

Research Article**Medicinal uses of selected wild edible vegetables consumed by Hyderabad-Karnataka region of Karnataka State in India****Hanumantappa Bherigi Nayaka***Department of Life Sciences, Faculty of Sciences, *Kristu Jayanti College Autonomous*, Bengaluru, Karnataka, India

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Abstract

Objective: The use of untamed vegetables as a supply of food is well-documented everywhere the globe. However, a number of the wild vegetables have since found their manner into the info of healthful plants. The purpose of this study was to assess the medicinal value of wild vegetables consumed by local people of Hyderabad-Karnataka region of Karnataka State in India. **Materials and Methods:** Fifteen wild vegetables reported to have medicinal value were assessed in this study. The 15 wild vegetables with medicinal values were found to be distributed within 10 plant families. **Results and Conclusion:** Brassicaceae was found to be the dominant family followed by Amaranthaceae. Leaves were the most half employed in preparation of medicines from wild vegetables. The use of leaves is found to be the most sustainable mode of medicinal preparation since it does not impact negatively on wild vegetables. The consumption of untamed vegetables with healthful values as food ought to be inspired since they will assist within the wellbeing of communities.

Keywords: Edible vegetables, semi-structured questionnaire, Brassicaceae, Amaranthaceae

Introduction

Wild plant species have been used worldwide over many years as part of human diet. Several studies dealt with the identification and classification of wild edibles including vegetables (Bonet et al., 2002; Pieroni et al., 2002). Their findings frequently indicated the medicinal uses and nutritional properties of these wild edibles. Wild plant species are plant species that are neither managed nor cultivated (Tardío et al., 2006). Other works have pointed out that there is unquestionable strong relationship between food and medicine (Etkin et al., 1994; Pieroni et al., 2000). The relationship is in such a way that the possibilities of separating food use from medicinal use appear slim.

In India, wild edible vegetables have been seen as a contributor of significance when it comes to socioeconomic well-being of societies. The use of wild edible vegetables for medicinal purposes was also documented in Zimbabwe (Maroyi et al.,

2011). Many studies conducted in the Hyderabad Karnataka region of the India concentrated on the documentation and evaluation of some of the wild edible vegetables. The fact that nothing is being done on the medicinal vegetables of this region aroused a need to survey the wild edible vegetables with medicinal uses that can help local people. Documentation of wild edible vegetables with medicinal value may go a long way in the discovery of drugs from these wild vegetables whose leaves can be easily harvested in a sustainable manner.

The aim of this study was to assess the medicinal use of selected wild edible vegetables consumed as a source of food by local people of Hyderabad-Karnataka region of Karnataka State in India.

The traditional medicine use is not a new practice since it was seen receiving a remarkable attention in the 1990s (Rome, Italy, 1997). In other parts of the world such as USA, Europe and Australia, the health roles of wild edible vegetable consumption are also receiving attention as functional foods, nutraceuticals or phyto-nutrients (Craig et al., 1999). Additionally the issue of thinking about food as medicine existed in the Chinese medical theories and Chinese food therapy as far back as time immemorial and many wild plants have multiple uses, for example, providing nutrients, and

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promoting dietary variety, feeding livestock and providing medication for humans (Chen et al., 2000; Falconer et al., 1991).

Materials and methods

Study area

The study was conducted in the Hyderabad-Karnataka region of Karnataka State in India. Hyderabad-Karnataka is that the name given to north-east Karnataka, India. It is the communicatory a part of the Hyderabad State. That was dominated by the Nizams of Hyderabad till 1948. After merging with the Indian union, the region was a part of Hyderabad State till 1956. The Hyderabad Karnataka region includes Bidar, Yadgir, Raichur, Koppal and Gulbarga of Hyderabad state and, Bellary of Madras that are in the present state of Karnataka as shown in figure 1. The Northeast-Karnataka region is that the second largest arid region in India. 17 September 1948 was an important day in the history of Hyderabad as Karnataka state was merged into the Indian Union. The historical background of the movement started with a new era in Indian history. The current study focused on selected four deep rural villages situated in each of the six local municipalities of Hyderabad Karnataka region municipality namely; Bidar, Gulbarga, Yadgir, Raichure, Koppal and Bellary local municipalities. A total of 12 rural villages were therefore visited for data collection. The climate of the Hyderabad Karnataka region, in general, is characterized by dryness for the major part of the year and a very hot summer. The region receives rainfall both from south west and north east monsoon.

