

Chapter 2

Edible Wild Plants: A Solution to Overcome Food Insecurity

2.1 What Are the Edible Wild Plants?

Wild food is considered as all the non-domesticated plant and animal resources that are collected and hunted from forests and bushlands for the purpose of human feasting. However edible wild plants can be defined as the “Plants which as whole or their any part (roots, leaves or fruits) are acceptable for eating purpose by urban and rural communities.” It is very important to note that plants have many parts, i.e., stem, root, shoot, leaves, fruit, seeds, and buds, and if any part (at least one) is comestible, then that plant is considered to be an edible one. A plant considered to be an edible one could also have poisonous, medicinal, bitter, woody, and hairy parts as well. So it is very important to identify which plant is an edible one; in other case it could have disastrous consequences. The FAO defines the wild edible plants in such following words: “Plants that grow spontaneously in self-maintaining populations in natural or semi-natural ecosystems and can exist independently of direct human action” [1]. Another definition stated that WEPs as the plant species can be used as food sources and are never cultivated and never domesticated, but these can get from their wild habitat [2].

2.2 Characteristics of WEPs

The chief characteristics of WEPs are listed below:

1. They are locally accessible, and traditional ecological knowledge is considered to be the basis for their utilization [3–5].
2. They are considered as low input and cheap source for nutritional enhancement and reduction in spending restricted money resources [4, 6].

3. They are potentially beneficial for poorer families who are extremely affected by uncertain climatic catastrophes [7].
4. They play important role in maintenance of living hoods, as they are available during the periods of famine [8–10].

2.3 Enlightenment to Wild Edible Plants

In developing nations, numerous types of edible wild plants are exploited as sources of food because these provide an adequate level of nutrition to the inhabitants. These wild food sources can also be termed as wild vegetables because they are nutritionally viable and have the ability to grow in the wild. They are important elements of natural ecosystem and agriculture because they have necessary nutritious qualities such as micro- and macronutrients, vitamins, proteins, fats, and fiber content as well. These are often considered as green factories that nature has provided us, and since ancient times they are playing role in improving human health as well as in maintenance of balance agricultural productivity.

2.4 Why Wild Edible Plants Are Important?

According to the report of the Food and Agricultural Organization (FAO), a minimum of one billion people in the world utilize wild vegetables in their daily routine diet. These wild veggies add a variety of colors, taste, and texture in our diet. The phytochemicals present in these vegetables protect human body from a great number of diseases, so that's why these wild vegetables are also called as protective food. Recently agropostoral societies have revealed that these wild plant resources not only play a vital role in nutrition but also are good sources for income generation. Wild vegetables are fascinating dietary components for poor people because these have relatively low prices as compared to the other daily routine food items and are locally available as well. Now Pakistan Agricultural Research Council (PARC) has also started research and development strategic programs with these underutilized wild vegetables.

In developing countries a significant problem to human survival is the increasing gap between the food availability and human population. So the research is based on the underutilized wild plants that can help to reduce the gap within the food deficiency and ever-growing human population. Growing and using the wild plants as food is an opportunity that is not explored properly to reduce the food insecurity and malnutrition.

The diet of the poor people is cereal based and nutrient deficient predominantly. Food insecurity results in lesser consumption of fruits and vegetables that leads to mineral and vitamin deficiency. According to a survey, due to vitamin deficiency, 0.6 million people died in 2004 and more than 190 million children lesser than 5 years old were vitamin and mineral deficient.

Wild edible plants (WEPs) are the plant species that can be used as sources of food and are never cultivated and never domesticated, but these can be obtained from their wild native habitat. Wild edible plants that are assembled in the form of one or whole parts (roots, leaves, or fruits), at the proper phase of growth, and prepared properly can be used as food. Weeds which are growing in the urban areas to indigenous plants growing in deep uninhabited region could be edible wild plants. In recent years there has been a recommence interest in wild food plants because of worldwide agitation about the quality of mass-produced crop plants, which are deprived in micronutrients.

The high extensiveness of food inhibition and contagious disease, gathered with a scarcity of approach to healthcare systems in rural areas, makes a practical alternative of conventional plant origins of food and medical treatment for endangered households. These foods have a potential to meet household food and insecurity to food.

