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Survey of some underutilized edible plants in outskirts areas of Chandigarh

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ABSTRACT: In order to feed the burgeoning world population, new sources of food are being explored. Of these, one of the options is to utilize food from the underutilized edible plants that may provide nutrient rich food in the near future. However, these plants lack potential market value owing to their less preference over the cultivated foods. As a consequence, many of such plants are fast becoming rare or endangered. The need of the hour is to conduct site specific studies to determine their current status and to divert the attention of people to conserve them. A survey based study was thus conducted to find out the number of underutilized plants available in the outskirts of Chandigarh and to highlight their edible uses. The plants under this category were selected on the basis of their edible value in the form of fruits, leaves, buds and flowers. The study was conducted in the rural areas around Chandigarh during the years 2013-2014. During the survey, 27 different plants belonging to 19 families were identified and documented. Majority of the underutilized plants were trees, followed by shrubs and herbs. The most common edible part was fruit, besides leaf, bud, flower and even petal. The most common underutilized plants identified on the basis of the survey were *Annona squamosa, Carrisa carandas, Cordia dichotoma, Moringa oleifera, Schleichera oleosa and Zizyphus mauritiana*. The most common way of consumption of these plants was direct consumption.

Key words: Underutilized plants, Edible plants, Inventory, Mode of consumption

INTRODUCTION

Human survivorship is one of the biggest challenges for mankind due to food and nutritional scarcity especially in the developing countries. Although as many as 7000 plants have been cultivated for food yet humans rely greatly on only a few species (Rehm and Espig, 1991; Wilson, 1992; FAO, 2012). Nearly 50% of the food requirement is fulfilled just by three crops *viz. Triticum aestivum* L. (wheat), *Zea mays* L. (maize) and *Oryza sativa* L. (rice) worldwise. Several edible plants thus remain neglected though they possess good potential to serve as a food. Such plants are referred to as underutilized or neglected plants (Padulosi *et al*., 2002; Kuhnlein *et al*., 2009). The over-dependence of man on a few species has led to the crop homogenization which is detrimental to ecosystem stability. Of late, it is being realized that underutilized or neglected plants can serve as useful healthy source of food for people as the currently available crop plants are unable to fulfill the ever increasing food demand and also not safe for human consumption as these may be contaminated with residues of pesticides.

The underutilized plants thus are currently gaining attention of the scientists as the source of healthy food for future.

Different criteria are used to define underutilized plants – a) those with limited representation at national and international level; b) those which are less known to the people and c) those with limited use compared to their potential (Gruère *et al*., 2006). If scientifically utilized or managed, underutilized plants may provide food security, improve nutritional status and help generating income to the poor people (Jaenicke *et al*., 2006). Some studies have also shown that underutilized plants are well adapted to different environmental conditions and can withstand biotic and abiotic stresses (Hammer *et al*., 2001; Mitra, 2001). Additionally, a number of underutilized plants especially the edible ones are also used for medicinal purposes. Some recent studies have shown that these can also serve as rich source of antioxidants and thus may provide health benefits to the people (Ikram *et al*., 2009; Mahajan and Chopra, 2009). Despite the multiple uses of underutilized plants, their potential has not been utilized much.

It is, thus important to evaluate their potential use for food and medicines. However, this can be achieved only if we know their status in a given area, making local inventories and exploring their utilities. A site specific survey was therefore undertaken around the modern city of Chandigarh with a view to making an inventory of underutilized plants and generating more biological and ecological information for the people. Chandigarh was selected as study site because there is lack of information regarding the underutilized plants being used by the rural people.

MATERIALS AND METHOD

A. Study site

The proposed study was carried out in the outskirts (adjacent villages) of Chandigarh (76° 47' 14E longitude; 30° 44' 14N latitude; 304-365 meters altitude from mean sea level). Chandigarh is located in the foothills of the Shivalik range of the Himalayas in northwest India and covers an area of approximately 114 km^2. It has a humid subtropical climate characterized by a seasonal rhythm: very hot summers, mild winters, unreliable rainfall and great variation in temperature (−1 °C to 46 °C).

B. Methodology

A survey of the different sites around Chandigarh was made in a systematic manner during the years 2013-2014. For this, ten sites were selected and the data on underutilized edible plants were collected through general conversations with the informants having age of 30 to 65 years. The information collected was with regards to their local names, part used, flowering time, medicinal uses and edible part used. During the field survey, samples of underutilized plants were also collected and identified using relevant literature as well as with the help of herbarium from Panjab University, Chandigarh, India.