Data collection and analysis

This study was undertaken over a period of 10 months in selected villages of the six local municipalities of Hyderabad Karnataka region. The purposive sampling approach was followed as investigations were carried out among 160 respondents in their own Kannada language. Semi-structured questionnaire was used to interview respondents after Prior

Informed Consent was obtained verbally with them before commencing each interview. During the interviews, respondents were asked questions about the names of known wild edible vegetables, methods of preparations, taste, supply system and other additional uses. The collection of voucher specimens assisted in clarifying the confusion that usually arises due to reference by local people to one species by two or more common names. In some cases different species are known by one common name. The pressed voucher specimens were validated and deposited at the Gulbarga University herbarium housed in Botany department. Validation of authority on botanical names was done through the International Plant Names Index (IPNI) database(<http://www.ipni.org/ipni/simplePlantNameSearch.do>).

From all the inventoried wild edible vegetable species, 20 mostly cited vegetables were selected by using the relative frequency of citation or quotation index (RFC) which is calculated by the following formula:

$$RFC = (FC/N) \times 100,$$

Where FC is the number of informants who mentioned the plant species and N is the total number of informants (Madikizela et al., 2012).

Results and discussions

Informant's profile

Among the 160 respondents interviewed in this study, most of them were youth aged between 18 and 35 (n= 74) followed by elders aged 61 and above (n= 47). Adults aged between 36 and 60 (n= 39) constituted the least category. The results show that elders contributed more vegetables with medicinal values as compared to other age categories. When looking at gender, females (n = 107/160) dominated

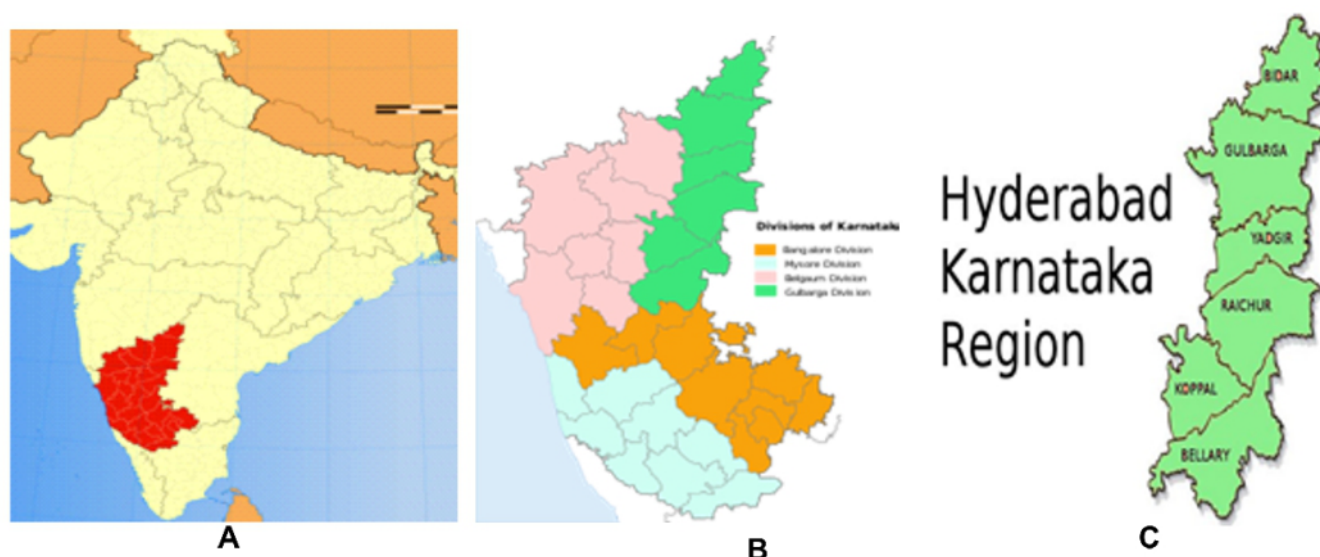


Figure 1. A) Showing India map, B) Karnataka State, C) Hyderabad-Karnataka Region

over males (n=53/160). Fifty six percent of the surveyed respondents hold secondary education while 6, 13 and 25% had tertiary education, no education and primary education respectively.

