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Evaluation of Ascorbic Acid Content in Edible Leaves: A Comparative Study of Diverse Plant Species

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ABSTRACT

Edible leaves are a rich source of vitamin C, an essential nutrient for immune function, collagen synthesis, and antioxidant defense. Moringa oleifera, Psidium guajava, and Phyllanthus emblica provide substantial amounts of vitamin C, supporting iron absorption and reducing the risk of chronic diseases. While citrus fruits are well-known sources, leafy greens offer an often-overlooked alternative. Cooking methods affect vitamin C retention, with steaming preserving more nutrients than boiling. Traditional diets have long recognized the benefits of leafy greens, emphasizing their role in preventing deficiencies and promoting overall health. Increased dietary inclusion of these leaves can enhance nutritional well-being.

Keywords: Edible leaves, Traditional diet, Vitamin C, Health benefits

I. INTRODUCTION

Leaves have played a significant role in human nutrition for centuries, serving as a rich source of essential vitamins, minerals, and bioactive compounds. Among these, vitamin C (ascorbic acid) is a crucial nutrient found abundantly in many edible leaves such as *Moringa oleifera, Psidium guajava,* and *Phyllanthus emblica*. As a water-soluble antioxidant, vitamin C is vital for immune function, collagen synthesis, iron absorption, and oxidative stress reduction (Carr & Maggini, 2017). It aids in the neutralization of harmful free radicals, thereby reducing the risk of chronic diseases such as cardiovascular disorders and certain types of cancer (Padayatty et al., 2003). Additionally, vitamin C enhances non-heme iron absorption from plant-based foods, making it essential for individuals relying on vegetarian or vegan diets for their nutritional needs (Cook et al., 2001).A deficiency in vitamin C can lead to scurvy, weakened immunity, impaired wound healing, and fatigue, underscoring the importance of an adequate intake from dietary sources (Jacob, 2002). While citrus fruits are commonly associated with vitamin C, leafy greens provide an often-overlooked yet substantial source of this vital nutrient. For instance, *Moringa oleifera* leaves contain significantly high levels of vitamin C, making them an excellent dietary supplement for populations at risk of micronutrient deficiencies (Saini et al., 2015).

Similarly, guava leaves (*Psidium guajava*) are traditionally brewed into herbal teas that not only deliver vitamin C but also exhibit antimicrobial and anti-inflammatory properties (Gutiérrez et al., 2008).Cooking methods also influence the retention of vitamin C in leafy greens. Studies have shown that boiling and prolonged exposure to heat can degrade vitamin C, whereas steaming and minimal cooking help preserve its content (Munyaka et al., 2010). Therefore, incorporating raw or lightly cooked leafy greens into the diet ensures optimal vitamin C intake. Traditional diets across various cultures have long recognized the health benefits of consuming leafy vegetables, reinforcing their significance in preventing nutritional deficiencies and promoting overall well-being. As research continues to highlight the diverse health benefits of edible leaves, their role in dietary recommendations and functional food formulations becomes increasingly evident.

Rationale

Ascorbic acid, or vitamin C, is an important antioxidant that is necessary for the production of collagen, the absorption of iron, and immune system function. Although they are important nutritional sources, the amount of ascorbic acid in green leafy vegetables varies depending on the species, growing method, and processing method. Researching its content in edible leaves promotes the development of functional foods, improves agricultural methods, and optimizes diets for improved health results

II. MATERIALS AND METHOD

Sample collection

The edible leaves were collected in February and March, 2025 from Gujarat University and the surrounding area. The plant species were identified with the help of experts, local flora and literatures. The freshly collected leaves were washed in water for a few minutes. External moisture were blotted dry with tissue paper followed by air drying briefly and the non-edible portions were sorted and discarded. The edible portions were chopped into small pieces and used in ascorbic acid analysis.