In recent years a growing interest has emerged to evaluate the nutritional analysis of wild edible plants. Ethnobotanical information of WEPs and their nutritional analysis could be coupled to know the importance of these WEPs and to use these as food substitute. WEPs are directly approachable from natural habitats; native people have knowledge about how to gather and then produce the foods. Ethnobotanical investigation of wild edible plants has focused on the objective of the documentation of the native knowledge related to these plants. In different cultures or ethnic groups of a country or different countries, comparative studies on wild edible plants may have contribution in the identification and authentication of widely used species for further nutritional analysis.

On a daily basis, there are about one billion people in this world who use wild foods (mostly from plants). Besides it over 300 million people are there who attain a considerable part of their sustenance from wild forests or from non-timber forest products. There are about 30,000 plants from which more than 250,000 currently reported plants are edible used by human beings for household consumption. Whereas WEPs were ethnobotanically investigated, it was suggested that there are more than 7000 species which were cultivated for food purposes in the human history. In different countries such as China, India, Thailand, and Bangladesh, there are hundreds of WEPs which are consumed by the domesticated species.

Vegetables are the rich part of the human food and are the affordable energy source as these are the rich source of fats, proteins, and carbohydrates. Along with the biochemicals which were present in the vegetables, other parameters such as energy values, ash, moisture, and fiber contents of each vegetable and plant species have also been considered important for the soil quality and the human health. The important chemicals present in the wild plants have been indicated by many scientists. Vegetables and fruits (including green leafy vegetables) are rich sources of Vitamin C.

Wild edible plants are inexpensive and vital and are rich sources of antioxidants, vitamins, fiber, and minerals. Nutraceutically these plants can be used for a variety of ailments and have the power to prevent the human body from cardiovascular diseases, chronic cancer, diabetes mellitus, inflammation, and many others.

According to literature review, little attention has been given to the properties of inorganic substances that play a central role for the formation of many active and vital chemical substances, and in this way they are responsible for therapeutic and nutritional attributes.

Locally available wild herbs and plant parts are recognized for their characteristic therapeutic value, color, and flavor and are also rich sources of iron, calories, and proteins, and they are used as a part of food to manage the degenerative diseases and nutrient deficiency.

In developing countries millions of people depend on wild medicinal and edible plants, to fulfill their dietary needs and for their healthcare. Edible plants have an important part as sources of energy and micronutrients. Wild edible plants are used as food in small amounts, they handle hunger, effect on the intake of cereal staples and has a vital part in household food security for the indigent rural society. By mixing different WEPs in one food, it gives dietary diversity with reference to choice of zest and with reference to more vegetables.

Edible plants have the vital role in the traditional medicine. Trace elements present in WEPs play both curative and preventive role in combating diseases. Mostly the flora present in the developing countries virtually remains unexplored due to the medicinal utility by traditional Eastern medicinal system which strongly uses the trace elements of medicinal plants for curing several diseases. There is a small portion of mineral elements present in the plant material as compared to its total body weight and total composition, but no doubt they have important physiological role in the metabolism of human body.

Wild edible plants are available locally, so for low-income sector of the economical society, they are inexpensive. These wild edible plants contain rich amount of nutrients that have vital role in food security and nutritional point of view and are also used as the supplements to handle the illness. Modern agricultural techniques and marketing systems have become the reason of reduction in the genetic diversity of plant species, especially in vegetables, globally.

For the prosperous commercialization of wild edible plants, a good policy, robust information, and institutional environment are required that should improve the confidence of the investor in the sector. Wild edible plants provide several economic advantages to the national finance as well as to the people who are involved in the trade and cultivation of these plants.

Wild edible plants (WEPs) which are harvested locally provide food and cash income for native people and have great importance in fortifying global food security. However, with development, WEPs are endangered, and traditional knowledge which is associated with these wild plants is in danger of being lost.

The first record of edible medicinal plants in Indo-Pak was documented between 4500 and 1600 BC in Rig Veda and between 2500 and 600 BC in Ayurveda. According to estimation 46% of world's poor population lives in the South Asia. In Pakistan there is a variety of medicinal edible herbs which are scattered in the entire country because of varied climate. Eighty percent of the population of the Pakistan lives in villages and rural areas, and these plants were used in folklore medicine and hakims [10]. They depend mostly on the Unani medicine system.