Taxonomic diversity, life forms and plant parts

Twenty-five wild vegetables indicated on table 1 were recorded from the 160 respondents. The recorded vegetables belong to 16 plant families dominated by

Table 1. Recorded wild edible vegetables consumed by Hyderabad, Karnataka region

S. No.	Family Name	Botanical Name	Common English (E) and Kannada (K) Names
1	Amaranthaceae	<i>Amaranthus retroflexus</i>	Amaranth leaves (E) Dttu (K)
2	Apiaceae	<i>Coriandrum</i>	Coriander leave (E) Kothambari (K)
3	Rutaceae	<i>Murraya koenigii</i>	Curry leaves (E) Karibevu (K)
4	Apiaceae	<i>Anethum graveolens</i>	Dill (E) Sabsoge (K)
5	Moringaceae	<i>Moringa oleifera</i>	Drumstick leaves (E) Nugge (K)
6	Fabaceae	<i>Trigonella foenum -graecum</i>	Fenugreek leaves (E) Menthya (K)
7	Linaceae	<i>Linum usitatissimum</i>	Linseed (E) Agase (K)
8	Solanaceae	<i>Solanum nigrum</i>	Garden night shade (E) Ganike (K)
9	Polygonaceae	<i>Rumex acetosa</i>	Sorelle leaves (E) Pundi (K)
10	Apiaceae	<i>Centella asiatica</i>	Indian pennywort (E) Vandelaga (K)
11	Poaceae	<i>Cymbopogon citratus</i>	Lemon grass (E) Nimbe hullu (K)
12	Basellaceae	<i>Basella alba</i>	Malabar spinach (E) Basale (K)
13	Lamiaceae	<i>Mentha; L</i>	Mint (E) Pudina (K)
14	Brassicaceae	<i>Brassica Juncea</i>	Muster leaves (E) Sasuve (K)
15	Amaranthaceae	<i>Spinacia oleracea</i>	Spinach (E) Palak (K)
16	Amaranthaceae	<i>Atriplex hortensis L</i>	Mountain spinach (E) Chakkotha (K)
17	Brassicaceae	<i>Eruca vesicaria ssp. sativa</i>	Rocket leaves (E) Akariki (K)
18	Portulacaceae	<i>Portulaca oleracea</i>	Porsulane (E) Goli (K)
19	Brassicaceae	<i>Nasturtium officinale</i>	Watercress (E) Hunchika (K)
20	Cruciferae	<i>Brassica oleracea L</i>	Cabbage (E) Elekosu (K)
21	Amaryllidaceae	<i>Allium cepa L</i>	Spring onion (E) Hulagaddi (K)
22	Asteraceae	<i>Carthamus tinctorius</i>	Safflower (E) Khushibi (K)
23	Convolvulacea e	<i>Ipomoea aquatica</i>	Water spinach (E) Anne (K)
24	Brassicaceae	<i>Raphanus sativus</i>	Radish leave (E) Mullangi (K)