Vitamin C determination

Ascorbic acid content was determined according to standard method (Ranganna, 1986). Five (5) g sample in 3% metaphosphoric acid was blended and final volume made upto 50 ml. Mixture was filtered using filter paper. 5 ml of the extract/filtrate was titrated against 2, 6 dichlorophenol indophenol to light pink endpoint which persist for about 15 sec. Experiments were conducted in triplicates. Vitamin C content was calculated by the formula:

$$\text{Vitamin C (mg)/ 100 g} = \frac{\text{Titre} \times \text{Dye factor} \times \text{Volume made up} \times 100}{\text{Volume of extract taken} \times \text{Weight of the sample taken}}$$

III.RESULTS AND DISCUSSION

The selected 30 species of edible leaves in the present investigation falls under 19 families and 28 genera, among which family Amaranthaceae has maximum representative with four species viz., *Amaranthus viridis, Achyranthes aspera, Chenopodium album* and *Alternanthera sessilis* while others are represented by either two or one species each (Table 1). The detailed information on recipe, parts used and modes of consumption is represented in Table 1. Food and health are strongly inter-related which can be observed in the usage of the same plant as food and remedy for ailments by indigenous folks. This is demonstrated by the current study, which found that practically some of the plants examined are simultaneously utilized as food and medication (Table 1). Since it functions as a natural antioxidant and must be consumed by diet or supplement, vitamin C is one of the most important nutritional components. The human body is unable to produce it. This study was conducted to ascertain the vitamin C content of regularly used wild edible plants, taking into account the significance that vitamin C plays in human health and disease. Based on their vitamin C concentration

(Table 2, 3&4), these plants can be roughly divided into three groups: high, moderate, and low.

Table 1. List of edible plant names, local name, family, use and reference

Sl.no	Scientific name	Local name	Family	Uses	Reference
1	*Abrus precatorius* L.	Chanothi	Fabaceae	Used in leafy green dishes, herbal teas, traditional soups and decoctions	Garaniya & Bapodra (2014)
2	*Acalypha indica* L.	Kumbhi	Euphorbiaceae	Leaves consumed as a vegetable in traditional dishes.	Zahidin et al. (2017)
3	*Achyranthes aspera* L.	Andhedi	Amaranthaceae	Young leaves used in traditional medicinal food preparations.	Srivastav et al. (2011)
4	*Aegle marmelos* (L.) Corrêa	Billi	Rutaceae	Used in herbal teas and medicinal dishes.	Singh et al. (2024)
5	*Alternanthera sessilis* (L.) R.Br. ex DC.	Joyweed	Amaranthaceae	Young leaves used as leafy vegetables, in soups and stir-fries.	Hwong et al. (2022)
6	*Amaranthus viridis* L.	Amaranth	Amaranthaceae	Young leaves used as vegetables, in soups, and stir-fries.	Reyad-ul-Ferdous et al. (2015)
7	*Basella alba* L.	Poi	Basellaceae	Leaves used in soups, stir-fries, and salads.	Roshan et al. (2012)
8	*Chenopodium album* L.	Cheel	Amaranthaceae	Leaves cooked like spinach, used in soups and curries.	Poonia & Upadhayay (2015)
9	*Clitoria ternatea* L.	Aparajita	Fabaceae	Leaves used in herbal teas and cooked as vegetables.	Gupta et al. (2010)
10	*Cocculus hirsutus* (L.) W.Theob	Vevdi	Menispermaceae	Leaves used in soups, curries, and herbal preparations.	Chambhare (2025)
11	*Cymbopogan flexuosus*	lemongrass	Poaceae	Leaves used in teas, soups, and flavoring agents.	Zhao et al. (2024)
12	*Cynodon dactylon* (L.) Pers.	Durva	Poaceae	Young leaves used in herbal infusions and green juices.	Savadi et al. (2020)
13	*Ficus religiosa* L.	Pipal	Moraceae	Young leaves eaten raw or in salads.	Singh et al. (2011)
14	*Mangifera indica* L.	Aambo	Anacardiaceae	Used in herbal tea, traditional medicines.	Kumar et al. (2021)

