तो सबसे पहले ऑर्गेनिक फूड का नाम लिया जाता है। बड़े-बड़े सुपर मार्केट से लेकर लोकल मार्केट तक लोग यह सोचकर ऑर्गेनिक फल और सब्जियां खरीद रहे हैं कि यह ज्यादा पौष्टिक, सुरक्षित और सेहत के लिए बेहतर है। सोशल मीडिया पर भी अक्सर यह दावा किया जाता है कि ऑर्गेनिक डाइट से शरीर फिट रहता है और बीमारियां दूर रहती हैं। लेकिन सवाल यह उठता है कि क्या यह सच है कि ऑर्गेनिक फूड वाकई में आमतौर पर उगाए जाने वाले फलों और सब्जियों से ज्यादा सेहतमंद



होता है। इसे लेकर कुछ एक्सपर्ट साफ करते हैं कि ऑर्गेनिक और रेगुलर खाने के बीच का फर्क पोषण का नहीं बल्कि पेस्टीसाइड्स के लेवल का है।

कई रिसर्च में यह पाया गया है कि दोनों ही तरह के खाने में विटामिन, मिनरल्स और अन्य जरूरी पोषक तत्वों का लेवल लगभग समान होता है। जिसका मतलब है कि अगर आप केवल न्यूट्रिशनल वैल्यू के हिसाब से चुनाव कर रहे हैं तो ऑर्गेनिक पर ज्यादा पैसे खर्च करने की जरूरत नहीं है। हालांकि जब बात पेस्टीसाइड्स की आती है तो यहां ऑर्गेनिक खाने को बढ़त मिलती है।

दरअसल ऑर्गेनिक फूड में पेस्टीसाइड का लेवल सामान्य खाने की तुलना में करीब 30 प्रतिशत कम पाया गया है। ज्यादा पेस्टीसाइड्स लंबे समय में नुकसानदायक हो सकते हैं, खासकर किसानों जैसे लोगों के लिए जो सीधे उनके संपर्क में रहते हैं। लेकिन आम लोगों के लिए जो खाना बनाकर या धोकर फल सब्जियां खाते हैं उनमें मौजूद थोड़ी मात्रा के पेस्टीसाइड्स को अब तक खतरनाक साबित नहीं किया गया है।

ऑर्गेनिक और कन्वेंशनल फल—परिभाषा

ऑर्गेनिक फल:

ऐसे फल जो केवल प्राकृतिक उर्वरक और पद्धतियों से उगाए जाते हैं। इनमें रासायनिक कीटनाशक, सिंथेटिक उर्वरक या GMO का उपयोग नहीं होता।

परंपरागत फल:

पारंपरिक खेती में उगाए जाते हैं जहाँ रासायनिक कीटनाशक, फंगिसाइड्स और उर्वरकों का उपयोग आम है ताकि उत्पादन बढ़े और कीटों से बचाव हो।

पोषण गुणवत्ता का वैज्ञानिक तुलनात्मक अध्ययन विटामिन और खनिज

कई शोधों से पता चला है कि ऑर्गेनिक फलों में कुछ पोषक तत्वों की मात्रा थोड़ी अधिक हो सकती है, लेकिन यह अंतर हर फल में समान नहीं होता। उदाहरण के लिए, कुछ अध्ययनों में ऑर्गेनिक सेब और अंगूर में विटामिन C का स्तर थोड़ा अधिक पाया गया, जबकि अन्य खाद्य घटकों में फर्क नगण्य रहा।

वैज्ञानिक कारण:

ऑर्गेनिक खेती में पौधों पर हल्का तनाव (जैसे कि कम रसायन) पड़ता है जिससे वे अपने बचाव सिग्नल बढ़ाते हैं और कुछ सुरक्षात्मक यौगिक अधिक बनाते हैं।

रसायन अवशेष—कीटनाशक अवशिष्टता

यह शायद सबसे बड़ा फर्क है।



परंपरागत फल में अवशेष

रसायनिक कीटनाशक छिड़काव से अवशिष्ट रसायन फल की परत पर या अंदर रह सकते हैं। वैज्ञानिक जांच में अक्सर पारंपरिक फलों पर बहुत कम से मध्यम मात्रा में रसायन पाए गए हैं—अधिकतर मानक सुरक्षित स्तर के भीतर।

ऑर्गेनिक फल

इनमें कीटनाशक अवशेष न्यूनतम या नगण्य पाए गए हैं, क्योंकि रसायनों का उपयोग नहीं होता।

निष्कर्ष:

जहाँ तक स्वास्थ्य जोखिम का सवाल है, वैज्ञानिकों का मानना है कि यदि रसायन सुरक्षित स्तर से नीचे हैं तो स्वास्थ्य पर असर कम है, पर अगर आप अधिक साफ विकल्प चाहते हैं तो ऑर्गेनिक बेहतर है।

प्रतिरोधक क्षमता और प्राकृतिक सुरक्षा

ऑर्गेनिक खेती में:

मिट्टी की जैविक क्षमता बढ़ाने पर ध्यान दिया जाता है। प्राकृतिक कीटनाशकों और फसल चक्र का उपयोग होता है।

फल पर प्राकृतिक माइक्रोबायल संतुलन बेहतर होता है। परंपरागत में:

तेज उत्पादन के लिए रसायन का उपयोग होता है जिससे कुछ बैक्टीरिया प्रतिरोधक भी बन सकते हैं।

स्वाद और बनावट—क्या फर्क पड़ता है?

