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Leafy vegetables in Rangpur city corporation area of Bangladesh focusing on potential medicinal values

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Abstract

Leafy vegetables were conducted in the Rangpur city corporation of Bangladesh from October 2019 to December 2021. There were 44 species identified, divided into 33 genera and 20 families. Out of the recorded species, 69.44% were herbs followed by climbers (18.18%), shrubs (11.11%) and trees (2.27%) respectively. In the research area, wild species made up 34.09% of the total, while cultivated species made up 65.91%. The current investigation revealed that traditional knowledge about the use of wild vegetables is in urgent need of documentation as part of intangible cultural heritage. To meet the dietary demands of Rangpur city corporation residents, the use and cultivation of these leafy vegetables should be encouraged. The study can provide baseline data that can be used to prioritize conservation efforts through resource management that is both sustainable and environmentally friendly. In Rangpur City Corporation, major medicinal leafy vegetables were carried out. Thirty seven (37) therapeutic plants have been identified, with their usefulness for the treatment of over 40 ailments were recorded. The current study found that medicinal plants continue to play a significant role in rural communities. The information acquired from local traditional healers will be beneficial for further ethnobotany, taxonomy, and drug development studies using natural resources.

Keywords: Leafy vegetables; Medicinal values; Drug discovery; Rangpur; Bangladesh

1. Introduction

Vegetables are the leaves of any plant that is used as a vegetable, which may or may not be accompanied by sensitive petioles and stems. They make up a large component of our diet and help to prevent malnutrition. In the decade 2010-12, the FAO projected that about 870 million people were chronically undernourished, accounting for 12.5 percent of the global population, or one in every eight individuals. To address the under nutrition problem, great emphasis has been placed on the exploitation and use of uncommon plant resources for food [99]. Indigenous vegetables are best characterized as species that are locally essential for the economic, nutritional, and health of humans, as well as social systems. Many studies have revealed that fresh veggies contribute significant functional food components such as vitamins, iron, folic acid, minerals, physiologically active chemicals, and photosynthetic pigments throughout the last decade. Antioxidants found in vegetables protect against a variety of chronic diseases, including heart disease and certain cancers [102].

Leafy vegetables, often known as pot herbs, greens, or leafy greens, are vegetable-like plants with sensitive petioles and stems. Despite the fact that they come from a wide range of plants, their nutrients and preparation procedures are remarkably similar to those of other leaf vegetables. Plants with edible leaves are found in about a thousand different species. Short-lived herbaceous plants like lettuce and spinach are commonly used to make leafy vegetables. *Adansonia*, *Aralia*, *Moringa*, *Morus*, and *Toona* are among the woody plants whose leaves can be consumed as leafy vegetables. Humans can consume the leaves of numerous fodder plants, but only in times of hunger. Alfalfa, clover, and the vast

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majority of grasses, including wheat and barley, are examples. These plants are frequently far more prolific than more traditional green vegetables, but because of their high fiber content, getting the most out of their nutritious benefits is tough. Further processing, such as drying and grinding into dust or pulping and pressing for juice, might be used to address this challenge. Leafy vegetables are often low in calories, fat, protein per calorie, nutritional fiber, and cultivated African food plants [102].

People in Bangladesh have a long history of eating green vegetables. However despite the fact that leafy vegetables make up a substantial part of the daily diet of Bangladesh's rural population, little research has been done on them [5], [96], [98], [100], [101], [37], [70] and [74]. Despite the importance of leafy vegetables in modern human life, no major systematic attempt to identify and document plant species has been done in Bangladesh. Similar medicinal plants studies in Bangladesh have been carried out by [2], [6-53], [54-83] and [88-95]. The objectives of the current research are to identify and uses of medicinal leafy vegetables in the Rangpur city corporation area of Bangladesh.

2. Material and methods

2.1. Study area

Rangpur City Corporation is located in the Rangpur division, Northern region of the country. It has a total area of 205.7 square Kilometres. The study area was conducted at Rangpur City Corporation. The study area is bounded by Mithapukur, Rangpur, Mirzapur, Kafrikhal, Latifpur, Ranipukur, Khoragachh, Mayenpur, Haridebpur and Darshana. The types of land in this study area include fallow land, cultivated land, grazing and non-grazing land. For this reason various kinds of leafy vegetables are present in the study area [4].