Sl.no	Scientific name	Local name	Family	Uses	Reference
15	*Moringa oleifera* Lam.	Moringa	Moringaceae	Used as vegetables, in soups, curries, and as powder.	Moyo et al. (2011)
16	*Morus alba* L.	Shetur	Moraceae	Used in soups, as vegetables, and for tea preparation.	Polumackanycz et al. (2021)
17	*Murraya koenigii* (L.) Spreng.	Mitho limdo	Rutaceae	Used as a seasoning in Indian and Southeast Asian dishes.	Gahlawat et al. (2014)
18	*Nyctanthus arbortristis* L.	parijat	Oleaceae	Used in traditional medicine and herbal food preparations.	Santosh & Manojkumar (2016)
19	*Oxalis stricta* L.	Changeri	Oxalidaceae	Used in salads, soups, and herbal teas.	Shad et al. (2013)
20	*Phyllanthus emblica* L.	Amla	Phyllanthaceae	Used in salads, herbal tea.	Mirunalini & Krishnaveni (2010)
21	*Piper betel* L.	Nagarvel	Piperaceae	Leaves chewed raw, used in herbal preparations and salads.	Jaiswal et al. (2014)
22	*Portulaca oleracea* L.	Moti luni	Portulacaceae	Consumed raw in salads or cooked in soups and stews.	Iranshahy et al. (2017)
23	*Portulaca quadrifida* L.	Nani luni	Portulacaceae	Used in salads, soups, and stir-fries.	Saxena (2023)
24	*Psidium guajava* L.	Jamfal	Myrtaceae	Used in herbal teas, soups, and traditional dishes.	Díaz-de-Cerio et al. (2017)
25	*Syzygium cumini* (L.) Skeels.	Jamun	Myrtaceae	Used in chutneys, salads and herbal infusions.	Ayyanar & Subash-Babu (2012)
26	*Tamarindus indica* L.	Imli	Fabaceae	Cooked in curries, soups, and chutneys.	Parvez et al. (2003)
27	*Terminalia Arjun* (Roxb.) Wight & Arn.	Arjun sadad	Combretaceae	Consumed in herbal teas and medicinal preparations.	Amalraj & Gopi (2017)
28	*Terminalia catappa* L.	badam	Combretaceae	Young leaves eaten in salads and traditional dishes.	Mgbemene & Ohiri (1999)
29	*Vitex negundo* L.	Nagod	Verbenaceae	Used in herbal dishes and medicinal preparations.	Devi (2004)
30	*Ziziphus mauritiana* Lam.	Ber	Rhamnaceae	Leaves consumed in herbal formulations.	Butt et al. (2021)

Table 2. Vitamin C in edible leaves of trees

Sl.no	Scientific name	Vitamin C(mg/100g)
1	*Aegle marmelos* (L.) Corrêa	7
2	*Ficus religiosa* L.	12
3	*Mangifera indica* L.	19
4	*Moringa oleifera* Lam.	46
5	*Morus alba* L.	15
6	*Murraya koenigii* (L.) Spreng.	12
7	*Nyctanthus arbortristis* L.	5
8	*Phyllanthus emblica* L.	35
9	*Psidium guajava* L.	40
10	*Syzygium cumini* (L.) Skeels.	62
11	*Tamarindus indica* L.	22
12	*Terminalia Arjun* (Roxb.) Wight & Arn.	14
13	*Terminalia catappa* L.	11
14	*Vitex negundo* L.	15
15	*Ziziphus mauritiana* Lam.	19