बहुत से उपभोक्ताओं को लगता है कि ऑर्गेनिक फल ज्यादा स्वादिष्ट और सुगंधित होते हैं। वैज्ञानिक अध्ययनों में यह पाया गया है कि कुछ ऑर्गेनिक फलों में फेनोलिक यौगिक और सुगंधक कम्पौनेंट अधिक होते हैं, जिससे स्वाद बेहतर महसूस होता है। लेकिन यह हर

फल और परिस्थिति पर निर्भर करता है—मिट्टी, मौसम, प्रजाति और परिपक्वता का भी असर पड़ता है।

पर्यावरणीय प्रभाव

ऑर्गेनिक खेती

- ✓ मिट्टी स्वास्थ्य में सुधार
- ✓ जल संरक्षण
- ✓ जैव विविधता को बढ़ावा
- ✓ रसायनों का प्रदूषण कम

परंपरागत खेती

- ✓ उत्पादन तीव्र
- ✓ कम जमीन पर अधिक फल

कौन सा चुनें—ऑर्गेनिक या परंपरागत?

✘ रसायनों से मिट्टी और पानी में प्रदूषण का खतरा इसी वजह से कई वैज्ञानिक मानते हैं कि **लंबे समय में ऑर्गेनिक खेती पर्यावरण के लिए बेहतर है।**

लागत तुलना

ऑर्गेनिक फल आमतौर पर **थोड़े महंगे** होते हैं क्योंकि:

उत्पादन लागत अधिक (मैन्युअल श्रम, प्राकृतिक उर्वरक)

उत्पादन मात्रा कम

परंपरागत फल सस्ते होते हैं पर इसमें रसायन शामिल हैं जो कुछ उपभोक्ताओं को नापसंद हैं।

स्थिति	बेहतर विकल्प
अगर आप रसायन residues से बचना चाहते हैं	ऑर्गेनिक
अगर बजट महत्वपूर्ण है	परंपरागत
अगर पोषण और स्वाद प्राथमिकता है	दोनों ही अच्छे हो सकते हैं
अगर पर्यावरण समर्थन लक्ष्य है	ऑर्गेनिक

समान सुझाव: फल को अच्छी तरह धोएँ—यह रसायन अवशेष को काफी हद तक घटा देता है।

निष्कर्ष

वैज्ञानिक दृष्टिकोण से देखा जाए तो ऑर्गेनिक फल में रसायन अवशेष कम, संभावित पोषक तत्व कुछ अधिक, परंपरागत फल पैदावार अधिक, लागत कम, दोनों फल स्वास्थ्यवर्धक हैं अगर सुरक्षित मात्रा में सेवन हों आखिरकार चुनाव आपके स्वास्थ्य प्राथमिकता, बजट और उपलब्धता पर निर्भर करता है। दरअसल जो

लोग ऑर्गेनिक फूड चुनते हैं वह बाकी चीजों में भी सेहत का ध्यान रखते हैं, जैसे प्रोसेस्ड फूड से दूरी बनाना, रेगुलर एक्सरसाइज करना और संतुलित आहार लेना। इसलिए उनकी सेहत ज्यादा बेहतर होती है। वहीं एक्सपर्ट्स बताते हैं कि लोगों को केवल इस बात पर ध्यान नहीं देना चाहिए कि फूड ऑर्गेनिक है या नहीं बल्कि सबसे जरूरी है कि आप अल्ट्रा प्रोसेस्ड फूड को कम करें, ज्यादा से ज्यादा फ्रेश फल और सब्जियां डाइट में शामिल करें।



Sustainable Management of Insect Pests in Vegetable and Fruit Crops for a Resilient Agricultural Future

Payal Sharma^{1*}, Arshia Prashar^{1*}, Himanshu Thakur^{2*}

¹Department of Vegetable Science and Floriculture, ²Department of Entomology,
CoA, CSK Himachal Pradesh Krishi Vishvavidyalaya, Palampur, India

Vegetables and fruits occupy a central place in human nutrition, providing essential vitamins, minerals, antioxidants, and dietary fiber. With rising population, changing food habits, and increasing awareness about health and nutrition, the demand for fresh vegetables and fruits has increased substantially across the world. To meet this growing demand, farmers are under constant pressure to produce higher yields and better-quality produce. However, vegetable and fruit crops are among the most vulnerable agricultural commodities, as they are highly susceptible to a wide range of insect pests and diseases throughout their growth period. Insect pests alone can cause severe yield losses, reduce market quality, and make cultivation economically unviable if not managed properly.