Because of variable climate and soil conditions, Pakistan is very rich in flora. There are 270,000 total vascular plants found on the earth, out of which in Pakistan 6000 species of higher plants exists which include 2000 medicinal plant species.

2.5 A Brief Review of Wild Edible Plants

Wild edible plants are the raw plants which are free of cost and can be found at any place we are living. Their roots, leaves, or fruits are acceptable for eating purpose by urban and rural communities. These wild edible plants may be seasonal and can have more nutritional value than those grown in particular field in particular environmental conditions. These are fresh and more tasteful than those arranged on shelves in stores and cultivated. These wild edible plants play a significant role to improve agriculture, and some of these now become cultivated plants.

Wild vegetables increase agro-biodiversity at the household level. Although they may be consumed in small quantities, they influence the intake of cereal staples, manage hunger, and play a central role in household food security for the poorer rural groups. Several national and international researchers suggested them as alternate food resources because of their nutritional value as well as their richness in micronutrients.

Increasing rate of population all over the world has reduced the resources of food especially. To fulfill such demands, it is necessary to search for those wild edible plants which can be used in case of malnutrition, and fewer amounts are spent on them for their management. In case of natural disasters like famine, such plants can be helpful in fulfilling food demands. Hence a considerable attention is needed to explore, isolate, and characterize the phytochemical constituents to ascertain the antioxidant properties of wild edible plants. Due to frequent changes in our environment, the health and immune system of humans is badly affected. The resistance toward diseases has also decreased. In such situations we should use natural antioxidants instead of chemical antioxidants because they are less harmful and has no side effects.

2.6 Can Edible Wild Plants Be Used as an Alternative Food Source?

Day by day a significant gap is increasing between human population growth and food availability. Moreover a number of people usually fed on cereal-based diet which ultimately led to nutrient deficiencies. Therefore it has been a great challenge to provide safe and healthy nutritional sources to forthcoming generations. Hence, to meet the food and nutritional demand of human population, the researchers emphasized to search some alternative food sources. An alternate food source must be healthy and accessible which must not include the conventional foods. In this regard

wild edible plants have been emerged as striking food alternate. Previously these plants have been using for ethnomedicinal and ethnobotanical purposes by indigenous people; however it can be served as potential food source. Utilization of wild edible plants as food sources is a chance to ensure the food security and reduce malnutrition problems [11]. This fact is supported that wild edible plants are substantial part of global food basket. These plants must be associated with indigenous knowledge of particular area and have stretched history of selection and utilization [13]. The associated advantage with these plants is that they are accessible from their native habitats, and local people have preknowledge about their indigenous use [14]. These plants are capable to fight against multiple health disorders, so that health status of undernourished population can be raised. The Food and Agricultural Organization reported that at least one billion people are thought to use wild food in their diet.

2.7 Steps to Find Wild Edible Plants

2.7.1 Locate Wild Edible Plants Habitat

Firstly you must remember about the climate of your living place. If your place is humid, then you probably find the wild edible plants in those places which are sunnier. This could be clear lands or edges around the crowded plantation. However if your living region is more dry, then possibly the wild edible plants grow near watery places.

2.7.2 Preknowledge About Wild Edible Plants

Before you go into fields to search for wild edible plants, you must have preknowledge about them. You must know which wild edible plants are found around your habitat, what their identification marks are, and which could be poisonous among them. Most importantly try to learn that information as much as you could because it will be worthwhile in field.

2.7.3 Always Take Initiative from Small Scale

After getting the preknowledge rather going directly in field, you must start with small land, because without having a pilot-scale experience, you will not succeed at larger scale. You can start with grasses because all grasses are edible. Their taste ranges from sweet to mild bitter. However if you can't eat them directly, you can take in juice form.



Field showing diversified grasses

2.7.4 Start Looking to Other Areas

Once you will be able to identify the wild edible plants around your land, you can go for other areas like parks, road sides, canal banks, etc. The following are some exemplary wild edible plants which you can probably find around these areas:

- *Taraxacum officinale* (dandelion)



For this plant you must be sure that it is without whitish sap at the base of flower petiole because that sap will give you a bitter flavor. The young leaves are present in the center. You can eat the entire plant but flower is the best one. You can eat it as boiled, and you can make it as tea as well which is good for refreshment.

- *Stellaria media* (chickweed)



You can eat the entire plant as raw because it has sweet and grass-like taste. If you are not happy to eat stems, you can pluck out leaves and flowers as well.