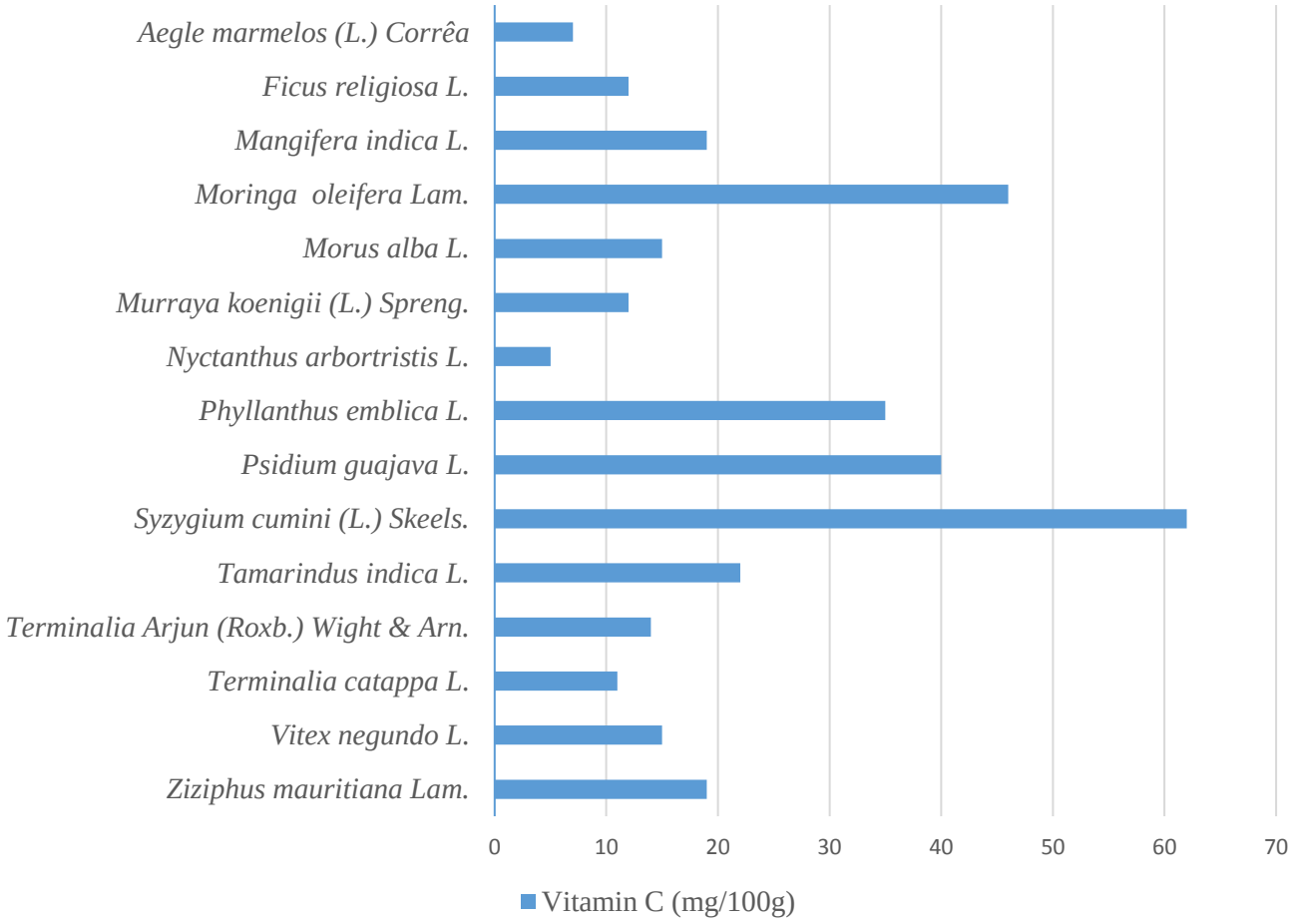


Table 3. Vitamin C in edible leaves of herbs

Sl.no	Scientific name	Vitamin C (mg/100g)
1	*Acalypha indica* L.	28
2	*Achyranthes aspera* L.	10
3	*Alternanthera sessilis* (L.) R.Br. ex DC.	7
4	*Amaranthus viridis* L.	28
5	*Chenopodium album* L.	4
6	*Cymbopogan flexuosus* Steud.	11
7	*Cynodon dactylon* (L.) Pers.	8
8	*Oxalis stricta* L.	16
9	*Portulaca oleracea* L.	8
10	*Portulaca quadrifida* L.	3