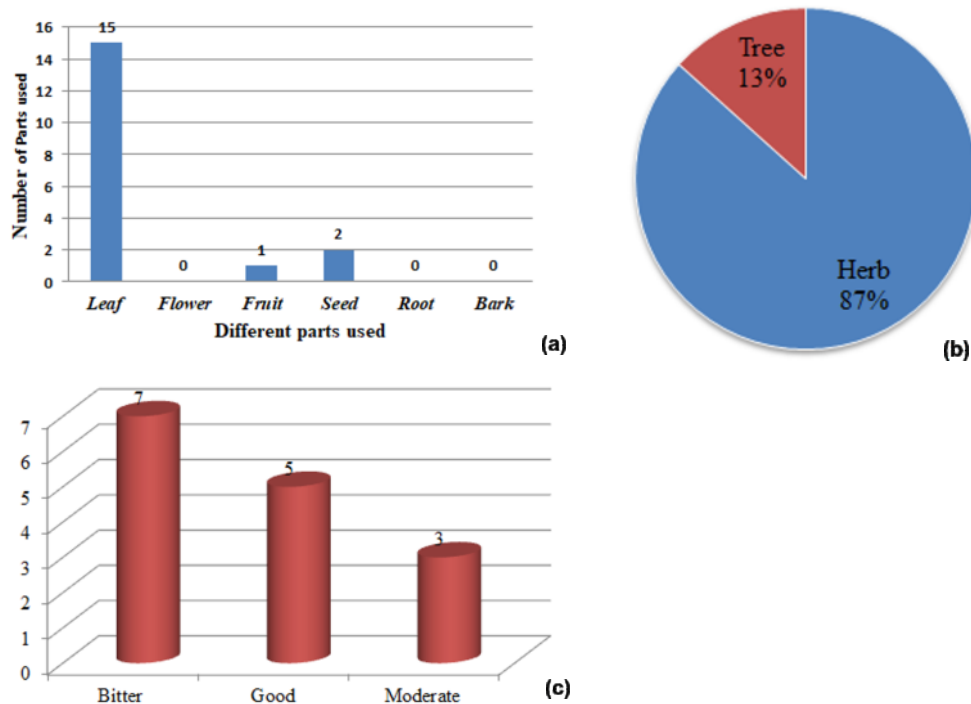


Figure 2. (a) Plant parts utilization reported respondents of Hyderabad Karnataka peoples, (b) Different life forms of selected wild edible vegetables, (c) Number of plant species per different tastes.

Table 2. Ethno medicinal properties of documented medicinal wild edible vegetables

Sl. No.	Botanical and Family Name	Common English (E) and Kannada (K) Names	Life forms	Plant part(s) used	Taste	Medicinal applications and other reported therapeutic uses
1	<i>Amaranthus retroflexus</i> ; AMARANTHACEAE	Amaranth leaves (E), Dttu (K)	Herb	Leaves	Good	Cooked leaves used as curry. antiviral activity against the Foot and Mouth Disease virus (FMDV) (Singh et al., 2016)
2	<i>Coriandrum</i> ; APIACEAE	Coriander leave (E), Kothambari (K)	Herb	Leaves and seeds	Bitter	Leaves are used in preparation of curries and seeds are used in preparation of masala. Antioxidant Activity (Hwang et al., 2014)
3	<i>Murraya koenigii</i> ; RUTACEAE	Curry leaves (E) , Karibevu (K)	Tree	Leaves	Bitter	Leaves are used in preparation of curries. Anti-Inflammatory Activity (Jain et al., 2017)
4	<i>Anethum graveolens</i> ; APIACEAE	Dill (E), Sabsoge (K)	Herb	Leaves	Moderate	Squeezed liquid from leaves is used to treat earache in children. Antimicrobial and anti-inflammatory activity (Dhiman et al., 2017)
5	<i>Moringa oleifera</i> ; MORINGACEAE	Drumstick leaves (E), Nugge (K)	Tree	Leaves and fruits	Good	Cooked leaves used as curry and fruits are also used to prepare curry. Anti-oxidant Activity (Paikraet al., 2016)
6	<i>Trigonella foenum-graecum</i> ; FABACEAE	Fenugreek leaves (E), Menthya (K)	Herb	Leaves And seeds	Bitter	Cooked leaves used as curry. Antibacterial and Anti-oxidant Activities (Premanath et al., 2011)
7	<i>Rumex acetosa</i> ; POLYGONACEAE	Sorelle leaves (E) , Pundi (K)	Herb	Leaves	Moderate	Cooked leaves used as curry. Anticancer and Hepatoprotective activity (Mishra et al., 2018)
8	<i>Mentha</i> ; LAMIACEAE	Mint (E), Pudina (K)	Herb	Leaves	Bitter	Decoction of leaves is taken orally. Anti-microbial and antioxidant activity (Mikaili , et al., 2013)
9	<i>Spinacia oleracea</i> ; AMARANTHACEAE	Spinach (E) , Palak (K)	Herb	Leaves	Bitter	Cooked leaves used as curry. antibacterial activity (Olasupo et al., 2018)
10	<i>Eruca vesicaria</i> ssp. <i>Sativa</i> ; BRASSICACEAE	Rocket leaves (E) , Akariki (K)	Herb	Leaves	Bitter	Cooked leaves used as curry. Anti-diabetic activity (Khan et al., 2016)
11	<i>Portulaca oleracea</i> L; PORTULACACEAE	Porsulane (E) , Goli (K)	Herb	Leaves	Moderate	Cooked leaves used as curry and antibacterial activity (Nayaka et al 2014)
12	<i>Nasturtium officinale</i> ; BRASSICACEAE	Watercress (E) , Hunchika (K)	Herb	Leaves	Good	Cooked leaves used as curry. Antioxidant activity (Haro et al., 2018)
13	<i>Brassica oleracea</i> L; CRUCIFERAE	Cabbage leaves (E), Elekosu (K)	Herb	Leaves	Good	Cooked leaves used as curry. Antibacterial activity (Satish et al., 2018)
14	<i>Carthamus tinctorius</i> ; ASTERACEAE	Safflower leaves (E), Khushibi (K)	Herb	Leaves	Bitter	Crushed leaves are used to dress wounds (paste) And seeds are used to oil extract. Antioxidant activity (Dehariya et al., 2015)
15	<i>Raphanus sativus</i> ; BRASSICACEAE	Radish leave (E) , Mullangi (K)	Herb	Leaves	Good	Cooked leaves used as curry. Anti-tumor, anti-viral activity (Gutiérrez et al., 2004)

