

Evaluating the Economic and Ecological Importance of Traditional Fruit Trees in Uttarakhand

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Abstract

This study investigates the distribution, morphological characteristics, phyto-constituents, and conservation practices of traditional fruit trees in Uttarakhand, India. The region, characterized by its mountainous terrain and diverse climatic conditions, hosts a variety of fruit species, including apple, pear, peach, plum, khumani, walnut, mango, litchi, malta, santra, lemon, aonla, guava, and pomegranate. Data on morphological traits were collected from hilly and valley areas, emphasizing their traditional importance and nutraceutical values. Furthermore, the study explores local conservation strategies aimed at sustaining these vital resources. Findings indicate a growing recognition among local communities of the nutritional benefits offered by wild edible fruit species, contributing to food security and aligning with sustainable development goals, particularly Zero Hunger.

Keywords: Traditional fruit trees, Morphological characteristics, Phyto-constituents, Nutraceutical values, Conservation practices, Uttarakhand, Food security, Sustainable development, Wild edible fruits

INTRODUCTION

Uttarakhand, a state in northern India, is renowned for its rich biodiversity and traditional agricultural practices. Covering a geographic area of 53,483 km², with 86% of its landscape characterized by mountains and 65% enveloped by forests, Uttarakhand provides an ideal habitat for a variety of traditional fruit trees. These fruit trees not only contribute to the region's ecological balance but also hold significant cultural and nutritional value for local communities.

In recent years, there has been a growing interest in studying the physical traits and nutritional value of these fruit species. Traditional fruits like as apple, pear, peach, plum, khumani, walnut, mango, litchi, malta, santra, lemon, aonla, guava, and pomegranate are vital to local food security and survival.

This study aims to systematically examine the distribution patterns and morphological traits of these traditional fruit trees, assess their phyto-constituents and nutraceutical values, and investigate the conservation practices employed by local populations. By documenting the traditional significance of these species and their sustainable management, this research contributes to broader discussions on food security and the importance of indigenous plant resources in achieving sustainable development goals, particularly the goal of Zero Hunger.

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Received Date: October 28, 2024

Accepted Date: October 29, 2024

Published Date: October 30, 2024

Citation: Maneesha Singh. Evaluating the Economic and Ecological Importance of Traditional Fruit Trees in Uttarakhand". International Journal of Land, 2024; 1(2): 6–21p.

Objectives

- Studies on distribution and morphological characters of traditional fruits trees.
- Studies on phyto-constituents, nutraceutical values and uses of traditional fruits trees.
- Studies on conservation practices of the traditional fruit trees.

MATERIALS AND METHODS

The study focused on the climatic conditions of Uttarakhand, a state with a total size of 53,483km² (86% hilly, 65% forest).



Figure 1. Study area-Uttarakhand.

- Information about phytoconstituents and nutraceutical values of fruit trees grown in Uttarakhand region will be collected.
- Traditional importance of fruits trees will be recorded.
- Conservation strategy followed by local people will be known for its sustainability.

Collect data on morphological characteristics of hilly fruits cultivated in Tarai and valley areas, including apple, pear, peach, plum, khumani and walnut mango, litchi, malta, santra lemon, aonla, guava, and pomegranate.

RESULTS AND DISCUSSIONS

In order to ensure the food and nutritional security local people have begun utilization of wild edible fruit plant species, available in the surrounding environment. The Sustainable Development Goals-- Zero Hunger--recognize the necessity of bringing a healthy diet to every part of the world, and fruit plays an important role in this. Poor diets are a major source of malnutrition and the biggest cause of disease globally.

Improving diets, including increasing fruit intake could improve the health of people. These wild traditional fruits not only provide nourishment and food, but also serve other purposes such as fodder, fuel, and medicinal.

The traditional fruit plant recorded in present study are listed as follows:

1. *Kafal*

Botanical name	-	<i>Myrica esculenta</i>
Local name	-	Kafal or kaphal
Family	-	Myricaceae

Kafal is the state fruit of Uttarakhand. People consume this fruit by slicing it into pieces and seasoning with rock salt and chili powder. Kafal is one of the state's most popular fruits due to its excellent flavor and medicinal benefits.



Ethnobotanical uses: The health advantages of kafal include anti-asthmatic effects, sore throat and ulcers. It is widely used to treat cough, ulcers, anemia, fever, diarrhoea etc.