RESULTS AND DISCUSSION

The present study documented 27 species of underutilized plants used by the local people for edible purpose. These belonged to 19 families (Table 1). Among the documented families, Moraceae was the most represented (with 4 taxa) followed by Fabaceae (with 3 taxa). The families Solanaceae, Cucurbitaceae and Oxalidaceae were represented by 2 species each whereas the rest of the families by single taxa each (Table 1).

Table 1: Different families of the underutilized plants along with number of taxa located from the outskirts of Chandigarh.

Family name	Number of taxa	Plant species	Habitat
Annonaceae	1	*Annona squamosa* L.	Forest area
Apocynaceae	1	*Carissa carandas* L.	Road side and Forest area
Bombacaceae	1	*Bombax ceiba* L.	Forest area
Boraginaceae	1	*Cordia dichotoma* G.Forst.	Forest area
Chenopodiacae	1	*Chenopodium album* L.	Wasteland
Cucurbitaceae	2	*Coccinia grandis* (L.) Voigt *Momordica charantia* L.	Wasteland Wasteland
Dilleneaceae	1	*Dillenia indica* L.	Forest area
Fabaceae	3	*Bauhinia variegata* L., *Medicago sativa* *Tamarindus indica* L.	Forest area and wasteland Forest area
Malvaceae	1	*Grewia asiatica* L.	Forest area
Moraceae	4	*Artocarpus lakoocha* Lam. *Artocarpus heterophyllus* Buch. - Ham *Ficus racemosa* L. *Morus nigra* L.	Forest area Forest area Forest area Forest area
Moringaceae	1	*Moringa oleifera* Lam.	Forest area
Myrtaceae	1	*Syzygium cumini* (L.) Skeels.	Wasteland
Oxalidaceae	2	*Averrhoa carambola* L. *Oxalis corniculata* L.	Forest area Wasteland
Phyllanthaceae	1	*Phyllanthus emblica* L.	Open areas
Rhamnaceae	1	*Ziziphus mauritiana* Lam.	Road side
Rutaceae	1	*Aegle marmelos* (L.) Correa	Forest area
Sapindaceae	1	*Schleichera oleosa* (Lour.) Merr.	Forest area and Road side
Sapotaceae	1	*Madhuca longifolia* (J.Konig) J.F.Macb	Forest area
Solanaceae	2	*Physalis minima* L. *Solanum nigrum* L.	Wasteland

The underutilized edible plants belonged to different life forms and as per our survey ~ 67% were trees, 15% herbs, 11% shrubs and 7.4% climbers (Fig.1). These plants grew in a variety of habitats such as forest area, open grasslands, fields and wastelands (Table 1). Further analysis revealed that different parts such as fruits, leaves, buds, petals or flowers of the underutilized plants are utilized (Table 2). The most common plant part used for this purpose was fruit (68%) followed by leaf (11%), bud (9%), flower (9%) and petal (3%) (Fig. 2).

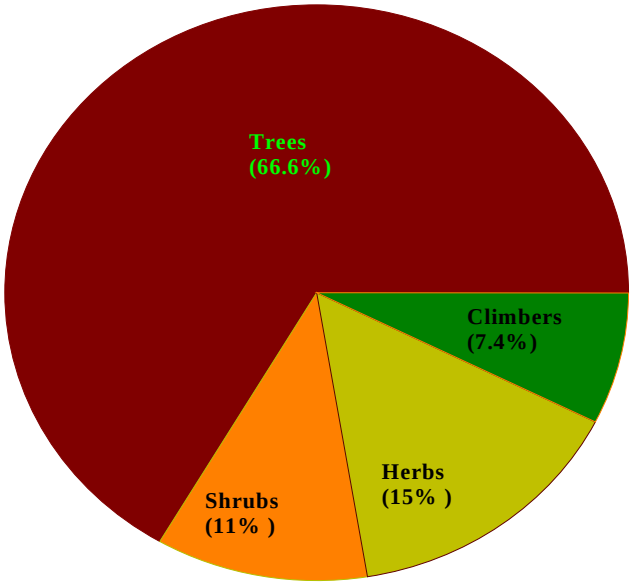


Fig. 1. Different life forms of underutilized plants collected from the outskirts of Chandigarh.