Brassicaceae family (n=4). Amarantaceae (n=3) and Apiaceae (n=3) were the second most families.

A total of 15 wild edible vegetables with medicinal uses were observed from the 24 recorded vegetables (Table 1) and were botanically identified into 11 families (Table 2). Brassicaceae was found to be the most represented family with two species from three different genera. It was followed by Amaranthaceae with two species from two different genera. The remaining 9 families were represented by one species each.

During the current survey it was apparent that leaves (n=15) were the most used part in preparation of medicines used in treatment of different diseases (Figure 2). Fruits and seeds of one and two of the wild vegetables respectively were also reported to have medicinal properties.

Two different life forms were observed from the profile of the 15 selected wild edible vegetables. Among the 2 life forms were

herbs (Chen et al., 2016) and trees (Pieroni et al., 2002) (Figure 2). The fact that trees contributed a small percentage is a good sign of medicinal practice since most harvesting techniques of trees for medicinal purposes are usually destructive. Avoiding or reduction of harvesting medicinal materials from tree species may promote their conservation efforts. Threat of extinction as a result of overharvesting of trees and habitat destruction throughout the world and mostly in African countries has also been lamented by (Chen et al., 2016).

Figure 2 shows the different taste attributes measured in relation to bitterness as reported by respondents on vegetables with medicinal properties. Most of the plants have been reported to have bitter taste. Interestingly, it was mentioned during the survey that vegetables with bitter taste are able to ease diseases such as diabetes and hypertension. It was explained further that the anti-diabetic

and the lowering of blood pressure properties of bitter tasting vegetables may be due to the fact that “bitter foods lower the levels of sugar in the blood”.

According to (Leonti et al., 2002), taste of vegetables play an important role in the adaptive behavior of human beings, especially in determining cognitive characteristics of medicinal vegetables. The possible parts that can be used for the preparations of various remedies for various ailments include leaves, roots, barks, flowers, fruits, seeds and whole plant. It is evident from the responses quoted by the respondents of the current survey, that the vegetables with bitter taste are perceived to be very good for maintenance of healthy lives.

Medicinal applications and dosage

As indicated in table 2, the majority of the wild edible vegetables reported to be used for medicinal purposes are for treatment of blood pressure and sugar diabetes. In treatment of these various medical conditions, most of the vegetable leaves are eaten when cooked (n = 12) whereas in some of them a decoction (n = 1) is used. Liquid from fresh squeezed leaves (n = 1) is used either in treatment of earache or wounds. The vegetables were also reported to be used as pastes (n= 1) in wounds dressing. The consumption of leafy vegetables is also linked to the traditions and dietary patterns of each ethnic and socioeconomic group. The consumption of the leaves of *B. pilosa* has been reported as a risk factor for esophageal cancer in South Africa. On the other hand, pharmacological studies conducted on this plant showed a number of many bioactive compounds including terpenes, tannins, essential oils amino acids and ascorbic acid that aid in the remedial of many various ailments (Diouf et al., 1999; Arthur et al., 2012; Silva et al., 2011).