2. **Hisalu**

- Botanical name - *Rubus ellipticus*
Local name - Yellow Himalayan raspberry
Family - Rosaceae



This fruit is usually found during the summer months. Hisalu, a native of China, may be purchased from *merchants in Nainital and Almora*. *This yellow-colored, nutrient-packed fruit is endemic to Uttarakhand*. Hisalu plant roots are used ethnobotanically to cure stomach troubles and headaches. Berries treat digestive difficulties, stomach troubles, and peptic ulcers.

3. *Bedu*

- Botanical name - *Ficus palmata*
Local name - Khemri, pheru, Bendu, Anjir
Family - Moraceae



It's dark purple. It is usually found on the sides of streams and rivers up to 1800 meters. Unripe Bedu is cooked as a vegetable in various parts of Kumaon.

Bedu has ethnobotanical purposes, including reducing inflammation and treating warts. It is also used to treat constipation and respiratory issues.

Plum

Botanical name	-	<i>Prunus domestica</i>
Local name	-	Plum, Aloo Bukhara
Family	-	Rosaceae



This is sweet and tangy fruit. Plum are low calorie fruits. Plum can be eaten raw, dried or in jam form. Plum is fleshy and delicious temperate fruit.

Ethnobotanical uses - Plums are rich in vitamin C. Rich in antioxidants. May have inflammatory properties. May help in weight loss. Protection against cancer.

4. Timil

Botanical name	-	<i>Ficus auriculata</i>
Local name	-	Timul, Timil
Family	-	Moraceae



Timla is one of the most common fruits in Uttarakhand. The fruits form enormous clusters on the trunk and branches. The locals also use it to make various types of jams and curries.

Ethnobotanical uses: Timil has cancer cure properties. Timil leaves are more significant than the fruit itself.

5. **Mulberries**

Botanical name	-	<i>Morus alba</i>
Local name	-	Shahtoot, White Mulberry
Family	-	Moraceae



Mulberries are available in either white or purple. It's used to make jam and jelly.

Mulberries have been used ethnobotanically to lower cholesterol and even reduce the incidence of cancer. Mulberries has antioxidant effects.

6. **Wild grapes:**

Botanical name	-	<i>Vitis vulpina</i>
Local name	-	River bank of forest grape
Family	-	Vitaceae



Wild grapes are natural, uncultivated grapes.

Wild grape flowers are green. The fruit is very important for wild life.

Ethnobotanical uses: Grapes are a good source of fibre, potassium, and vitamins. Grapes are used to treat cancer, small pox, eye infections, renal and liver problems.

Grapes contain vitamin A and B. Grapes are also high in antioxidants. Unripe grapes were used for treating sore throat.

7. Wild pear

Botanical name	-	<i>Pyrus pyrifolia</i>
Local name	-	Wild pear, Bada kainth, Shiara, Zarenth
Family	-	Rosaceae



The fruits are luscious, delicious, and serve as an excellent jam preservative. The wild pear thrives in most soils, whether in full sun or moderate shade. Sometimes the stems have a few thorns. Bees and other insects are drawn to the blossoms in the spring.

Ethnobotanical applications: The fruit includes sugar, protein, and pectin. Pears contain high levels of vital minerals like copper and potassium. Pears contain dietary fiber. It's possible that gut health will improve. May decrease inflammation. They also include modest amounts of cholesterol, sugar, and fat. May aid in weight loss. The juice of ripe fruit is used to alleviate diarrhea.

Amla

Botanical name	-	<i>Phyllanthus emblica</i>
Local name	-	Amla
Family	-	Phyllanthaceae



It grows wild, primarily in woods in the Himalayan mid-hill regions, where the climate is subtropical. It is cultivated for its fruit. The amla fruit is constantly in high demand. Ethnobotanical applications: It is high in vitamin C. Helps fight against the common cold.

Reduces cholesterol levels. Improve the digestive processes. Consumption of amla to aid cancer treatment. Amla is a natural cosmetic ingredient.

8. **Jamun**

Botanical name	-	<i>Syzygium cumini</i>
Local name	-	Jamun, Java, Plum, Black plum
Family	-	Myrtaceae



Jamun is a valuable summer fruit. Fruits are used to make jam, jellies, squash, vinegar, and ice cream because of their lovely and appealing purple tint.

Fruit syrup has ethnobotanical purposes, including treating diarrhoea. Black plum vinegar helps to minimize spleen enlargement, diarrhea, and urinary retention. Contains cooling and digesting effects. Black plum is noted for its stomach pain relief, carminative properties, and diuretic effects.

9. **Imli-**

Botanical name	-	<i>Tamarindus indica</i>
Local name	-	Madeira Mahogany, Tamarind tree, Tentul, Amla
Family	-	Leguminosae



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10. **Quince-**

Botanical name	-	<i>Cydonia oblonga</i>
Local name	-	Bihi
Family	-	Rosaceae



It is a deciduous tree. The quince is often grown as an ornamental plant because to its beautiful pale pink blooms.

