

# A Brief Review of Underutilized Foods

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## Abstract

Present review article unveil the importance of underutilized foods. In this article, we have documented the uses of underutilized foods and summarized recent research into nutrient composition, health benefits and potentialities of underutilized foods. Underutilized plants with high nutritional and therapeutic potential and low input needs have been identified as a potential remedy for this concern. These foods are rich in carbohydrate, fat, protein, energy, vitamins, minerals & dietary fibers. They can be used as a cooling agent to lessen the adverse effects of strokes and treat a variety of illnesses, including scurvy, constipation, haemorrhage, leucorrhoea, anemia, stomach discomfort and others. Additionally, value added product preparation through processing has the potential to generate employment.

**Keywords:** Underutilized Foods, Health Benefits, Therapeutic Potential and Value Addition

## Introduction

Underutilized crops that are neither farmed commercially nor traded widely over the world. These crops are less well-known plant species in terms of research and marketing, yet it can be demonstrated that they adapt well to harsh and stressful environments. Though, 40-100,000 plant species have been frequently used over the years as food, fiber, shelter and for commercial, cultural and medicinal purposes, only a small number of plants are widely used as food sources world wide (Magbagbeola *et al.*, 2010). Despite the fact that only a few plant species are vitally necessary for both the security of the world's food supply and the economic growth of rural populations, the remaining plant variety is still seen as underutilized. Underutilized edible plants are those that are minor, neglected, local, orphan and promising species that are used as food, fodder and pharmaceuticals. However, their importance and utilization have dramatically declined due to their restricted availability, short shelf life, unknown nutritional benefits, low levels of consumer understanding and adverse reputations as "famine food" or "poor people's food." (Williams *et al.*, 2002). Underutilized crops, often referred to as underused crops, are frequently referred to as "new crops," not because they are "new," but rather because commercial enterprises and researchers have chosen them for a new market. Although the fact that they can be grown on poor marginal lands with lower management costs, they are nevertheless neglected due to a lack of awareness and the popularization of relevant technologies. In addition to the medicinal and

nutritional value of arid food crops, these underutilized crops have multipurpose uses, such as ornamental, avenue tree, root stocks, bio-fencing, windbreak/shelter tree, furniture, screening in backyard gardening, forest restoration and as social and economic plants (Reddy *et al.*, 2019).

### Underutilized foods in Rajasthan

Underutilized foods cultivated in Rajasthan often serve a wide range of crucial purposes especially in isolated and traditional communities. The foods which are neither grown commercially on a large scale nor traded widely are known as underutilized foods. These are easier to grow even under adverse soil and climatic conditions. Underutilized foods are rich in carbohydrate, fat, protein, energy, vitamins, minerals & dietary fibers. So, they can provide nutrition by meeting the nutrient requirement. Meghwal and Singh (2016) reported that there are around 30 plant species in arid zone such as *ker*, *lasora*, *sangri*, *ber*, *pilu*, *phalsa*, *bael*, *karonda*, fig, *kachri*, *mateera*, *phoot kakdi*, *phog*, *kheep* etc. known for their special features like deep tap root system, leaf shedding in summer, water binding mechanism, tolerance capacity to salinity and alkalinity and synchronization of flowering and fruiting during rainy season or at maximum water availability. Recently, Meghwal *et al.* (2022) identified the germplasm collection, evaluation, conservation, ethnomedicinal values, improvement, propagation, agrotechniques, post-harvest management, value addition and future prospects of certain species of *ker*, *lasora*, *jhar ber*, *bordi*, *pilu*, *khejri*, *phalsa*, bengal quince, *karonda*, prickly pear and snap melon *etc.* These plant species are drought hardy plants with fewer incidences of pests and diseases yet give good yield despite environmental constraints. Being a rich source of vitamins, minerals, dietary fibre and bioactive compounds they play a major role in supporting the nutritional status of rural people.

### Nutrient composition

#### Proximate

Proximate analysis of *ber* as investigated by Pareek, (2013) was recorded as moisture (81.6-83%), protein (0.8g), fat (0.07g), fiber (0.16g), carbohydrate (17g) and total ash (0.3-0.59%). The recent values regarding the proximate composition by Hasan *et al.* (2022) showed that *ber* contained a significant amount of carbohydrate (76.10–77.3%), protein (4.23–5.00%), fat (1.35–2.33%), ash (3.08–3.28%) and fiber (5.66–7.35%).