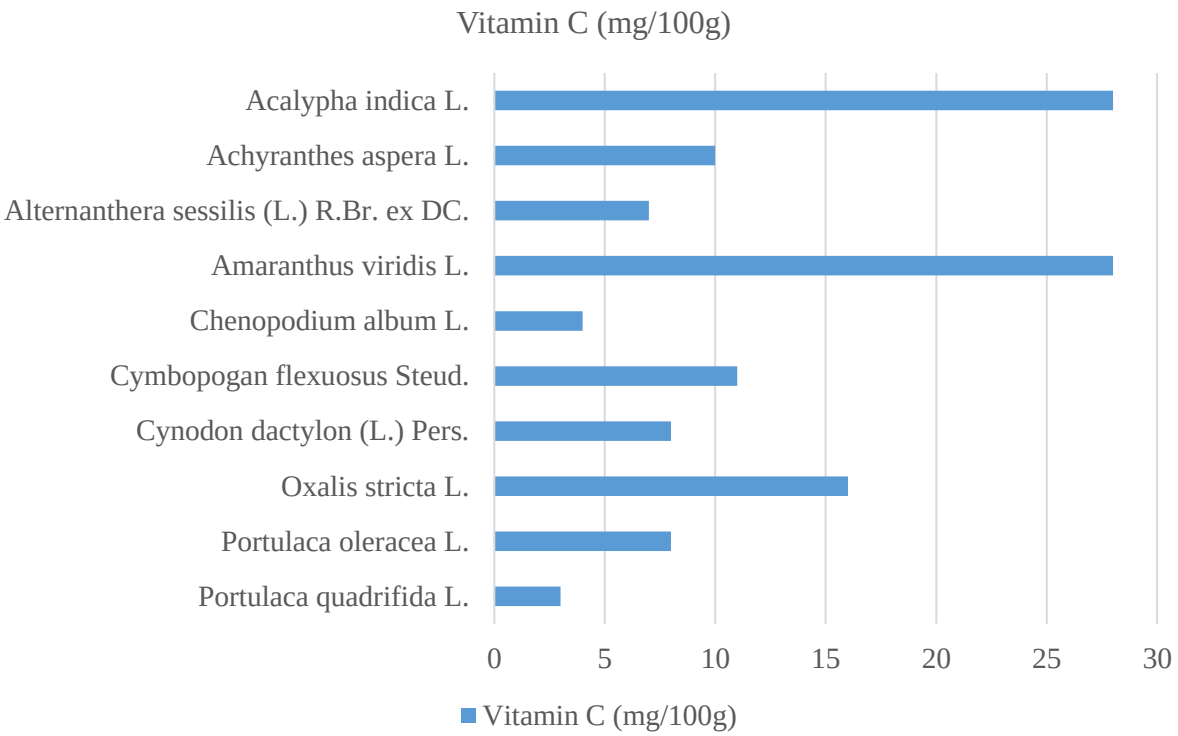
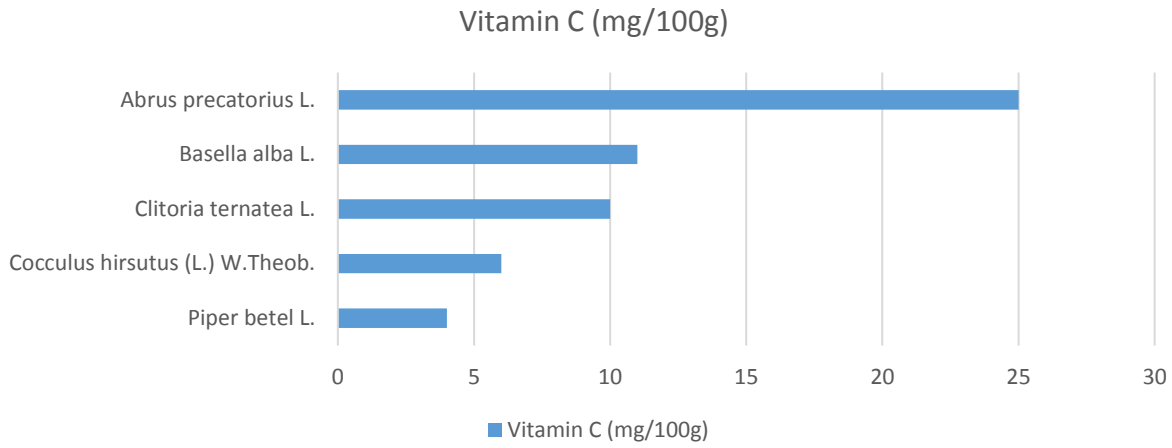