Over the years, pest management in horticultural crops has relied heavily on chemical pesticides, but this approach has raised serious concerns related to sustainability, environmental safety, and human health. In this context, sustainable management of insect pests has emerged as a critical requirement for ensuring long-term productivity, food safety, and ecological balance. Insect pests affect vegetable and fruit crops at every stage of growth, from seedlings to harvest and even during storage. Leaf-feeding insects such as caterpillars, beetles, and grasshoppers reduce photosynthetic area and weaken plants. Sap-sucking pests like aphids, whiteflies, thrips, and mites cause direct damage by feeding on plant sap and indirect damage by transmitting viral diseases. Fruit borers and maggots attack the economic parts of the crop, making produce unfit for consumption or marketing. Root-feeding insects damage the underground parts, leading

to poor plant growth and reduced yields. The economic losses caused by insect pests in vegetables and fruits are often higher than in cereal crops because of the high value and perishability of horticultural produce. Even minor cosmetic damage can lead to rejection in markets, especially for export-oriented production systems.

Traditionally, chemical insecticides have been used as the primary tool for controlling insect pests in vegetable and fruit crops. These chemicals offer quick and visible results, which makes them attractive to farmers who are dealing with severe pest outbreaks. However, indiscriminate and excessive use of insecticides has led to several unintended consequences. One of the most serious problems is the development of insecticide resistance. When the same chemical or group of chemicals is used repeatedly, insect populations gradually adapt and develop resistance, making the insecticide ineffective.

Resistant pests survive and multiply rapidly, forcing farmers to use higher doses or switch to newer and more toxic chemicals. This not only increases the cost of cultivation but also creates a cycle of dependency that is difficult to break. Another major drawback of excessive insecticide use is the destruction of beneficial organisms. Agricultural ecosystems are home to a wide range of natural enemies, including predators such as ladybird beetles, lacewings, spiders, and parasitoids like wasps and flies. These beneficial insects play a crucial role in keeping pest populations under natural control. Broad-spectrum insecticides often kill these natural enemies along with the target pests. When natural enemies are eliminated, pest populations rebound quickly, leading to pest resurgence and secondary pest outbreaks. This phenomenon is commonly observed in vegetable crops, where repeated insecticide sprays result in severe infestations of mites or aphids that were previously minor pests. The environmental impact of chemical insecticides is another serious concern. A large proportion of sprayed insecticides does not reach the target pest and instead contaminates soil, water, and air. Insecticide residues can persist in the environment for long periods, affecting soil microorganisms and reducing soil fertility. Runoff and leaching carry these chemicals into nearby water bodies, where they harm aquatic organisms and disrupt ecosystems. Spray drift exposes non-target plants, animals, and humans to toxic chemicals, especially in densely populated agricultural regions. The cumulative effect of these impacts threatens biodiversity and ecological stability. Human health risks associated with insecticide use cannot be ignored. Farmers and farm workers

are at high risk of exposure during mixing, spraying, and handling of insecticides, often without adequate protective equipment. Acute poisoning can cause symptoms such as headaches, nausea, dizziness, skin irritation, and respiratory problems. Long-term exposure to low levels of insecticides has been linked to serious health issues, including neurological disorders, hormonal disruption, reproductive problems, and cancer. Consumers are also exposed to insecticide residues on vegetables and fruits, particularly when pesticides are applied close to harvest or used in excessive quantities. Growing public concern about food safety has increased demand for residue-free produce, creating both challenges and opportunities for farmers.

In response to these challenges, sustainable insect pest management has gained global attention as a viable alternative to chemical-intensive practices. Sustainable pest management aims to control insect pests effectively while minimizing negative impacts on the environment, human health, and non-target organisms. It is based on the principle of working with nature rather than against it, using a combination of preventive, biological, cultural, mechanical, and chemical methods in a balanced manner. Instead of attempting to eliminate pests completely, sustainable approaches focus on keeping pest populations below economic threshold levels, where they do not cause significant economic damage. One of the key components of sustainable insect pest management is cultural control. Cultural practices are preventive measures that reduce pest establishment, survival, and reproduction by modifying the cropping environment. Crop rotation is an effective strategy for breaking pest life cycles,