2.2. Methodology

The work is based on fresh materials collected during nineteen visits to Rangpur city corporation, Bangladesh from October 2019 to December 2021 to cover the seasonal variations. There were 44 species identified, divided into 33 genera and 20 families. The visits covered all types of habitats, particular river bank, slope, village grove, fruit gardens and roadsides of the study area. Medicinal information was obtained through semi-structured interviews with knowledgeable people such as local Kabiraj and elderly people. A total of 117 informants having an age range 21-76 years were interviewed using semi-structured interviewed method [3]. Plant parts with either flower or fruits collected using traditional herbarium techniques to make voucher specimens for documentation and voucher specimens have been preserved at Herbarium of Rajshahi University.

2.3. Plant identification

Collected specimens have been critically examined, studied and identified. Identifications have been confirmed by consulting standard literatures [84], [87] and [1]. Nomenclature has been updated following recent literature [1], [85] and [86].

3. Results

A leafy vegetable was conducted in the Rangpur City Corporation of Bangladesh from October 2019 to December 2021. There were 44 species identified, divided into 33 genera and 20 families (Table 1). Six Amaranthaceae species, five Araceae species, Brassicaceae species, Cucurbitaceae species, two Apiaceae species, Asteraceae, Convolvulaceae, Liliaceae, Marsileaceae, Solanaceae, Tiliaceae species, and one Athyriaceae, Basellaceae, Chenopodiaceae, Euphorbiaceae, Malvaceae, Meliaceae, Meliaceae, Meliaceae, Moringaceae, Nyctaginaceae, Rubiaceae, are among the leafy vegetables. (Figure 2) Herbs (69.44%) were the most common life form, followed by climbers (18.18%), shrubs (11.11%) and trees (2.27%). In the research area, (Figure 3) wild species made up 34.09% of the total, while cultivated species made up 65.91%. Out of these wild and cultivated leafy vegetables (Figure 4) 88.63% species were used as leafy vegetables, (20.45%) species fruit, (6.81%) species seed, (4.54%) species bulb, (6.81%) species flower, (2.27%) species frond, (2.27%) species corm, (2.27%) petiole and (15.90%) species as a whole plant. The current investigation revealed that traditional knowledge about the use of wild vegetables is in urgent need of documentation as part of intangible cultural heritage. To meet the dietary demands of Rangpur city corporation residents, the use and cultivation of these leafy vegetables should be encouraged. The study can provide baseline data that can be used to prioritize conservation efforts through resource management that is both sustainable and environmentally friendly. Documentation of leafy vegetables in Rangpur City Corporation, Bangladesh was investigated. Out of 44 species, 43 belong to angiosperms and 1 to pteridophytes. The flowering seasons of dominant species range from January-December (36.36%), October-January (22.72%), March-October (11.36%), January-May (9.09%), June-October

(4.54%), March-May (4.54%), March-August (4.54%), November-February (4.54%) and February-May (2.27%). Distribution was measured only to indicate the status of the occurrence of each species in this area and was based on eye estimation. A: Species that are distributed everywhere are called abundant (very common); when they are distributed at certain intervals, they are called frequent (common). The occurrence of species that are very rare is called "rare". Of the 44 species recorded here, common is represented by (61.36%), very common (20.45%) and rare (18.18%) (Figure 1).

In Rangpur City Corporation, major medicinal angiosperm leafy vegetables were carried out. Thirty seven (37) therapeutic plants have been identified, with their usefulness for the treatment of over 40 ailments described. The medicinal plants are utilized by the locals to treat a variety of ailments, including anemia, asthma, blood illnesses, bronchitis, chicken pox, diarrhea, diabetes, eczema, fever, headache, skin diseases, wounds, and more. Diverse plant parts from various species are used as medication to cure various diseases. To treat various diseases, (Figure 5) the leaves (77.27%), fruit (15.90%), root (20.45%), seed (6.81%), bulb (4.54%), flower (4.54%), frond (2.27%), corm (2.27%), and whole plant (13.63%) were used. The scientific name, local name, family name, and medicinal applications of each species were mentioned. The current study found that medicinal plants continue to play a significant role in rural communities. The information acquired from local traditional healers will be beneficial for further ethnobotany, taxonomy, and drug development studies using natural resources.