In *ker*, the moisture, protein, carbohydrate, fiber, ash and fat content of fresh pulp was determined as 63-75, 11.88-20.4, 68.16-78.22, 7.6-16.5, 5.3-6.8 and 3.2-7.9 per cent of its total weight (Kumar *et al.*, 2013). The results of analysis by Ayat (2018) also showed that the fruits contain total ash (6.34±0.06%), moisture (5.18±0.01%), total oil percentage (6.02±0.02%), crude fiber (6.19±0.5%), crude protein (14.32±0.2%), total carbohydrates (61.95±0.03%) and total sugar (0.42±0.1%).

Proximate analysis of *prosopis cineraria* (*sangri*) determined by Chandra and Mali (2014) revealed the presence of crude protein, crude fiber, ash, and total carbohydrates as 15.8, 19.5, 8.2 and 72.6 per cent of dry matter basis, respectively. Similarly, the major chemical compounds seen in *sangri* are (18%) protein (18%), fat (2%), crude fiber (26%), total carbohydrates (56%), and ash (4%) as determined by Vyas *et al.* (2020).

Aloe vera has a long history as a medicinal plant with diverse therapeutic applications. Many of the health benefits associated with aloe vera have been attributed due to the presence of protein, carbohydrate, fat etc. in the gel of the leaves. Proximate analysis of the aloe vera leaves revealed fat (1.83%), protein (10.50%), ash (19.50%), carbohydrate (56.27%) and energy (290.08 kcal) (Haque *et*

*al.*, 2014). Another study also revealed the presence of proximate matters such as moisture (6.8%), ash (3.66%), crude fat (4.86%), crude fiber (12.33%) and crude protein (0.95%) in aloe vera on dry weight basis (Waris *et al.*, 2018).

Rambabu *et al.* (2020) revealed that the date fruits contain moisture, protein, lipid and ash content in the ranges of 14.8–20.5 per cent, 2.19–3.12 per cent, 0.25–0.51 per cent, and 1.37–1.97 per cent, respectively. In accordance with the findings another investigation reported by Pasha *et al.* (2022) analyzed in date palm (*Pheonix dactylifera*). Proximate composition (% of dry weight) revealed the content of moisture (13.3%), ash (7.33%), crude fat (1.6%), crude fiber (78.3%) and crude protein (1.55%).

*Citrullus colocynthis* (Tumba) is an herbaceous plant containing an abundance of nutrients that play a key role in the improvement of well being. Shahid *et al.* (2019) reviewed that the proximate analysis of various parts *viz* seeds, leaves, whole fruit and roots of *Citrullus colocynthis* and found their nutrient contents, which are ash (4.02%- 6.02%), fats (18.90%-24.23%), moisture (5.12%-9.01%), fiber (5.24%-10.23%), carbohydrates (15.89%-23.12%) and protein (12.64%-19.03%). It has gained importance in society, due to immense nutritional properties.

### Mineral and vitamins

The vitamin and mineral content of *ber* (*Ziziphus mauritiana*) helps to support cardiovascular health and enhance metabolism. High content of vitamin C was also evident in a study conducted by Hasan *et al.* (2022) where the value was ranging from 63-96mg/100g. The study also analyzed the presence of other minerals such as calcium (334-400mg/100g), magnesium (11-16.1mg/100g), potassium (208-250mg/100g), sodium (83.2-104.2mg/100g) and iron (161-261mg/100g).

Iqbal *et al.* (2014) appraises the minerals profile of fruit of *ker* Sodium (60.08-120.32mg/100g), potassium (140.21-480.36mg/100g), calcium (15.20-35.10mg/100g), manganese (0.10-0.12mg/100g), copper (0.90-2.10mg/100g), iron (12.30-17.32mg/100g), zinc (0.17-0.23mg/100g) and phosphorous (701-807mg/100g). Similarly, Alrasheid *et al.* (2018) also reported the mineral content of *ker* i.e. iron (81.8 mg/100g), sodium (26.9 mg/100g), potassium (2969.6 mg/100g), calcium (14.1 mg/100g) and manganese was not detected but it might be found in trace undetectable amounts. Generally, proximate compositions revealed that *ker* fruits have better nutritional value as food and livestock feed stuff.

Subsequently, Kulkarni *et al.* (2019) assessed calcium 0.05g/100g, phosphorus 0.02g/100g and iron 1.5mg /100g content in *amla*. It is one of the richest natural sources of vitamin C (600 mg/100g) and plays a vital role in preventing innumerable health disorders. The amount of nicotinic acid is 0.2 mg /100 g in Indian gooseberry. According to Gul *et al.* (2022) the mineral content such as iron, calcium and phosphorous (2.0–4.5, 2.1–3.1 and 0.2–0.6g/100g DW) respectively. Another important component found in *amla* fruit is ascorbic acid (193 and 720 mg/100 g).