- *Oxalis corniculata* (wood sorrel)



This whole plant is excellent to eat as raw form. It has some sour acidic flavor which brings refreshing pleasure. It is usually seen with yellow flower, but some varieties have shown pink- or white-colored flowers as well. This plant is very common in every kind of land. However in eating this you must be cautious because it

contains oxalic acid. Although oxalic acid is very good for human health, high intake of oxalic acid could cause stomach problems.

2.7.5 Look for Berries



Many ornamental shrubs have berries and they are quite good for eating. For instance silver berry is very good in this regard. Its leaves show silvery appearance and its berries are juicy to eat.

2.7.6 Search for Berries on Trees

You can also find the berries on trees. Most wild cherries can be found in winters as well.



2.7.7 Search for Nuts Underneath the Trees

Fresh nuts are usually wet and more digestible with better flavor. Have you seen the oaks? There are so many acorns under the oak trees. The acorns will require less or no processing time if they are obtained from the oak tree with lobed leaves. Some

white oak acorns usually don't have the tannin. However once you start eating them, you will get used to it.



2.7.8 Look for Fruiting Trees

Look around the road sides, forest edges, and canal banks for fruiting trees. More commonly you will find the fruity trees at places which are sunnier because fruit needs sun to be ripened so they are hardly found in the middle of woody forest. You can find some wild apples, mulberries, hackberries, autumn olive, and so on.



Wild apples



Wild mulberries

2.7.9 Search Plant Near Water Bodies

Look around the water bodies and search for some plants like cattail, watercress, and bulrush. Cattail is usually found in stagnant water, but it can also be seen along streamsides. It can also outrage itself to the lakes and bays. Its shoot and pollen are both edible. The pollen is best considered for making flour, and it is one of the healthiest wild edible plants.



2.7.10 Be Aware of Poisonous Flowers

Flowers are usually sweet and rich in antioxidants, but sometimes, they could be poisonous as well. So before eating, make sure that it's not poisonous. Usually poisonous flower has strong base which could have bitter taste. For instance the flower of Azaleas is deadly poisonous.



2.7.11 Search for Vines

Wild grapes are more commonly found around the forest areas. The good thing about it is that not only its fruit but its leaves and tendrils are also edible.



2.7.12 *Look for Deciduous Leaves*

The deciduous leaves of sassafras, box elder, and sourwood are excellent raw food. Along with these, beech leaves are also preferably edible plant in young state. These leaves can be used as salads. Leaves of linden can be used as tortillas.



Sassafras



boxelder



Beech leaves

2.7.13 Conifer Leaves

The young conifer leaves with acidic flavor are delicious to eat and good for health. The small tender male cones are also edible, and its pollen is full of nutrition. Many pines also have the nuts, which fall in late summers.

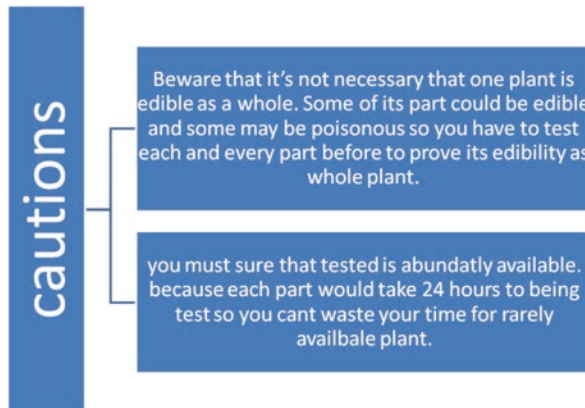


2.7.14 Test for Poison for Unknown Wild Edible Plants

If you are not hundred percent sure that you have found the right plant, still, DON'T rush to eat it. Some plants are too lethal; even in minor amounts, they can indeed harm you. There are general prescribed test for wild edible plants which are unknown to you.

- Test only single part at a time for any wild edible plant.
- Always separate out the plant's basic reproductive and vegetative part like root, stem, leaves, bud, and flowers.