Table1 Showing the families of the plant species recorded

Sl. No.	Family name	No. of the Herb Species	No. of the Shrubs species	No. of the Climber Species	No. of the tree species
1	Amaranthaceae	6	-	-	-
2	Apiaceae	2	-	-	-
3	Araceae	5	-	-	-
4	Asteraceae	2	-	-	-
5	Athyriaceae	-	1	-	-
6	Basellaceae	-	-	1	-
7	Brassicaceae	4	1	-	-
8	Chenopodiaceae	1	-	-	-
9	Convolvulaceae	1	-	1	-
10	Cucurbitaceae	-	-	5	-
11	Euphorbiaceae	1	-	-	-
12	Liliaceae	2	-	-	-
13	Malvaceae	1	-	-	-
14	Marsileaceae	2	-	-	-
15	Meliaceae	-	-	-	1
16	Moringacea	-	1	-	-
17	Nyctaginaceae	1	-	-	-
18	Rubiaceae	-	-	1	-
19	Solanaceae	1	1	-	-
20	Tiliaceae	1	1	-	-
Total	20	30	5	8	1

Table 2 Assessment of wild and cultivated leafy Vegetables in Rangpur district, Bangladesh

Sl. No.	Scientific Name	Local Name	Family Name	Habit	Abundance	Flowering time	Use of Plant Parts
1	<i>Amaranthus gangeticus</i> L.	Lal shak	Amaranthaceae	Herb	Very common	Jan-Dec	Whole plant
2	<i>Amaranthus oleracea</i> L.	Data Shak	Amaranthaceae	Herb	Common	Jan-Dec	Leaf
3	<i>Amaranthus spinosus</i> L.	Katanotey	Amaranthaceae	Herb	Common	Jan-Dec	Leaf
4	<i>Amaranthus viridis</i> L.	Noteyshak	Amaranthaceae	Herb	Common	Jan-Dec	Whole plant
5	<i>Alocasia indica</i> Schott	Bashpor kochu	Araceae	Herb	Common	Jan-Dec	Leaf
6	<i>Amorphophalus bulbifer</i> (Roxb.) Blume	Olkchu	Araceae	Herb	Common	Jan-Dec	Leaf, corm
7	<i>Acalypha indica</i> L.	Muktajhuri	Euphorbiaceae	Herb	Rare	Mar-Oct	Leaf
8	<i>Allium cepa</i> L.	Piaj	Liliaceae	Herb	Common	Oct-Jan	Bulb, Leaf
9	<i>Allium sativum</i> L.	Rasun	Liliaceae	Herb	Common	Oct-Jan	Bulb, leaf
10	<i>Azadirachta indica</i> A. Juss	Nimpata	Meliaceae	Tree	Common	Mar-Oct	Leaf
11	<i>Basella alba</i> L.	Puishak	Basellaceae	Climber	Very common	Jan-Dec	Leaf
12	<i>Brassica campestris</i> L.	Sorisha shak	Brassicaceae	Shrub	Very common	Oct-Jan	Leaf
13	<i>Brassica juncea</i> L.	Rai sorisha	Brassicaceae	Herb	Very common	Oct-Jan	Leaf
14	<i>Brassica oleracea</i> L. var. <i>botrydis</i>	Fulkopi	Brassicaceae	Herb	Common	Oct- Jan	Leaf
15	<i>Brassica oleracea</i> L. var. <i>capitata</i>	Badhakopi	Brassicaceae	Herb	Common	Oct-Jan	Leaf
16	<i>Benincasa hispida</i> (Thunb) cogn	Panikumra	Cucurbitaceae	Climber	Common	Mar-May	Leaf, fruit, flower
17	<i>Boerhaavia repens</i> L.	Punarnava	Nyctaginaceae	Herb	Common	Jan-Dec	Leaf
18	<i>Celosia cristata</i> L.	Moragphul	Amaranthaceae	Herb	Common	Jan-Dec	Leaf Flower
19	<i>Centella asiatica</i> (L.) Urb.	Thankuni	Apiaceae	Herb	Rare	Jan-May	Whole Plant, Leaf
20	<i>Coriandrum sativum</i> L.	Dhaniya	Apiaceae	Herb	Common	Oct-Jan	Whole plant
21	<i>Colocasia esculenta</i> L. Schott	Kochu	Araceae	Herb	very common	Jan-Dec	Leaf