Dghaim *et al.* (2021) studied the mineral content of date varieties. In dates particularly, potassium was the highest with concentrations in the range 6306.95–8293.69 mg/kg, followed by phosphorus (611.60–852.03mg/kg), calcium (571.95–766.00mg/kg), magnesium (496.55–717.26mg/kg), sodium (207.29–429.98mg/kg), boron (6.32–12.84mg/kg), iron (4.71–10.17mg/kg), zinc (4.73–5.15mg/kg), manganese (2.39–5.07mg/kg) and copper (1.07–3.59mg/kg). Another similar observation by

The mineral content of aloe vera leaves determined by Kamble *et al.* (2022) noted the presence of macro mineral concentration like phosphorus (213.53±1.53), potassium (214.53±9.11), magnesium

(202.15±1.70), sodium (115.18±5.81) and calcium (90.61±1.43) parts per million which have been found in a high concentration in aloe vera gel. The concentration of other micro minerals Mn, Fe, Co, Ni, Cu, Zn and Mo was found 8.23±0.32, 36.73±0.21, 0.09±0.04, 1.54±0.09, 4.51±0.25, 3.78±0.09, 0.58±0.73 ppm respectively.

### Health benefits

Dhawan *et al.* (2013) concluded that the *sangri* pods are consumed like a vegetable. In addition to curing leprosy, dysentery, bronchitis, asthma, leucoderma, piles and muscle spasms, *sangri* also functions as a tonic, anthelmintic and cooling agent. Subsequently India's native herb, *photo kakdi*, is eaten like a vegetable. It possesses a number of fruit-related characteristics that are both naturally occurring and widely grown around the world for the purpose of producing fruit (Sabanadzovic *et al.*, 2016). It has been used in the treatment of ulcers, bronchitis, eye infection and fever, due to the presence of active phytoconstituents (Srivastava *et al.*, 2017). Furthermore, *Aonla* has a variety of positive properties, including ophthalmic, digestive, stomachic, laxative, dyspepsia, aphrodisiac, rejuvenative, diuretic, antipyretic and tonic. *Aonla* is said to have antioxidant, anti-inflammatory, analgesic, antipyretic and restorative characteristics in addition to hepato, cardiac, nephro and neuroprotective benefits (Diwan *et al.*, 2018). Similarly, *ker* has found significant traditional medicinal applications including antirheumatic, analgesic, anthelmintic, laxative, renal disinfectant, diuretic, cough, diarrhea, dysentery, cholera, cardiovascular ailments as well as gastrointestinal disorders. Numerous pharmacological properties of the plant, including as antidiabetic, antibacterial, antifungal, anti-aging, anticancer, hepatoprotective, antioxidant, antiatherosclerotic, anti-giardial, antihypertensive, hypolipidemic and anti-inflammatory properties. Rheumatism and gout overcome using *ker* by the local communities (Singh, 2019). However the *kachri* fruit is said to have compounds that aid in the treatment of kidney stones and other urinary-related problems. It has the ability to improve bowel movements and relieve constipation, but it has anti-inflammatory properties and analgesic value. As a result, it relieves stomach discomfort. It cures earaches, bedsores, prickly heat, and other disorders (Abhi, 2020). According to Hameed *et al.* (2020) *tumba* can be used to treat bacterial infections of the lungs, skin, diabetes, constipation, oedema and cancer. Another investigation done by Lum *et al.*, (2019) asserts that reductions in body weight, body mass index (BMI), and blood pressure can be achieved through daily consumption of watermelon, which also improves some factors associated with overweight and obesity. Additionally date fruits have historically been used to treat a variety of health issues, including diabetes, hypertension, bronchitis, digestive ailments and fever (Qadir *et al.*, 2020). *Ber* is one of the unique plants that have a number of therapeutic uses. All parts, including leaves, seeds and fruits, have medicinal potential, according to ancient literature. *Ber* is known for its powerful healing powers due to a variety of derived metabolites, including terpenes, flavonoids and alkaloids (Naaz *et al.*, 2020).