- Smell for plant odor; either it has fruity, acidic, or irritating odor. However the plant odor can never directly indicate its edibility.
- Test for its poisonous action by putting it under the elbow or wrists for 15 min at least. If the plant is poisonous, it will start allergic reactions to your skin.
- During the test period, you should not eat or drink anything else except water and that under test plant part.
- Select the part which you like to eat and think about its preparatory method, whether you want to eat it raw, boiled, or mixed with any other food.
- Before taking in that plant part, put a pinch of it at the edge of your lips and test it for itching reactions.
- If for 3 min you feel no burning sensations on your lips, then roll in with your tongue and hold for 15 min there.
- If still you feel ok with it, start to chew it but do not dare to swallow. Just chew it for 15 min.
- If now for 15 min, you felt no burning or numbing reactions, you are allowed to swallow that.
- Now you have to check for a minimum of 8 h. During this 8 h, if you feel any kind of illness, you have to induce vomiting or take boiled water.
- If you will feel ok till 8 h now, take another doze of that plant part and monitor yourself for another 8 h. If you are still ok, then that plant part is proved to be edible.



Here are some keys to avoid the poisonous plants. Avoid that part or plant if having one of the following features:

- Milky or tarnished sap
- Beans, bulbs, or seeds in the pods
- Bitter or foamy flavor
- Spines, adequate hairs, or thorns
- Dill-, carrot-, parsnip-, or parsley-like foliage
- “Almond” aroma in woody parts and leaves
- Grain heads with spurs of pink, purplish, or black color
- Three-leaved growth pattern

These criteria are good and usually avoids your time to be wasted, but sometimes the plant is not that much poisonous even with that indicators. So by following these criteria, it is advantageous in narrowing your scope of search but at the same time has drawback to reduce the diversity of studied wild edible plants.

2.7.15 Collect Those Plants Which Are Abundant

Always try to collect and eat those plants which are abundantly available in wild. In other case developing an eating habit to less abundant plant will cause no benefit. However by doing this you can negatively affect its diversity status.

2.7.16 Avoid to Look Around Trashes

Never pick wild plants from the trash or polluted areas because they might be the store house of unknown dangerous chemicals. So beware in collecting them.

2.7.17 Washing Rule

Whenever you collect any wild edible plant, you must wash it thoroughly to avoid all the soil and airborne containments. It is very important for your health and safety.

2.8 General Preparatory Methods for Wild Edible Plants

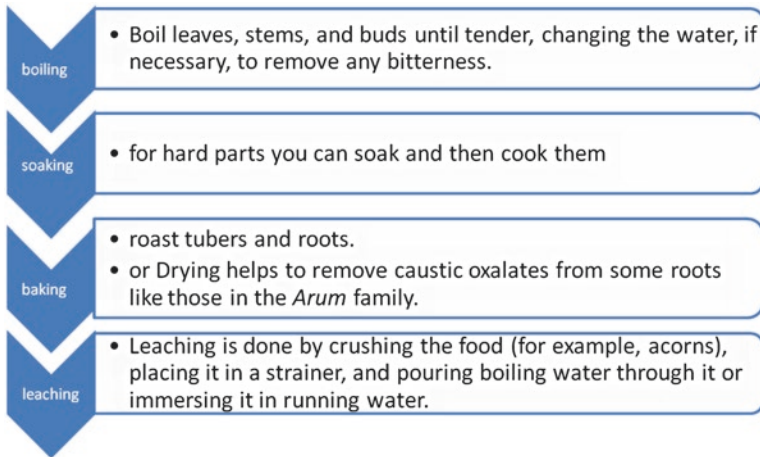
- **Raw**

Most of the wild edible plants can be eaten as raw. You can eat them as fruits or as salad.

- **Cooking**

You can also cook the plant or part of plant which is edible or palatable. Both these terms are interrelated because all palatable plants are edible, but all palatable plants do not necessary to be palatable. Because edibility only means that that particular plant or its part is fulfilling your energy demands, however palatability means that whether it is satisfying your taste buds or not. Wild edible plants more commonly satisfy the edibility criterion rather than palatability.

However through a number of methods, you can improve its tastes such as the following:



- To remove the bitterness of acorns, you can boil, bake, and leach them in water. Some nuts, like chestnuts, are good if raw, but their tastes improve if roasted.
- You can eat a number of grains and seeds in raw form until they mature. When they become hard or dry, you can boil or grind them into meal or flour.
- The sap from many trees contains sugar like maples, birches, walnuts, and sycamores. This sap could be boiled to make sweetening syrup.

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