22	<i>Chenopodium album</i> L.	Bathua shak	Chenopodiaceae	Herb	Common	Jan-May	Leaf
23	<i>Coccinia grandis</i> L.	telakucha	Cucurbitaceae	Climber	Rare	Mar-Oct	Leaf
24	<i>Cucurbita maxima</i> Duch	Mistikumra	Cucurbitaceae	Climber	Very common	Jan-May	Leaf, fruit, Flower
25	<i>Capsicum frutescens</i> L.	Marich	Solanaceae	Shrub	Very common	Jan-Dec	Leaf, Fruit
26	<i>Corchorus capsularis</i> L.	Deshipat	Tiliaceae	Shrub	Common	Mar-Aug	Leaf
27	<i>Corchorus olitorius</i> L.	Merashak	Tiliaceae	Herb	Common	Mar-Aug	Leaf
28	<i>Diplazium esculentum</i> Retz	Dhekishak	Athyriaceae	Shrub	Common	Oct-Jan	Leaf, Frond
29	<i>Enhydra fluctuans</i> Lour.	Helencha	Asteraceae	Herb	Common	Nov-Feb	Leaf
30	<i>Ipomoea aquatica</i> Forssk	Kalmi Shak	Convolvulaceae	Climber	Very common	Mar-Oct	Leaf
31	<i>Ipomoea batatas</i> (L.) Lamk	Mistialu	Convolvulaceae	Herb	Rare	Feb-May	Leaf, fruit
32	<i>Lagenaria siceraria</i> L.	Lau	Cucurbitaceae	Climber	Very common	Jan-Dec	Leaf, fruit
33	<i>Lactuca sativa</i> L.	Lettuce	Asteraceae	Herb	Rare	Jan-Mar	Leaf
34	<i>Malva verticillata</i> L.	Napashak	Malvaceae	Herb	Common	Nov-Feb	Leaf
35	<i>Marsilea minuta</i> (L.) Mant	Shusni shak	Marsileaceae	Herb	Rare	Jan-Dec	Leaf
36	<i>Marsilea quadrifolia</i> L.	Shusni shak	Marsileaceae	Herb	Rare	Jan-Dec	Leaf
37	<i>Moringa oleifera</i> Lamk	Sajna	Moringaceae	Shrub	Common	Jan-Dec	Leaf, fruit
38	<i>Paederia foetida</i> L.	Gandhabhaduli	Rubiaceae	Climber	Rare	Jan-Dec	Leaf
39	<i>Raphanus sativus</i> L.	Mula shak	Brassicaceae	Herb	Common	Oct-Jan	Leaf, fruit
40	<i>Spinacia oleracea</i> L.	Palong shak	Amaranthaceae	Herb	Common	Oct-Jan	Whole plant
41	<i>Solanum tuberosum</i> L.	Alu shak	Solanaceae	Herb	Common	Jan-May	Leaf, fruit
42	<i>Trichosanthes dioica</i> Roxb	Potol	Cucurbitaceae	Climber	Common	Mar-Oct	Leaf, fruit
43	<i>Xanthosoma sagittifolium</i> L.	Boi Kochu	Araceae	Herb	Common	Mar-May	Corm, Leaf
44	<i>Xanthosoma violaceum</i> Schott	Kalo Kochu	Araceae	Herb	Common	Jan-Dec	Petiole, Leaf

Table 3 Medicinal Leafy vegetables are used by local people in Rangpur city corporation Bangladesh