Conclusions

Results of the current investigation clearly demonstrated that wild vegetables are perceived to have medicinal values. Additionally, the results presented in this report will therefore provide locals of Hyderabad Karnataka regions municipalities with suitable guide to choices of wild vegetables of medicinal importance. Adequate consumption of bitter vegetables of the Brassicaceae family is perceived by Hyderabad Karnataka regions community members to improve health by minimizing chances of diabetes and hypertension. The cucurbit plants are a rich source of protein that poses many biological compounds necessary for good health, as a valuable support of these findings and some of researchers argue that, when we consume vegetables we get proper nutrition to live healthy lives.

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References

- Arthur GD, Naidoo KK, Cooposamy RM. 2012. *Bidens pilosa* L, Agricultural and pharmaceutical importance. Journal of Medicinal Plants Research 6: 3282–3287.
- Bonet MA, Valles J. 2002. Use of non-crop food vascular plants in Montseny biosphere reserve (Catalonia, Iberian Peninsula). International Journal of Food Sciences and Nutrition 53: 225–248.
- Chen JC. 2000. Regulatory control of Functional Food in China. Scandinavian Journal of Nutrition 44: 130–131.
- Chen S, Yu H, Luo H, Wu Q, Li C, Steinmetz A. 2016. Conservation and sustainable use of medicinal plants: Problems, progress and prospects. Chinese Medicine 11:37.
- Craig WJ. 1999. Health-promoting properties of common herbs. American Journal of Clinical Nutrition 70: S491–S499.
- Dehariya R, Dixit AK. 2015. A Review on Potential Pharmacological Uses of *Carthamus tinctorius* L. World Journal of Pharm Science 3 (8): 1741-1746.
- Dhiman C, Kumar N, Kothiya P. 2017. Evaluation of *Anethum graveolens* Extract on Memory impaired mice. Journal of Pharmacy Research 11: 5.
- Diouf M, Diop M, Lô C, Drame KA, Sene E, Ba CO, Gueye M, Faye B. 1999. Prospection de légumes feuilles traditionnels de type africain au Sénégal. In: phytothérapie JAC, hweya, Eyzaguirre PB, editors. The biodiversity of traditional leafy vegetables. International Plant Genetic Resources Institute 111–154.
- Etkin NL. (ed). 1994. Eating on the Wild Side: The Pharmacologic, Ecologic and Social Implications of Using Noncultigens. University of Arizona Press, Tucson, AZ. 305.
- Falconer J, Arnold JEM. 1991. Household Food Security and Forestry. An Analysis of Socio-Economic Issues. Pp. 11-25.
- FAO. 1997. The state of food and agriculture, Food and Agriculture Organization of the United Nations, Rome, Italy.
- Gutiérrez RMP, Perez RL. 2004. *Raphanus sativus* (Radish): Their Chemistry and Biology. The Scientific World Journal 4: 811–837.
- Haro G, Iksen I, Rumanti RM, Marbun N, Sari RP, Gultom RPJ, Rasayan. 2018. Evaluation of antioxidant activity