### Potentialities

*Aonla* is a very important ingredient in the *Chyavanprash*, and a constituent of *Triphala* (Boora and Bons, 2015). Bala *et al.*, (2015) studied on *chyanprash* bar having incorporation of various ingredients like skim milk powder, broken biscuit powder and chocolate powder to provide proper texture to the bar. The optimum amount for these ingredients found were 1.481g/ g of sample biscuit powder, milk powder 0.792g/ g of sample and chocolate powder 0.333 g/ g of sample. Devra *et al.* (2017) prepared a six levels of recipe, three blending ratio, 9 treatments with ginger juice (2%) and 9

treatment without ginger juice {*aonla*: lime (25:75, 50:50 and 75:25), *aonla*:orange (25:75, 50:50 and 75:25), *aonla*: pomegranate (25:75, 50:50 and 75:25) with ginger juice *aonla*: lime: ginger (25:73:2,50:48:2 and 75:23:2), *aonla*: orange: ginger (25:73:2, 50:48:2 and 75:23:2), *aonla*: pomegranate: ginger (25:73:2, 50:48:2 and 75:23:2) and one control (100% *aonla* juice)+ acidity (0.3%)+TSS (10%)}, thus total 19 treatment combination were laid out under CRD statics design with three replication. However, maximum retention of ascorbic acid was recorded in T17 (44.50mg/100ml) treatment and minimum acidity in T18 (0.34%) followed by T17 (0.39%) treatment. The relative economics of treatment T17 gave the highest net return (Rs 36.95/lit) RTS as compared to other treatments.

Subsequently Ibrahim *et al.*, (2021) evaluate the possibilities for using date fruit from in the formulation of a novel snack bar while replacing the used honey with date paste. The technological, textural, microbiological and sensory qualities of the obtained food products were evaluated during storage for 12 days after their production. Date palm fruit in the form of date paste was used as an ingredient in the composition of the new snack bars that also included nuts and dried fruits. Five formulations were prepared: a control bar, snack bar with 40 per cent date paste, snack bar with 50 per cent date paste, snack bar with 60 per cent date paste, and snack bar with 70 per cent dates paste. The resulting date paste's textural characteristics supported the bonding potential of the food system and gave a sweet taste to the final product. The formulations containing 50 per cent date paste presented the highest overall acceptability and were the formulation with the best sensory characteristics. Thus, the addition of date paste in snack bars would be a good option to develop a functional product that contributes to rational nutrition principles.

*Ber* fruits used to make a refreshing drink. In India, the berries are collected, when fully ripe, in the beginning of the November months. The dried fruits are grinded and the powder is sieved. The sieved powder consumed after meal as mouth freshener which is very rich in sugar and ascorbic acid (Meghwal and Singh, 2016). In rural areas, fruits are also used to making pickles and *chutney*. Dala *et al.*, (2019) prepared products like jam, candy, preserve, powder, *murabba*, beverages, wine, pickle etc. from *ber*. Apart from this *ber* is also used in traditional medicinal systems in India and other countries.

The mature fruits of *kachri*, a drought resistant cucurbitaceous vegetable found growing abundantly in rainy season in Rajasthan are usually cooked with various vegetable preparations. One teaspoonful of seeds has cooling action especially in bilious disorders (Kumar *et al.*, 2008). It is one of the components of the delicious vegetable "*panchkuta*". Fruits are dried, grounded and mixed with other species to make spice premixes and mouth fresheners (Goyal and Sharma, 2009).

Aloe vera gel can be used as natural preservative and flavoring agent in some foods (Christaki and Florou 2010). According to Mudgil *et al.* (2016), butter milk prepared with fortification of 10 per cent aloe vera juice give highest sensory acceptability. Kumar (2019) concluded that infused aloe vera with various other nutrients to enhance the nutritive quality of the food product such as jelly, dessert, fruit juices, curd etc.

Tahimna *et al.* (2020) developed a probiotic beverage using *chhana* whey and watermelon juice. The blends of whey and watermelon juice were optimized based on physicochemical and sensory evaluation. The bacterial culture was used as per 1 per cent *Lactobacillus acidophilus* NIAI L-54 as a probiotic culture. The 75:25 blend of whey and watermelon fermented for 5 h at 37°C obtained the highest sensory scores for overall acceptability. The shelf-life of the selected blend examined using titratable acidity, pH, microbiological analysis as well as sensory evaluation revealed that probiotic beverages can

be preserved for 21 days in refrigerated conditions (4°C) with higher acceptability along with probiotic bacterial count 4.00 Log<sub>10</sub>CFU/mL. It could be concluded that the whey based watermelon beverage enabled by-product utilization with excellent nutritional and functional value.

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