Sl. No.	Scientific Name	Family	Local Name	Used Parts	Diseases To be treated
1	<i>Acalypha indica</i> L.	Euphorbiaceae	Mukta jhuri	Leaf	Bronchitis, Skin diseases, Pneumonia, Infected wounds, Anti bacterial, Anti-fungal.
2	<i>Amaranthus oleracea</i> L.	Amaranthaceae	Data shak	Leaf	Inflammations, Haemorrhage, complaints, Boils abscesses, Fever, Anaemia or kidney and lung disorders.
3	<i>Amaranthus spinosus</i> L.	Amaranthaceae	Kata notey	Leaf, Koot	Leucorrhoea, Hallucination, Burning sensation, Piles, bronchitis, constipation, eczema, leprosy and flatulence.
4	<i>Amaranthus viridis</i> L.	Amaranthaceae	Notey shak	Leaf, Root	Bronchitis, piles, Burning sensation, Leprosy, hallucination, Leucorrhoea and constipation.
5	<i>Azadirachta indica</i> L.	Meliaceae	Neem	Leaf, Fruit	Skin ulcers, leprosy, stomach pain, Eye disorders, fever, diabetes, and Liver problems.
6	<i>Alocasia indica</i> Schott	Araceae	Bashpor Kochu	Whole Plant, Leaf	High fever, tuberculosis, diarrhoea and Influenza.
7	<i>Amorphophalus bulbifer</i> (Roxb.) Blume	Araceae	Olkochu	Corm	Gonorrhoea and Piles.
8	<i>Allium cepa</i> L.	Liliaceae	Piaj	Bulb	Asthma, cough, rheumatism, colic and insect bites.
9	<i>Allium sativum</i> L.	Liliaceae	Rosun	Bulb	Inflammation, Bronchitis, Leucoderma, Piles, Fever, coughs, wounds, heart diseases and indigestion.
10	<i>Brassica juncea</i> L.	Brassicaceae	Rai Sorisha	Leaf, seed	Tumours, lumbago, Arthritis, rheumatism and stomach disorders.
11	<i>Brassica oleracea</i> L. var. <i>botrydis</i>	Brassicaceae	Fulkopi	Leaf	Cancer and cardiovascular diseases.
12	<i>Basella alba</i> L.	Basellaceae	Puishak	Leaf, Root	Anaemia, Dysentery, Gonorrhoea and cancer.
13	<i>Boerhaavia repens</i> L.	Nyctaginaceae	Punarnava	Leaf, Root	Kidney disorders, Skin diseases, insomnia, asthma, Jaundice, gonorrhoea.
14	<i>Brassica campestris</i> Roxb.	Brassicaceae	Sorisha shak	Leaf, seed	Internal congestions, rheumatic affections, Febrile and inflammatory symptoms and neuralgic.
15	<i>Benincasa hispida</i> (Thunb.) Cogn.	Cucurbitaceae	Panikumra	Leaf, Fruit	Aphrodisiac, Jaundice, diuretic, blood disease, laxative, epilepsy, tonic and fever.