especially for soil-borne and host-specific insects. By alternating crops with different pest associations, farmers can reduce pest buildup in the field. Timely sowing and planting help crops escape peak pest periods, while proper spacing improves air circulation and reduces pest-friendly microclimates. Balanced fertilization is also important, as excessive nitrogen application often promotes lush growth that attracts sap-sucking pests. Sanitation practices, such as removal of crop residues and infested plant parts, help reduce sources of pest infestation. Mechanical and physical control methods play an important role, particularly in small-scale and organic farming systems. Handpicking and destruction of insect pests and egg masses can be effective in managing caterpillars and beetles in vegetable crops. The use of traps, such as light traps, sticky traps, and pheromone traps, helps monitor pest populations and reduce pest numbers. Netting and physical barriers can protect crops from insect attack, especially in nurseries and high-value fruit and vegetable production. These methods are environmentally safe and reduce reliance on chemical insecticides. Biological control is a cornerstone of sustainable insect pest management. It involves the use of natural enemies to regulate pest populations. Conservation biological control focuses on protecting and enhancing existing natural enemy populations by reducing pesticide use and providing suitable habitats, such as flowering plants that supply nectar and pollen. Augmentative biological control involves the release of mass-reared predators and parasitoids to suppress pest populations. Classical biological control introduces natural enemies from a pest's native region to control

invasive pests. Biological control is particularly effective in greenhouse and protected cultivation systems, where environmental conditions can be managed to favour natural enemies.

The use of biopesticides has emerged as a promising alternative to synthetic insecticides. Biopesticides are derived from natural sources such as microorganisms, plants, and certain minerals. Microbial pesticides based on bacteria, fungi, viruses, and protozoa target specific insect pests and are generally safe to non-target organisms. Botanical pesticides, such as plant extracts and oils, have insecticidal, repellent, or antifeedant properties. These products degrade quickly in the environment, leaving minimal residues on produce. Although biopesticides may act more slowly than chemical insecticides, they are well-suited for inclusion in sustainable pest management programs.

Host plant resistance is another important strategy for managing insect pests sustainably. Resistant or tolerant crop varieties can withstand pest attack or reduce pest development and reproduction. The use of resistant varieties reduces the need for insecticide applications and provides a cost-effective and environmentally friendly solution. Advances in plant breeding and biotechnology have led to the development of varieties with improved resistance to major insect pests. However, resistance management is essential to prevent pests from overcoming plant defenses through adaptation. Judicious use of chemical insecticides remains an important component of sustainable pest management, particularly when pest populations exceed economic threshold levels. The key is to use insecticides as a last resort

and in a rational manner. Selection of insecticides with selective action, lower toxicity, and shorter persistence helps minimize negative impacts. Rotation of insecticides with different modes of action delays resistance development. Proper timing, correct dosage, and adherence to pre-harvest intervals ensure effective control while reducing residue levels. Economic threshold levels guide decisions on when control measures are necessary. IPM emphasizes prevention, ecological balance, and long-term sustainability rather than short-term pest suppression. The success of sustainable insect pest management depends not only on technologies and practices but also on knowledge, awareness, and institutional support. Farmers need access to reliable information, training, and advisory services to adopt sustainable practices effectively. Extension programs, farmer field schools, and participatory approaches play a crucial role in building capacity and confidence among farmers. Community-based pest management initiatives encourage collective action and reduce the risk of pest migration between fields. Policy support and regulatory frameworks are equally important in promoting sustainable pest management. Strict regulation of hazardous insecticides, promotion of safer alternatives, and monitoring of pesticide residues help protect public health and the environment. Incentives for adopting sustainable practices, such as organic farming and IPM-based production, can encourage farmers to reduce chemical inputs. Investment in research and development is essential to generate locally adapted solutions and address emerging pest

challenges under changing climatic conditions. Climate change is expected to further complicate insect pest management in vegetable and fruit crops. Rising temperatures, changing rainfall patterns, and increased frequency of extreme weather events influence pest distribution, abundance, and behaviour. New pests and diseases may emerge, while existing pests may become more aggressive or complete additional generations in a season. Sustainable pest management approaches that emphasize diversity, resilience, and adaptability are better suited to cope with these uncertainties than chemical-dependent systems. In conclusion, sustainable management of insect pests in vegetable and fruit crops is not merely an alternative approach but a necessity for the future of agriculture. While chemical insecticides have contributed to increased production in the past, their overuse has created serious environmental, health, and economic challenges. Sustainable pest management offers a balanced and holistic solution that protects crops while preserving ecological integrity and human well-being. By integrating cultural, biological, mechanical, and chemical methods within an IPM framework, farmers can achieve effective pest control with reduced reliance on hazardous chemicals. The transition towards sustainable pest management requires collective efforts from farmers, researchers, extension workers, policymakers, and consumers. With appropriate support and commitment, it is possible to build resilient agricultural systems that produce safe, nutritious food while safeguarding the environment for future generations.