Table 4. Vitamin C in edible leaves of climbers

Sl.no	Scientific name	Vitamin C (mg/100g)
1	*Abrus precatorius* L.	25
2	*Basella alba* L.	11
3	*Clitoria ternatea* L.	10
4	*Cocculus hirsutus* (L.) W.Theob.	6
5	*Piper betel* L.	4



High Vitamin C

Plants in this category include *Syzygium cumini* (62 mg/100g), *Moringa oleifera* (46 mg/100g), *Psidium guajava* (40 mg/100g), *Phyllanthus emblica* (35 mg/100g), *Amaranthus viridis* (28 mg/100g), *Acalypha indica* (28 mg/100g), and *Abrus precatorius* (25 mg/100g). These species are rich sources of ascorbic acid, which is essential for antioxidant defense, collagen synthesis, and immune function. Among them, *Syzygium cumini* exhibits the highest concentration, aligning with previous findings that highlight its potent antioxidant and free radical scavenging properties (Baliga et al., 2011). *Moringa oleifera*, known as the "miracle tree," has been extensively studied for its nutritional benefits, including its high vitamin C content, which contributes to its medicinal and dietary applications (Anwar et al., 2007).

Moderate Vitamin C

A few of the species in this category are *Mangifera indica* (19 mg/100g), *Ziziphus mauritiana* (19 mg/100g), *Tamarindus indica* (22 mg/100g), *Vitex negundo* (15 mg/100g), *Morus alba* (15 mg/100g), *Oxalis stricta* (16 mg/100g), *Murraya koenigii* (12 mg/100g), *Ficus religiosa* (12 mg/100g), *Cymbopogan flexuosus* (11 mg/100g), *Terminalia arjuna* (14 mg/100g), and *Terminalia catappa* (11 mg/100g). Despite being a moderate provider of vitamin C, these species can nonetheless make a substantial contribution to dietary consumption. Research has demonstrated that Mangifera indica has bioactive components that increase its antioxidant capacity, and that vitamin C is essential for this activity (Berardini et al., 2005). In a similar vein, Vitex negundo's anti-inflammatory and immunomodulatory qualities have been acknowledged in traditional medicine, in part because of its vitamin C concentration (Maurya et al., 2025).

Low Vitamin C

Species in this group include *Aegle marmelos* (7 mg/100g), *Nyctanthus arbortristis* (5 mg/100g), *Achyranthes aspera* (10 mg/100g), *Portulaca oleracea* (8 mg/100g), *Cynodon dactylon* (8 mg/100g), *Cocculus hirsutus* (6 mg/100g), *Chenopodium album* (4 mg/100g), *Basella alba* (11 mg/100g), *Alternanthera sessilis* (7 mg/100g), *Clitoria ternatea* (10 mg/100g), *Piper betel* (4 mg/100g), and *Portulaca quadrifida* (3 mg/100g). Although these species have lesser quantities of vitamin C, they do supply vital antioxidants that contribute to overall health. Despite its low vitamin C concentration, *Portulaca oleracea* is prized for its omega-3 fatty acids and antioxidants (Uddin et al., 2014).

The variation in vitamin C content among different species could be attributed to environmental factors, plant metabolism, and genetic differences. Several studies have highlighted that external conditions such as soil quality, climatic variations, and plant maturity significantly influence vitamin C accumulation in plants (Davey et al., 2000). Moreover, vitamin C

degradation during storage and processing is an essential factor to consider in dietary applications (Lee & Kader, 2000).