16	<i>Coccinia grandis</i> L.	Cucurbitaceae	Telakucha	Leaf, Root	Asthma, Fever, epilepsy, gonorrhoea, Diabetes, catarrh dropsy and diabetes.
17	<i>Cucurbita maxima</i> Duch.	Cucurbitaceae	Mistikumra	Leaf, fruit	Intestinal infection, anthelmintic, Kidney problems, migraine and neuralgia.
18	<i>Chenopodium album</i> L.	Chenopodiaceae	Botua Shak	Leaf	Laxative, antirheumatic, anthelmintic, contraceptive, antiphlogistic, and intestinal ulcers.
19	<i>Celosia cristata</i> L.	Amaranthaceae	Morogphul	Leaf, flower, seed	Headache, eye inflammation, carpal tunnel syndrome, sores, skin eruption, and ulcers.
20	<i>Corchorus capsularis</i> L.	Tiliaceae	Deshipat	Leaf, root	Liver disorders, Dysentery, gonorrhoea, tonic, liver, and dysuria
21	<i>Corchorus olerius</i> L.	Tiliaceae	Marashak	Leaf	Demulcent, in worms of children hepatic, liver disorders, gastric catarrh, Dyspepsia and intestinal colic.
22	<i>Centella asiatica</i> (L.) urb.	Apiaceae	Thankuni	whole plant, Leaf	Bronchitis, fevers, ulcerations, Eczema, Leprosy, Inflammations and convulsive disorders.
23	<i>Coriandrum sativum</i> L.	Apiaceae	Doniya	Leaf, fruit	Asthenia, Suppuration, Piles, Inflammation Dyspepsia, hiccup, gleans Jaundice.
24	<i>Capsicum frutescens</i> L.	Solanaceae	Morich	Leaf, Fruit	Dysuria, night blindness, pain, bronchitis, chest trouble Headache cough and dyspepsia.
25	<i>Colocasia esculenta</i> (L.) Schott	Araceae	Kochu	Leaf	Cancer of nose and warts, Tumours, ulcerated polyp.
26	<i>Diplazium esculentum</i> Retz.	Athyriaceae	Dhekishak	Tender, Leaf, frond	Skin diseases and urinary problems.
27	<i>Enhydra fluctuans</i> Lour.	Asteraceae	Helencha	Leaf	Skin and nervous affection, dropsy, ascites anasarca.
28	<i>Ipomoea aquatica</i> Forssk	Convolvulaceae	Kalmishak	Leaf, flower	Jaundice, bronchitis and liver complaints, leucoderma, biliousness, leprosy, fever.
29	<i>Ipomoea batatas</i> (L.) Lamk.	Convolvulaceae	Mistialu	Whole plant, leaf, root.	Strangury and diarrhoea, Low fever skin disease.
30	<i>Lactuca sativa</i> L.	Asteraceae	Lettuce	Leaf	Prevents fall of inflammation and hairs, Ophthalmia, Headache.
31	<i>Malva verticillata</i> L.	Malvaceae	Napashak	Leaf	Gastrointestinal tract and respiratory tract, disorders of the skin.
32	<i>Moringa oleifera</i> Lamk	Moringaceae	Sajna	Leaf, fruit	Headache, general weakness, blindness, gastric problem and paralysis.

33	<i>Marsilea minuta</i> (L.) Mank.	Marsileaceae	Susnishak	Whole Plant, Leaf	Sleeping disorders and headache, hypertension, respiratory troubles, cough.
34	<i>Marsilea quadrifolia</i> L.	Marsileaceae	Susnishak	Whole plant, Leaf	Abscesses, Snakebite.
35	<i>Paederia foetida</i> L.	Rubiaceae	Gondhovaduli	Leaf, root	Diarrhoea dysentery, lumbago, liver and stomach troubles
36	<i>Spinacea oleracea</i> L.	Amaranthaceae	Palong shak	Whole Plant, Leaf	Inflammations of the lungs and bowels, scalding urine, fever, joint pain
37	<i>Trichosanthes dioica</i> Roxb.	Cucurbitaceae	Potol	Leaf, fruit, root	Dysentery, diarrhoea, bronchitis and catarrh.