पौष्टिकता युक्त गेहूँ के मूल्यवर्धित खाद्य उत्पाद

कल्पना आर्य, प्रसार विशेषज्ञ (गृह विज्ञान)

कृषि विज्ञान केन्द्र सुंदरनगर

भारत में मक्की के बाद गेहूँ ही एक ऐसी फसल है जिसे पूरे भारत में उगाया जाता है इसीलिए इसे चाहकर भी नजर अंदाज नहीं कर सकते हैं/ विशेषज्ञ के अनुसार गेहूँ मैदा की अपेक्षा ज्यादा स्वास्थ्यवर्धक है/ गेहूँ पेट के लिए बहुत हल्की व सुपाच्य होती है यह हमारे शरीर में आसानी से पच जाती है जबकि मैदा बनी चीजे आसानी से नहीं पचती है व उनसे कई बार स्वास्थ्य सम्बन्धी समस्याएं पैदा हो जाती है इसलिए हमें मैदे से बनी चीजों की बजाये गेहूँ से बनी खाद्य उत्पादों का प्रयोग अधिक करना चाहिए/

गेहूँ के फायदे :

- अंकुरित गेहूँ प्रोटीन का खजाना है
- अंकुरित गेहूँ खाने से कब्ज में राहत मिलती है
- अनीमिया के उपचार में भी गेहूँ फायदेमंद साबित होती है
- इससे रक्त साफ होता है व यह वजन घटाने में भी सहायक है
- यह हृदय रोग से बचाव करती है व इससे पाचन क्रिया मजबूत होती है

स्वास्थ्य की दृष्टि से गेहूँ स्वास्थ्यवर्धक आहार है यदि गेहूँ को अंकुरित करके खाया जाये तो यह पेट के लिए बहुत अच्छी है क्योंकि इसमें बहुत अधिक मात्रा में फाइबर पाया जाता है जो पेट के लिए पाचन क्रिया के लिए बहुत अच्छा होता है अंकुरित गेहूँ खाने से शरीर का मेटाबोलिज्म का स्तर बढ़ जाता है व यह शरीर में उत्पन्न होने वाले विषले पदार्थों को निष्प्रभावी करके शरीर में रक्त पूरा करता है। गेहूँ से रोटी, बिस्कुट, केक, दलिया, भटूरे, गूलगुल्ले, चिलरू

,सिरा,पिन्नी ,पंजीरी,सिडू, पूरी ,हलवा.गुजिया इत्यादि खाद्य उत्पाद बनाये जा सकते हैं। गेहूँ को मूंग दाल के साथ अंकुरित करके भी प्रयोग किया जा सकता है। गेहूँ के आटे में सोयाबीन का आटा , कोदरे का आटा या किसी और दाल का आटा मिलाकर इसे और भी



पौष्टिक बनाया जा सकता है।

गेहूँ के विभिन्न व्यजन व खाद्य उत्पाद

गेहूँ से आटा बनाने के अलावा भी इसका उपयोग बहुत सी उपयोगी खाद्य उत्पाद बनाने के लिए किया जा सकता है।

विभिन्न उत्पाद :

सीरा :**सामग्री:**

गेहूँ = 1 किलो घी = 80 ग्राम
चीनी = 50 ग्राम पानी = 150 मि.लि.

विधि: गेहूँ को दो से चार दिन पानी में भिगो कर रखें चार दिन बाद उपरी सतह का पानी फेंक दें व बाकि गेहूँ को निकाल कर ग्राइंडर में पिस लें फिर पानी से अच्छे से धोकर गहन को निकालकर धूप में छोटे छोटे गोले बना लें व सुखा लें। सुखाने के बाद इस सिरे को पकाने के लिए 100 ग्राम सिरा लेकर इसमें पानी व चीनी मिला कर पेस्ट बनाएं। घी को गर्म करके इस पेस्ट को उसमें तब तक पकाएं जब तक की कडाही के सिरे से न चिपके पकने के बाद गरम गरम प्रयोग करें।

गुज़िया :

गेहूँ का आटा = 2/3 कप दही = 1/2 चम्मच घी = 1 चम्मच
पानी गुथने के लिए

भरने के लिये

नारियल 2 कप खोया 1/2 कप किशमिश 1/4 कप
पीसी हुई चीनी 1/2 कप
पीसी हुई छोटी इलाइची घी तलने के लिए
बादाम काजू 1/2 कप पिसे हुए

विधि :

भरने वाले मिश्रण को अच्छे से मिला ले जो पिसने वाली वस्तुए है उनका पाउडर बना लें। आटे में दही, घी डालकर अच्छे से गूँथ लें फिर गोल रोटी बना कर उसमें मिश्रण भरकर गुजिया का आकार बना कर बंद कर लें व हल्का ब्राउन होने तक तल लें।

भटूरे**सामग्री**

गेहूँ का आटा = 100 ग्राम खमीर = 5 ग्राम तेल तलने के लिये
आटा गुथने के लिए पानी

विधि :