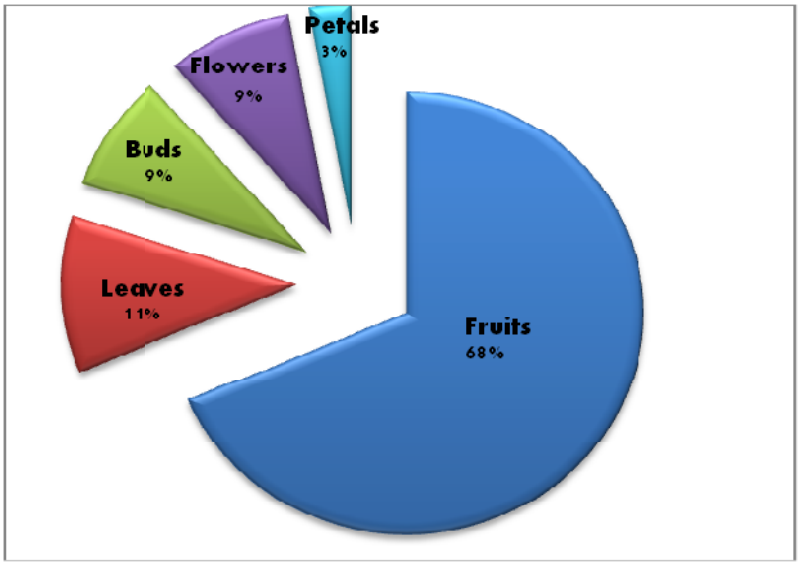


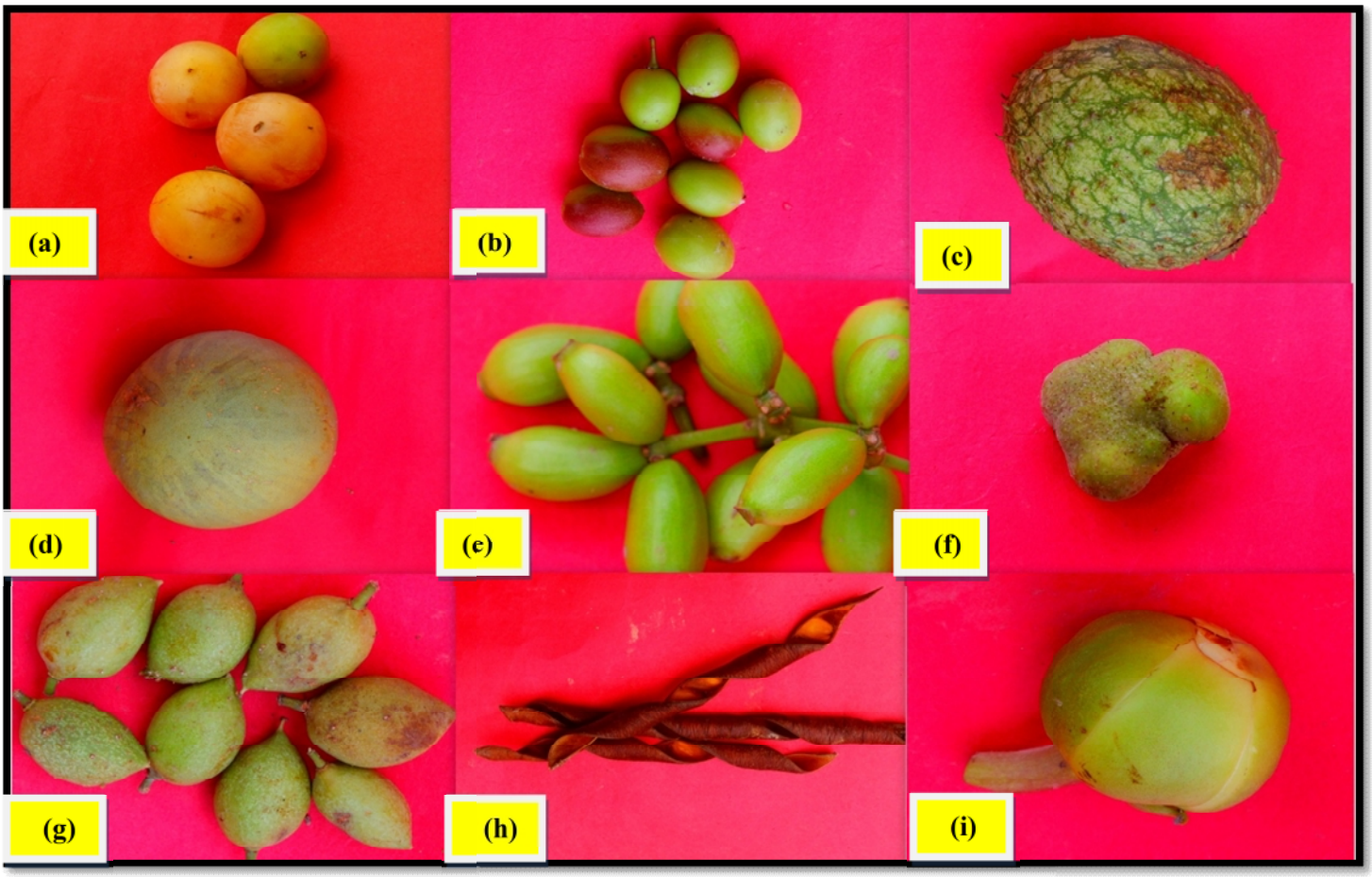
Fig. 2. Parts of underutilized plants possessing edible value for rural people.