- and minerals value from watercress (*Nasturtium officinale* R.Br.). *Journal of Chemistry* 11(1): 232-237.
- Hwang E, Lee Do-Gyeong, Park SH, Sook Oh M, Kim SY. 2014. Coriander Leaf Extract, Antioxidant Activity and Protects Against UVB-Induced Photo aging of Skin by Regulation of Pro collagen Type I and MMP-1 Expression. *Journal of Medicinal Food* 17(9): 985–995.
- Jain M, Gilhotra R, Singh RP. 2017. Curry leaf (*Murraya Koenigii*): A Spice with medicinal property. *Med Crave Online Journal of Biology and Medicine* 2 (3): 236–256.
- Leonti M, Sticher O, Heinrich M. 2002. Medicinal plants of the Popoluca, México: organoleptic properties as indigenous selection criteria. *Journal of Ethnopharmacology* 81: 307–315.
- Madikizela M, Ndhkala AR, Finnie JF, Staden JV. 2012. A Review of botany, Medicinal uses, and Biological activities of *Pentanisia prunelloides* (Rubiaceae). *Journal of Ethnopharmacology* 141: 61–71.
- Maroyi A. 2011. The Gathering and Consumption of Wild Edible Plants in Nhema Communal Area, Midlands Province, Zimbabwe. *Ecology of Food and Nutrition* 50: 506–525.
- Marwat SK, Rehman F, Khan AA. 2016. Phytochemistry and Pharmacological Values of Rocket (*Eruca sativa* Miller), A Review. *International Journal of Horticulture* 6:16.
- Mikaili P, Mojaverrostami S, Moloudizargari M, Aghajanshakeri S. 2013. Pharmacological and therapeutic effects of *Mentha longifolia* L and its main constituent, menthol. *Ancient Science of Life* 33 (2): 131–138.
- Mishra S, Dash DK, Das AK. 2018. South Indian leafy vegetable Gongura (*Hibiscus sabdariffa* L.) as an important medicinal herb: A Review. *Journal of Pharmacognosy and Phytochemistry* 1: 2534-2538.
- Nayaka HB, Londonkar R, Umesh MK, Tukappa A. 2014. Antibacterial Attributes of Apigenin, Isolated from *Portulaca oleracea* L. *International Journal of Bacteriology Article ID* 175851.
- Olasupo AD, Aborisade AB, Olagoke OV. 2018. Phytochemical analysis and antibacterial activities of spinach leaf. *American Journal of Phytomedicine Clinical Therapy* 6: No.2:8.
- Paikra BK, Kumar H, Dhongade J, Gidwani B. 2017. Phytochemistry and Pharmacology of *Moringa oleifera* Lam. *Journal of Pharmacopuncture* 20(3):194-200.
- Pieroni A, Nebel S, Quave C, Munz H, Heinrich M. 2002. Ethnopharmacology of *liakra*: traditional weedy vegetables of the Arbëreshë of the Vulture area in southern Italy *Journal of Ethnopharmacology* 81: 165–185.
- Pieroni A, Quave CL. 2000. Traditional pharmacopoeias and medicines among Albanians and Italians in southern Italy: A comparison. *Journal of Ethno Pharmacology* 70: 235–373.
- Premanath R, Sudisha J, Devi LN, Aradhya SM. 2011. Antibacterial and anti-oxidant activities of Fenugreek (*Trigonella foenum graceum* L) Leaves. *Research Journal of Medicinal Plants* 5: 695-705.
- Rahman KMM, Sousa-Poza A. 2010. Food consumption and nutritional status of vulnerable people rearing livestock in Bangladesh. *Bangladesh Journal of Agricultural Economics* XXXIII, 41–56.
- Rajasree RS, Sibi PI, Francis F, William H. 2016. Phytochemicals of *Cucurbitaceae* family – A review. *International Journal of Pharmacognosy and Phytochemical Research* 8: 113–123.
- Satish A, Farha Syeda S, Urooj Asna GSC. 2018. Quantification of flavonoids by UPLC-MS and its antibacterial activity from *Brassica oleracea* var. *Capitata* L. *Biological and Pharmaceutical Sciences* 05 (01): 109–114.
- Silva FL, Fischer DCH, Tavares JF, Silva MS, De Athayde-Filho PF, Barbosa-Filho JM. 2011. Barbosa-Filho Compilation of secondary metabolites from *Bidens pilosa* L. *Molecules* 16: 1070–1102.
- Singh DC, Chauhan S, Tomar P. 2016. Tanduliyaka (*Amaranthus Viridis*): A Highly Nutritional Herb. *International Journal of Ayurveda and Pharma Research* 4(5):53-55.
- Tardío J, Pardo-De-Santayana M, Morales R. 2006. Ethnobotanical review of wild edible plants in Spain. *Botanical Journal of the Linnaean Society* 152: 27–71.