आटे को ईस्ट डालकर छान लें। फिर पानी मिलाकर अच्छे से आटा गूँथ लें व कपड़े से ढक कर डेढ़ घंटे के लिए रख लें। जब खमीरीकरण हो जाये तो भटूरे बना लें व तेल गर्म कर के उसमें फ्राई कर लें।

कचोरी

यदि कचोरी बनानी हो तो उपर लिखे विधि अनुसार आटा गूँथ लें व अलग से किसी भी दाल :जेसे

सोयाबीन, माश ,दाल चना इत्यादि का मिश्रण भिगोकर छिलके निकाल कर पिस कर मसाले व नमक मिला कर तैयार कर लें व गोल गोल पेडे बना कर उसमे मिश्रण को अच्छे से भरें व रोटियां बनाकर तल लें पुदीने व इमली कि चटनी के साथ परोसे।

पिन्नी



सामग्री गेहूँ का आटा = 150 ग्राम मूंग फली पीसी हुई =50 ग्राम सोया आटा= 75 ग्राम चीनी =200 ग्राम बेसन = 75 ग्राम घी =100 ग्राम चौलाई दाना भुना हुआ पाउडर =25 ग्राम

विधि

सभी आटो को मिलाकर छानकर भुन लें। इसके अलावा मूंगफली का पाउडर व चौलाई दाना को भुन कर आटो में मिला लें 5 से 10 मिनट तक हिलाते हुए पकाएं व गोल गोल पिन्नियां बना लें।

पंजीरी

सामग्री

गेहूँ का आटा=100 ग्राम किशमिश = 15 ग्राम सौंफ =5 ग्राम सोया आटा=50 ग्राम बादाम =15 ग्राम चीनी=100 ग्राम मूंग दाल आटा=50 ग्राम काजू=15 ग्राम घी= 40 मिली

नारियल बुरा =50 ग्राम छोटी इलाइची =5

विधि

तीनो आटों को अलग भुन लें फिर प्लेट में डाल लें। फिर प्लेट पर डाल दें उस पर चीनी ,व अन्य भुने हुए काजू बादाम व अन्य सामग्री भी अच्छे से मिला लें इस पर नारियल बुरा डालें व हवा रहित डिब्बे म रखे

सीडू



सामग्री

गेहूँ का आटा=1/2 किलो खमीर =2.5 ग्राम हलदी=2 ग्राम चीनी =10 ग्राम खसखस/अखरोट/ माह की दाल/ सोया दाल=200 ग्राम लहसुन =12 कलियाँ गरम मसाला =10 ग्राम मिर्च पाउडर 10 ग्राम नमक =स्वादानुसार

विधि

आटा छान लें थोड़े से गर्म पानी में {100 मिली }खमीर व चीनी मिलाएं। फिर इसमें दो चम्मच आटा मिलाकर 20-25 मिनट तक खमीरीकरण के लिए रखें। जब यह आटा दुगुना हो जाये तो इसानी आटेमें मिलाकर थोडा सा सिल गर्म पानी से गूँथ लें अब इस आटेको खमीरीकरण के लिए 3-6 घंटे के लिए सूती गिले कपड़ों से ढक कर रख लो यदि आपने खसखस सिडू भरने के लिए प्रयोग करना है। तो उसे पहले 30 मिनट तक उबाल

लें व् ठंडा करके पानी निकल कर मिक्सर में पिस कर पेस्ट बना लें इसमें अदरक, लहसुन, प्याज का पेस्ट मसाले हल्दी व् नमक अच्छे से मिला लें। खमीरी करण होने के पश्चात् आटे को लें। उसको बेल लें व् उसमे

मिश्रण भर कर बंद करें व् भाप में 15-25 मिनट तक पकाएं चटनी या देसी घी के साथ परोसें। सीडू में भरने के लिए उडद दाल ,सोयाबीन ,अखरोट व मूंगफली का प्रयोग भी किया जा सकता है।



Seasonal Vegetables: Why Eating with the Seasons Matters More Than You Think

Payal Sharma^{1*}, Arshia Prashar^{1*}, Himanshu Thakur^{2*}

¹Department of Vegetable Science and Floriculture, ²Department of Entomology, CoA, CSK Himachal Pradesh Krishi Vishvavidyalaya, Palampur-176 062, India

Seasonal vegetables have been an integral part of human diets since the beginning of agriculture, shaping food habits, health, and cultural traditions across civilizations. For centuries, people relied on vegetables that naturally grew in their surroundings according to the changing seasons, as this was the only option available before the advent of modern technology.