IV. CONCLUSION

The current study examines the difference in vitamin C content among several plant species, categorizing them as rich, moderate, or low vitamin C sources. Species with the highest amounts included *Syzygium cumini*, *Moringa oleifera*, *Psidium guajava*, and *Phyllanthus emblica*, making them good natural sources of ascorbic acid. Moderate-level species such as *Mangifera indica*, *Tamarindus indica*, and *Ziziphus mauritiana* contribute significantly to dietary vitamin C intake. In contrast, species with lower concentrations, such as *Portulaca quadrifida* and *Chenopodium album*, nonetheless give significant nutritional benefits, but in smaller proportions. The observed difference in vitamin C concentration could be impacted by genetic, environmental, and post-harvest variables. Given the importance of vitamin C in human health, including these plants in daily meals can help prevent deficits and enhance antioxidant defense. Further research should focus on optimizing cultivation conditions, storage, and processing methods to maximize vitamin C retention in these plants. These findings provide insights into the potential of various plants as dietary sources of vitamin C. The high and moderate vitamin C-containing species can serve as excellent natural supplements to combat vitamin C deficiency-related disorders, such as scurvy and weakened immune responses. Further studies are needed to explore how processing, storage, and environmental factors influence their vitamin C stability.

REFERENCES

[1]. Amalraj, A., & Gopi, S. (2017). Medicinal properties of Terminalia arjuna (Roxb.) Wight & Arn.: a review. Journal of traditional and complementary medicine, 7(1), 65-78.

[2]. Anwar, F., Latif, S., Ashraf, M., & Gilani, A. H. (2007). Moringa oleifera: a food plant with multiple medicinal uses. Phytotherapy Research: An International Journal Devoted to Pharmacological and Toxicological Evaluation of Natural Product Derivatives, 21(1), 17-25.

[3]. Ayyanar, M., & Subash-Babu, P. (2012). Syzygium cumini (L.) Skeels: A review of its phytochemical constituents and traditional uses. Asian Pacific journal of tropical biomedicine, 2(3), 240-246.

[4]. Baliga, M. S., Bhat, H. P., Baliga, B. R. V., Wilson, R., & Palatty, P. L. (2011). Phytochemistry, traditional uses and pharmacology of Eugenia jambolana Lam.(black plum): a review. Food Research International, 44(7), 1776-1789.

[5]. Berardini, N., Fezer, R., Conrad, J., Beifuss, U., Carle, R., & Schieber, A. (2005). Screening of mango (Mangifera indica L.) cultivars for their contents of flavonol O-and xanthone C-glycosides, anthocyanins, and pectin. Journal of agricultural and food chemistry, 53(5), 1563-1570.

[6]. Butt, S. Z., Hussain, S., Munawar, K. S., Tajammal, A., & Muazzam, M. A. (2021). Phytochemistry of Ziziphus Mauritiana; its nutritional and pharmaceutical potential. Scientific Inquiry and Review, 5(2), 1-15.

[7]. Carr, A. C., & Maggini, S. (2017). Vitamin C and immune function. Nutrients, 9(11), 1211.

[8]. Chambhare, M. R. (2025). Bioactive metabolites of Jal-jamni (Cocculus hirsutus (L.) Diels.) and their traditional use and potential therapeutic benefits: a review. Discover Plants, 2(1), 1-18.

[9]. Cook, J. D., & Reddy, M. B. (2001). Effect of ascorbic acid intake on nonheme-iron absorption from a complete diet. The American journal of clinical nutrition, 73(1), 93-98.

[10]. Davey, M. W., Montagu, M. V., Inze, D., Sanmartin, M., Kanellis, A., Smirnoff, N., ... & Fletcher, J. (2000). Plant L-ascorbic acid: chemistry, function, metabolism, bioavailability and effects of processing. Journal of the Science of Food and Agriculture, 80(7), 825-860.

[11]. Devi, R. (2024). Ethnobotanical Aspects of Plant Diversity Along Kol Dam Water Reservoir In Himachal Pradesh, India.

[12]. Díaz-de-Cerio, E., Verardo, V., Gómez-Caravaca, A. M., Fernández-Gutiérrez, A., & Segura-Carretero, A. (2017). Health effects of Psidium guajava L. leaves: an overview of the last decade. International journal of molecular sciences, 18(4), 897.

[13]. Gahlawat, D. K., Jakhar, S., & Dahiya, P. (2014). Murraya koenigii (L.) Spreng: an ethnobotanical, phytochemical and pharmacological review. Journal of Pharmacognosy and Phytochemistry, 3(3), 109-119.