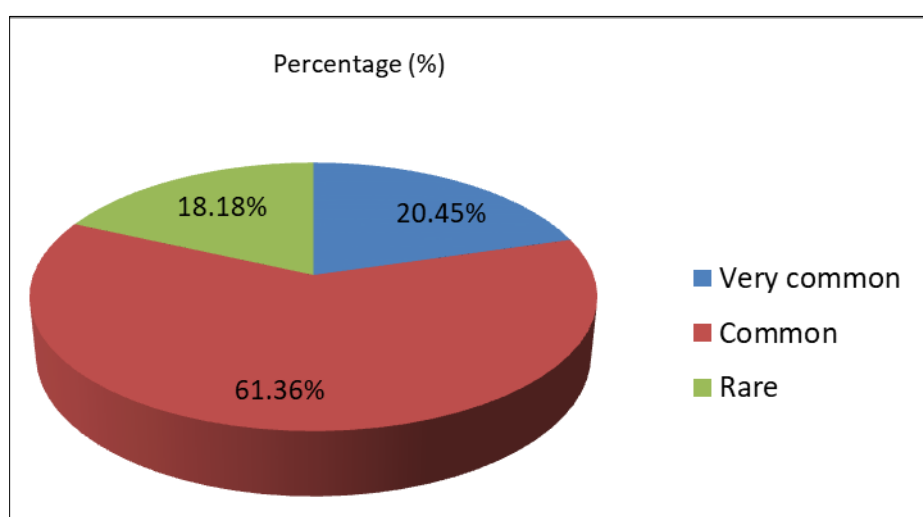


Figure 1 Recorded status of occurrence

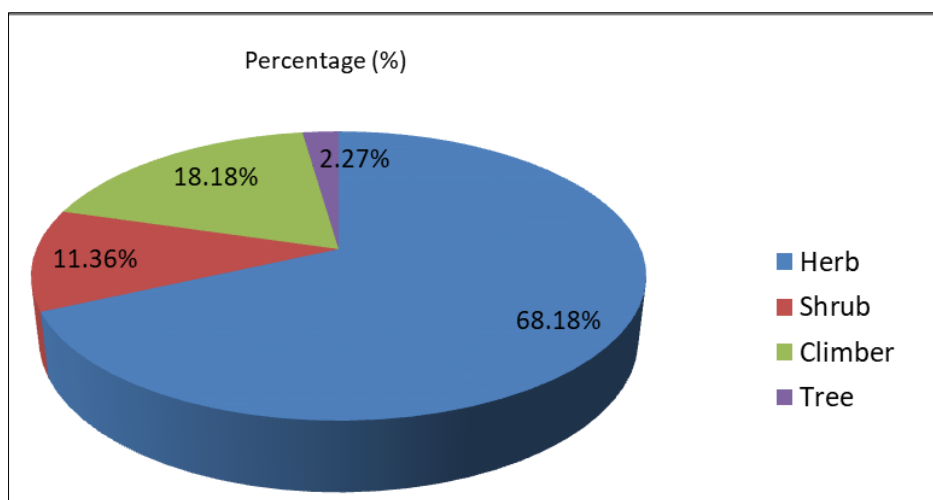


Figure 2 Habit diversity of the recorded species

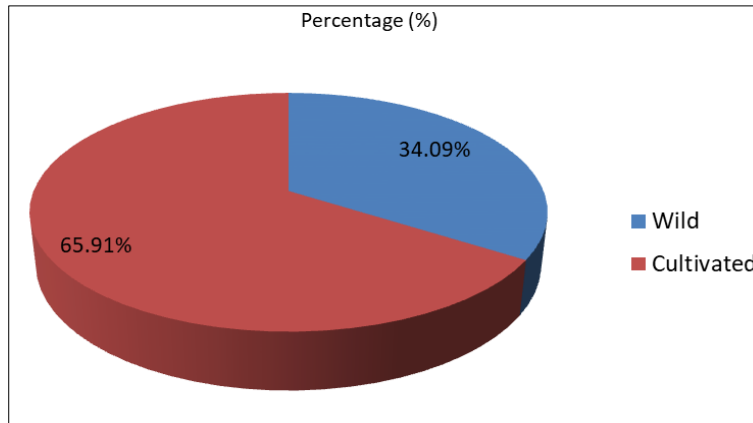


Figure 3 Recorded wild and cultivated Leafy Vegetables in the study area

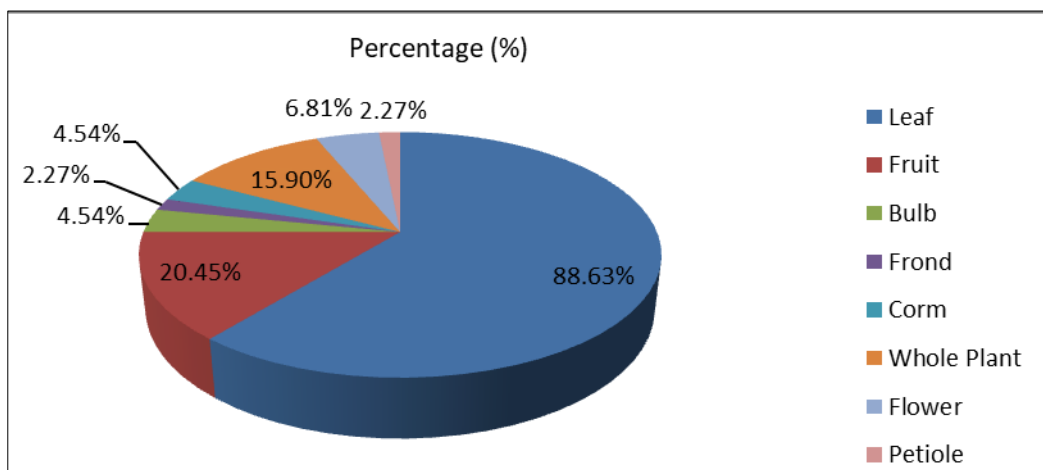


Figure 4 Recorded plant parts used as vegetables

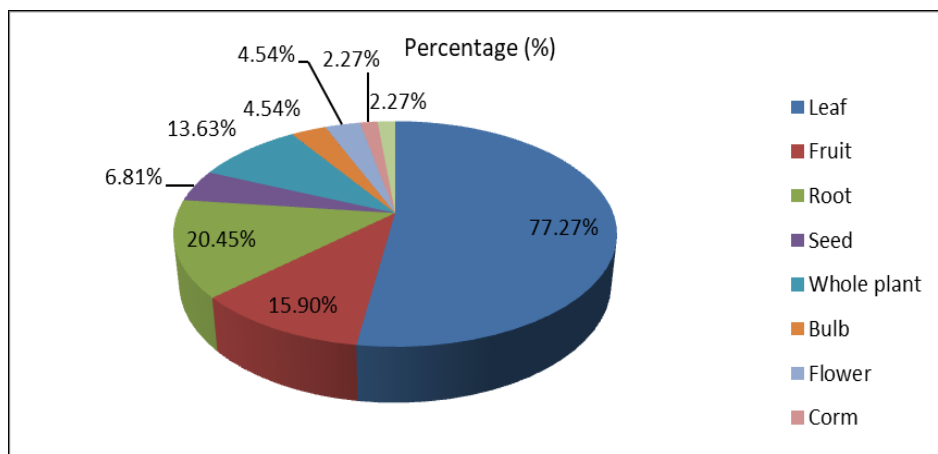


Figure 5 Recorded plant parts used as various diseases

4. Discussion

Plant foods, particularly green vegetable spices, have the most diverse alternatives in terms of availability and diversity, as humanity draws the majority of its foods, medicine, and industrial products from plant genetic resources, whether wild or farmed. However, the erosion of traditional knowledge connected with traditional food systems and resources is a severe threat to them [97]. Traditional meals have become less popular in recent years for a variety of reasons, with

traditional green leafy vegetables being one of the most affected (TGLVs). This reduction has been aided by the introduction of cash crops and exotic species, as well as the commercialization of agriculture and urbanization. Furthermore, some GLVs are frequently referred to be poverty foods [103] since many species are uncultivated, grow wild, and are viewed as agricultural weeds.

This stigma causes individuals to avoid them, particularly young people [103], resulting in a simplicity of many people's diets and a rise in high energy dense meals. These dietary changes have been accompanied by an increase in a number of diet-related chronic disorders, such as diabetes, cardiovascular disease, and cancer, all of which are major obstacles to human health and well-being. As a result, it is critical to develop knowledge about traditional community food consumption, as this will act as a prerequisite for food and nutrition. It will also aid in the development of successful food-based health promotion efforts and serve as the foundation for long-term diets.

5. Conclusion

The present study will be record an inventory of the wild and cultivated vegetables of Rangpur City Corporation of Bangladesh. The present study will be also focusing on diversity of wild and cultivated vegetables and their local uses for the healthcare. The present investigation will be helpful for botanical and pharmacological research in future for the herbal drug development. Therefore, our country will be benefited both socially and economically.

Compliance with ethical standards

Acknowledgments

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Disclosure of conflict of interest

The authors declare that there are no conflicts of interests.

Statement of informed consent

In this study, medicinal information was obtained through semi-structured interviews with knowledgeable informants. A total of 117 informants having an age range 21-76 years were interviewed in the study area.

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