Ethnobotanical applications: It has antioxidant properties and includes phenolic components. Traditional uses for seeds include diarrhoea, dysentery, coughing, and sore throat. The quince is a very healthy fruit with a low calorie density. Quince is high in calcium, iron, potassium, magnesium, and copper.

11. Apricot-

Botanical name	-	<i>Prunus armeniaca</i>
Local name	-	Khubani
Famil	-	Rosaceae



Apricot is loaded with nutrients. It is really juicy on the inside. This luscious and juicy fruit is extensively grown in Uttarakhand. It thrives in mountain slope soils.

Ethnobotanical applications: It is high in beta-carotene, potassium, and iron. This fruit is high in fiber and contains plenty of vitamins and minerals.

This fruit is high in carotene. The kernel can also be consumed after being crushed into almond oil.

12. Strawberry

Botanical name	-	<i>Fragaria ananassa</i>
Local name	-	Strawberry
Famil	-	Rosaceae



Uttarakhand's temperature and soil quality make it ideal for farming.

These delicious strawberry can be consumed directly from trees.

Ethno medical values: The fruit is a rich source of iron. Used in dairy products. Strawberries are jam-packed with vitamin C to support a healthy immune system. The nutritious compounds in strawberries may help protect against certain cancers.

13. Berberis

Botanical name	-	<i>Berberis asiatica</i>
Local name	-	Marpyashi, Darbi
Family	-	Berberidaceae



Berberis grows on little barberry shrubs. Barberries typically grow in bunches on the barberry bush. They contain a unique compound called berberine.

Ethno medical values: High in nutrients. Beneficial plant components may help manage diabetes. Acne may be treated more effectively. Berberine can help reduce high cholesterol levels. Diarrhea and dysentery can be treated. It's possible that it has anti-cancer properties.

Ghingaru

Botanical name	-	<i>Pyracantha crenulata</i>
Local name	-	Ghigaru, Nepal firethorn
Family	-	Rosaceae



Ghingaru is one of the most common wild fruits in Uttarakhand.

These fruits are produced in thorny bushes, and the leaves are used to make a calming herbal tea. Ethnobotanical applications - The Ghingaru tree is used to treat malaria. The fruit is high in antioxidants and helps to eliminate all free radicals in the body. It can be consumed with tea, and some people use it as a lotion for their faces and to treat sunburns. It also helps to reduce cholesterol. It's also rich in beta-carotene, iron, and potassium.

14. Burans

Botanical name	-	<i>Rhododendron arboreum</i>
Local name	-	Lali Guras
Family	-	Ericaceae



Burans are one of Uttarakhand's most famous trees, and they can be found throughout the state. These trees have scarlet, bell-shaped blossoms that yield tasty nectar. Ethnobotanical uses- The bark's juice is used to treat coughs, diarrhea, and dysentery. Burans help prevent cancer. This juice is useful to diabetics. Burans has anti-inflammatory, antioxidant, and antibacterial effects.

15. Kilmode

Botanical name	-	<i>Berberis aristata</i>
Local name	-	Kilmode
Family	-	Berberidaceae



This fruit plant is highly prickly, and the branches aren't very sturdy, but the sweet and sour taste compensates. It is also grown in hedgerows. This plant is in high demand due to its medicinal properties. The ripe fruit has purple color. and tastes sweet and sour. Ethanobotanical uses:

The roots are used for curing diabetes. The roots possess anti- cancer activity. This fruits has a large number of nutritional value.

16. Walnut

Botanical name	-	<i>Juglans regia</i>
Local name	-	Akhrot
Family	-	Juglandaceae



The majority of walnuts planted in Uttarakhand are for commercial uses. Some of Uttarakhand's key walnut-producing locales include Almora, Dehradun, and Pauri Garhwal.

Walnut is known for king of nut.

Ethanobotanical uses: Walnut are known for nutritious and healthy food. This is the most nutritious source of healthy fats, protein, fiber, and other necessary vitamins and minerals.

Walnuts may help in preventing cancer. Walnuts may help in controlling diabetes. Walnut may help in weight management.

17. Malta-

Botanical name	-	<i>Citrus sinensis</i>	Local name
	-	Sweet	Orange
Family	-	Rutaceae	



Malta is a wonderful fruit that grows in the highlands of Uttarakhand, where the weather is pleasant. It matures during the winter and is classed as a citrus fruit. Malta is a local winter fruit from Uttarakhand that is used to make squash and other products. The peel is used in face masks to treat skin issues. Ethnobotanical uses: It is a delicious fruit that includes vitamin C, which is beneficial to the skin and eyes. The fruit contains vitamin C and can be used as a substitute for other citrus fruits. It is effective at treating pneumonia.