These parts were either consumed directly or as vegetable, pickle, jam or chutney etc. (Table 2). Our studies revealed that there is good diversity of edible underutilized plants in the villages around Chandigarh, though these are hardly used.

Table 2: List of underutilized plants classified on the base of their utilization.

Plant name	Part used	Mode of consumption
Aegle marmelos	Fruit	Direct consumption
Annona squamosa	Fruit	Direct consumption
Artocarpus heterophyllus	Fruit	Direct consumption
Artocarpus lakoocha	Fruit	Direct consumption
Averrhoa carambola	Fruit	Direct consumption
Bauhinia variegata	Bud and flower	Used as vegetable
Bombax ceiba	Petals	Used as vegetable
Carissa carandas	Fruit	In the form of pickle
Chenopodium album	Leaves	Used as vegetable
Coccinia grandis	Fruit	Used as vegetable
Cordia dichotoma	Fruit	In the form of pickle
Dillenia indica	Fruit	In the form of jam, Jelly and chutney
Ficus racemosa	Fruit	Used as vegetable
Grewia asiatica	Fruit	Direct consumption
Madhuca longifolia	Bud and flower	Used as vegetable
Medicago sativa	Leaves	Used as vegetable
Momordica charantia	Fruit	Used as vegetable
Moringa oleifera	Buds, fruit, leaves and flower	Used as vegetable
Morus nigra	Fruit	Direct consumption
Oxalis corniculata	Leaves	Used as vegetable
Phyllanthus emblica	Fruit	Direct consumption
Physalis minima	Fruit	Direct consumption
Schleichera oleosa	Fruit	Direct consumption
Solanum nigrum	Fruit	Direct consumption
Syzygium cumini	Fruit	Direct consumption
Tamarindus indica L.	Fruit	Direct consumption
Ziziphus mauritiana	Fruit	Direct consumption

Generally people, even in the villages, do not prefer to eat underutilized plants despite the fact that these can serve as good source of vitamins such as (ascorbic acid (C), carotenoids (A), thiamine (B1), riboflavin (B2), niacin (B3), pyridoxine (B6), and folacin) minerals, fat, protein, and dietary fiber (Quebedeaux and Bliss, 1988; Quebedeaux and Eisa, 1990; Craig and Beck, 1999; Wargovich, 2000). Other important nutrients supplied by the fruits and vegetables include riboflavin (B2), zinc, calcium, potassium, and phosphorus (Quebedeaux and Eisa, 1990). Naylor *et al*. (2004) pointed that underutilized plant species could be used as a good source to combat the deficiency of micronutrients among the rural people. Guarino (1997) reported that the consumption of traditional leafy vegetables is known to be rich sources of micronutrients, essential vitamins and minerals for the poor people. The immature or fleshy calyx and flowers of *Bombax ceiba* are consumed as vegetable in Uttar Pradesh (Jain, 1996). In Australia, the tap roots of the young plants of *B. ceiba* are used as food (Brock, 2001). Different parts of the underutilized plants are used for the treatment of various ailments / disorders like fever, cold, cough, asthma, abdominal pains, blood pressure, and liver related problems. The leaves and fruits of *Moringa oleifera* possess anti-inflammatory and anti-ulcer activity (Guevara *et al*., 1999). Likewise, *Cyperus esculentus* is an underutilized plant which is effective in the treatment of spleen, liver and stomach related disorders (Jing *et al*., 2012). The fruits of *Averrhoa carambola* are used to cure mouth ulcers, toothache, nausea, diarrhoea, ascites etc (Shui and Leong, 2006). Thus, it is clear from the available literature as well as from our studies that underutilized plants are good bioresource that can be utilized properly.



Images from (a – i) shows the fruit part of following underutilized plants: (a) *Cordia dichotoma* (b) *Carissa carandas* (c) *Annona squamosa* (d) *Aegle marmelos* (e) *Syzygium cumini* (f) *Artocarpus lokoocha* (g) *Schleichera oleosa* (h) *Bauhinia variegata* (i) *Dillenia indica*

CONCLUSION

The present study concludes that area around Chandigarh have good diversity of underutilized plants that can serve as good source of food. There is thus an urgent need to fully harvest their properties for the benefit of the mankind.

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