Communities developed food systems that were closely aligned with nature, consuming what was locally available and freshly harvested. This close relationship between humans and seasonal produce ensured nutritional balance, environmental harmony, and sustainable use of natural resources. However, with advancements in agricultural technology, cold storage facilities, and long-distance transportation, vegetables are now available throughout the year, irrespective of their natural growing period. While this development has improved accessibility and convenience, it has also gradually disconnected people from nature's rhythm and seasonal food cycles. Seasonal vegetables, which are grown and harvested under suitable climatic conditions, offer numerous advantages that extend far beyond convenience. They are not only healthier and tastier but also more economical and environmentally friendly. Understanding their importance has become increasingly relevant in today's context of rising health concerns, environmental degradation, climate change, and unsustainable agricultural practices. As people become more conscious about what

they eat and how their food is produced, seasonal vegetables emerge as a simple yet powerful solution for achieving nutritional security and sustainable living. Seasonal vegetables are those crops that grow best during specific times of the year when environmental factors such as temperature, rainfall, humidity, and day length are naturally favourable. These conditions allow crops to grow without stress, ensuring proper development and natural maturation. For example, vegetables such as cabbage, cauliflower, carrot, peas, radish, beetroot, and spinach flourish during winter when cooler temperatures support vegetative growth and nutrient accumulation. In contrast, crops like cucumber, gourds, pumpkin, bitter melon, bottle gourd, and okra perform well during summer due to their tolerance to higher temperatures and ability to thrive under longer daylight conditions. Rainy-season vegetables such as cowpea, cluster bean, and ridge gourd grow well under moderate rainfall and humid conditions. When vegetables are cultivated in their natural season, they grow vigorously with minimal external support, resulting in

better yield, improved quality, and enhanced nutritional composition.

Vegetables grown in their appropriate season mature at their own pace, allowing natural processes such as photosynthesis, nutrient absorption, and pigment formation to occur efficiently. This leads to the development of natural flavour, colour, texture, and aroma that are often missing in off-season produce. Off-season vegetables, on the other hand, are frequently grown under artificial conditions or harvested prematurely to withstand long transportation, which can negatively affect their quality. As a result, seasonal vegetables not only look fresher but also taste better and provide greater satisfaction to consumers. Traditional food habits across different regions of the world were closely linked with seasonal availability of vegetables. People instinctively consumed foods that suited the climate and met the body's nutritional requirements during a particular season. Winter diets were rich in leafy greens and root vegetables that provided energy, warmth, and strength to the body during cold months. These vegetables were dense in nutrients such as iron, calcium, and complex carbohydrates, supporting immunity and physical endurance. In contrast, summer meals focused on light, water-rich vegetables that helped cool the body, maintain hydration, and prevent heat-related discomfort. Such dietary patterns supported efficient digestion, strengthened immunity, and maintained overall health without reliance on supplements or processed foods. Although modern lifestyles have altered eating patterns and reduced dependence on seasonal foods, scientific evidence increasingly supports the idea that seasonal eating aligns better with human

physiology. The human body undergoes subtle physiological changes with seasonal transitions, affecting digestion, metabolism, and nutrient requirements. Seasonal vegetables naturally complement these changes, helping the body adapt smoothly to environmental variations. Thus, seasonal eating is not merely a traditional practice but a scientifically sound approach to maintaining health and well-being. One of the most significant advantages of seasonal vegetables is their superior nutritional value. Vegetables grown in their natural season contain higher levels of essential vitamins, minerals, antioxidants, and dietary fibre. Since they are harvested at full physiological maturity, nutrients accumulate properly within plant tissues, enhancing their nutritional density. In contrast, off-season vegetables are often harvested early or grown using artificial environments such as greenhouses, which may compromise nutrient synthesis. Seasonal leafy vegetables are particularly rich in iron, calcium, folates, and vitamin C, which play a crucial role in preventing nutritional deficiencies. Summer vegetables, on the other hand, are high in water content and electrolytes, helping regulate body temperature and prevent dehydration.

Another important aspect of seasonal vegetables is improved bioavailability of nutrients. Bioavailability refers to the extent to which nutrients can be absorbed and utilized by the body. Nutrients present in seasonal vegetables are more readily absorbed because they are naturally balanced and suited to the body's seasonal needs. This means that consuming seasonal vegetables not only provides nutrients but also ensures that the body can effectively utilize them, enhancing

overall health outcomes. Taste and freshness are among the most noticeable benefits of seasonal vegetables. Freshly harvested seasonal produce has a natural sweetness, crispness, and aroma that significantly enhance the eating experience. These vegetables reach local markets quickly after harvest and require minimal storage, preserving their freshness and nutritional quality. In contrast, off-season vegetables often travel long distances and spend several days or even weeks in cold storage before reaching consumers. Prolonged storage and transportation can lead to loss of flavour, texture, and nutritional value. Many consumers observe that off-season vegetables may appear visually attractive due to polishing or waxing but lack the natural taste and aroma associated with freshly harvested seasonal produce. Food safety is another critical concern associated with vegetable consumption, and seasonal vegetables generally offer a safer option. Crops grown under favourable climatic conditions face fewer pest and disease pressures, reducing the need for excessive pesticide application. Farmers can manage seasonal crops using minimal chemical inputs, resulting in lower pesticide residues on produce. In contrast, off-season cultivation often involves heavy use of fertilizers, pesticides, and growth regulators to overcome unfavourable climatic conditions and pest outbreaks. This increases the risk of chemical residues entering the food chain, posing potential health hazards to consumers, particularly children, pregnant women, and elderly individuals.