18. Dadim

Botanical name	-	<i>Punica granatum</i>
Local name	-	Pomegranate
Family	-	Lythraceae



Considered to be one of the most underrated fruits of this region. When fully ripened, it tastes sweet and sour in equal measure, making it a delectable delicacy.

Ethanobotanical uses: It having a good amount of minerals, phosphorus, Calcium and Magnesium. Dadim is highly effective in the treatment of hyperacidity.

19. Apple

Botanical name	-	<i>Malus domestica</i>
Local name	-	Wilson Apples
Family	-	Rosaceae



The state ranks third in the production of apples. Apples are grown in nearly every hilly section of the state. Uttarakhand's primary growing areas are Uttarakashi, Almora, and Nainital. Apples produced in Harshil (Uttarkashi) are in high demand.

Ethnobotanical uses: May protect against heart disease. May prevent obesity. Helps to prevent disease like Parkinson's. Apples are low in sodium, fat, and cholesterol.

20. **Peach**

Botanical name	-	<i>Prunus persica</i>
Local name	-	Aadu, Pica, Alu
Family	-	Rosaceae



They are some of the most succulent ones. Peach trees bloom wispy pink blossoms from March to April. The peach fruit tree is grown in warmer temperate zones of both the Northern and Southern hemispheres. Peaches are commonly consumed fresh as a dessert fruit.

Ethnobotanical uses: It has a great nutritional value because it is high in protein, vital amino acids, minerals, and vitamins. Helps with digestion. Keep our bones strong. The peach is high in vitamins A and potassium.

21. **Kiwi**

Botanical name	-	<i>Actinidia deliciosa</i>
Local name	-	Kiwi, Chinese gooseberry
Family	-	Actinidiaceae



Kiwi is an important temperate crop grown in the hills region of Uttarakhand.

Kiwi fruit thrives in all climates with enough heat in the summer. They are both sweet and healthy.

Ethanobotanical uses: Kiwi are exceptionally high in vitamin C. Kiwi contain a variety of vitamins and mineral plus fibre. It is essential for immune health. Kiwi helps in digestion. Kiwi are also rich in antioxidants.

22. Makoi

Botanical name	-	<i>Solanum nigrum</i>
Local name	-	Black nightshade
Family	-	Solanaceae



Makoi typically develops as a weed in damp environments with a variety of soil types. When the fruits and berries reach maturity, they turn a purplish-black tint.

Ethnobotanical uses: The entire plant, including the berries, fruits, flowers, and leaves, can be utilized for therapeutic purposes. Ability to relieve pain and inflammation. The juice from the plant's fresh leaves can help heal stomach ulcers. The herb makoi has long been utilized in traditional medicine.

23. Chilgoza

Botanical name	-	<i>Pinus gerardiana</i>
Local name	-	Cedarnuts, Pinyon
Family	-	Pinaceae



Chilgoza is a gymnosperm fruit. It is a nut fruit. The villagers harvest and sell the nuts in the market. Chilgoza is a very good species for social forestry, and is planted in forest development projects in high hills. Chilgoza is a kind of pine fruit.

Ethnobotanical uses: Promotes a strong immune system. Chilgoza enriches with the goodness of many vitamins and minerals like Zinc, Phosphorus. Maintain a good eye health.

The growth of wild fruit in the area has decreased due to climatic changes and delayed rainfall. There are numerous traditional fruit plants identified by local residents that provide fruits throughout the year. Fruit has the potential to improve the local economy while also ensuring food security for the community. Wild fruit plants are widely distributed over the planet, albeit in relatively small numbers. Wild traditional fruits provide a source of revenue, particularly for poor rural residents and unemployed individuals in the region, by producing a variety of food goods such as jam, juice, and sauce. Wild edible fruits play an important role in acute and chronic food shortages that occur during extreme survival scenarios.

CONCLUSIONS

The primary goal of the project was to discover and identify the area's wild edible fruits, as well as to document indigenous knowledge and practices, so that these fruits can be used as food supplements and farmed for a larger population, so contributing to the area's economic progress. The use and availability of wild traditional fruits are gradually disappearing. Wild edible traditional plants provide as a valuable food supplement for local residents during times of scarcity. Another location-specific issue that farmers in rural areas face is access to roads. These wild fruits are underutilized, and their commercial value has yet to be realized.

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