From an economic perspective, seasonal vegetables are beneficial for both consumers and farmers. When vegetables are in season,

supply increases significantly, leading to lower market prices. Consumers can purchase fresh, nutritious produce at affordable rates, reducing household food expenditure. Seasonal vegetables also tend to have better shelf life under normal conditions, minimizing spoilage and wastage at home. For farmers, seasonal cultivation reduces the cost of production as crops require less irrigation, fewer fertilizers, and limited pest control measures. Lower input costs improve profit margins and reduce the financial risk associated with crop failure, making farming more economically sustainable. Seasonal vegetable farming also plays a crucial role in environmental conservation. Growing vegetables in their natural season reduces dependence on artificial inputs such as chemical fertilizers and pesticides, helping conserve soil health and biodiversity. Off-season vegetable production often relies on excessive irrigation, leading to groundwater depletion, soil salinity, and long-term degradation of agricultural land. Moreover, vegetables transported over long distances contribute to greenhouse gas emissions due to fuel consumption and refrigeration requirements. Seasonal, locally grown vegetables have a much smaller carbon footprint, making them an environmentally sustainable choice.

Digestive health is closely linked to seasonal eating habits, and seasonal vegetables play an important role in maintaining a healthy digestive system. These vegetables provide dietary fibre that supports digestion, promotes gut health, and prevents common digestive disorders such as constipation and acidity. The human digestive system adapts to seasonal changes, and vegetables grown in a

particular season naturally complement this adaptation. For instance, heavier and fibre-rich vegetables consumed during winter suit slower digestion, while lighter and water-rich vegetables in summer help prevent digestive discomfort and bloating. In the modern era, lifestyle diseases such as obesity, diabetes, hypertension, and cardiovascular disorders are becoming increasingly widespread due to unhealthy diets and sedentary lifestyles. A diet rich in seasonal vegetables helps regulate body weight, control blood sugar levels, and improve heart health. Seasonal vegetables are generally low in calories but high in nutrients, making them ideal components of balanced diets. Despite their numerous benefits, seasonal vegetables are often overlooked due to changing consumer preferences and market trends. Supermarkets and large retail chains promote uniformity and year-round availability, reducing public awareness about seasonal cycles. Many consumers are unaware of which vegetables grow naturally during different seasons and rely more on convenience than informed food choices. This lack of awareness poses a major challenge to promoting seasonal eating habits and sustainable agriculture. Education and awareness play a vital role in encouraging the consumption of seasonal vegetables. Displaying seasonal charts in markets, promoting local produce, and incorporating information about seasonal foods into school curricula can help reconnect people with natural food cycles. Media campaigns, social platforms, and agricultural extension services can further spread awareness about the nutritional, economic, and environmental benefits of seasonal vegetables.

Kitchen gardening is another effective approach to promoting seasonal awareness and responsible food choices. Growing vegetables at home, even on a small scale, helps individuals understand planting times, crop duration, and the effort involved in food production. Home-grown vegetables are fresh, chemical-free, and deeply satisfying to consume. Kitchen gardens also strengthen the connection between people and nature, encouraging appreciation for seasonal cycles and sustainable practices. In the context of climate change, food insecurity, and environmental degradation, seasonal vegetables offer a practical and achievable solution for building sustainable food systems. They support climate-resilient agriculture, protect natural resources, reduce environmental pollution, and ensure nutritional security for growing populations. Choosing seasonal vegetables is not merely a dietary preference but a conscious decision that benefits personal health, farmer livelihoods, and environmental sustainability. In conclusion, seasonal vegetables are nature's way of providing balanced nutrition in harmony with the environment. They are richer in nutrients, safer to consume, better in taste, economical, and environmentally friendly. Although modern lifestyles offer the convenience of year-round availability, returning to seasonal eating is a wise and forward-looking choice. By embracing seasonal vegetables, individuals can improve their health, support sustainable agriculture, and contribute to a healthier planet. Eating with the seasons is not a limitation but a return to nature's wisdom, balance, and long-term well-being.

“द पहाड़ी एग्रीकल्चर”

ई-पत्रिका

‘पर्वतीय कृषि की ऑनलाइन मासिक पत्रिका’



संपर्कसूत्र:

pahadiagriculture@gmail.com

<https://pahadiagromagazine.in>

www.pahadiagromagazine.in