[14]. Garaniya, N., & Bapodra, A. (2014). Ethno botanical and Phytophrmacological potential of Abrus precatorius L.: A review. Asian Pacific journal of tropical biomedicine, 4, S27-S34.

[15]. Gupta, G. K., Chahal, J., & Bhatia, M. (2010). Clitoria ternatea (L.): Old and new aspects. J Pharm Res, 3(11), 2610-2614.

[16]. Gutiérrez, R. M. P., Mitchell, S., & Solis, R. V. (2008). Psidium guajava: A review of its traditional uses, phytochemistry and pharmacology. Journal of ethnopharmacology, 117(1), 1-27.

[17]. Hwong, C. S., Leong, K. H., Aziz, A. A., Junit, S. M., Noor, S. M., & Kong, K. W. (2022). Alternanthera sessilis: Uncovering the nutritional and medicinal values of an edible weed. Journal of Ethnopharmacology, 298, 115608.

[18]. Iranshahy, M., Javadi, B., Iranshahi, M., Jahanbakhsh, S. P., Mahyari, S., Hassani, F. V., & Karimi, G. (2017). A review of traditional uses, phytochemistry and pharmacology of Portulaca oleracea L. Journal of ethnopharmacology, 205, 158-172.

[19]. Jacob, R. A., & Sotoudeh, G. (2002). Vitamin C function and status in chronic disease. Nutrition in clinical care, 5(2), 66-74.

[20]. Jaiswal, S. G., Patel, M., Saxena, D. K., & Naik, S. N. (2014). Antioxidant properties of Piper betel (L) leaf extracts from six different geographical domain of India. J. Bioresour. Eng. Technol, 1, 18-26.

[21]. Kumar, M., Saurabh, V., Tomar, M., Hasan, M., Changan, S., Sasi, M., ... & Mekhemar, M. (2021). Mango (Mangifera indica L.) leaves: Nutritional composition, phytochemical profile, and health-promoting bioactivities. Antioxidants, 10(2), 299.

[22]. Lee, S. K., & Kader, A. A. (2000). Preharvest and postharvest factors influencing vitamin C content of horticultural crops. Postharvest biology and technology, 20(3), 207-220.

[23]. Maurya, A., Pal, S., Pandey, K. K., Mishra, P. K., Yadav, V. S., & Kumar, R.(2025) An Overview of Nirgundi (Vitex negundo): A Traditional Ayurvedic Herb for Pain Relief and Healing.

[24]. Mgbemene, C. N., & Ohiri, F. C. (1999). Anti-sickling potential of Terminalia catappa leaf extract. Pharmaceutical biology, 37(2), 152-154.

[25]. Mirunalini, S., & Krishnaveni, M. (2010). Therapeutic potential of Phyllanthus emblica (amla): the ayurvedic wonder. Journal of basic and clinical physiology and pharmacology, 21(1), 93-105.

[26]. Moyo, B., Masika, P. J., Hugo, A., & Muchenje, V. (2011). Nutritional characterization of Moringa (Moringa oleifera Lam.) leaves. African journal of biotechnology, 10(60), 12925-12933.

[27]. Padayatty, S. J., Katz, A., Wang, Y., Eck, P., Kwon, O., Lee, J. H., ... & Levine, M. (2003). Vitamin C as an antioxidant: evaluation of its role in disease prevention. Journal of the American college of Nutrition, 22(1), 18-35.

[28]. Parvez, S. S., Parvez, M. M., Nishihara, E., Gemma, H., & Fujii, Y. (2003). Tamarindus indica L. leaf is a source of allelopathic substance. Plant Growth Regulation, 40, 107-115.

[29]. Polumackanycz, M., Wesolowski, M., & Viapiana, A. (2021). Morus alba L. and Morus nigra L. leaves as a promising food source of phenolic compounds with antioxidant activity. Plant Foods for Human Nutrition, 76, 458-465.

[30]. Poonia, A., & Upadhayay, A. (2015). Chenopodium album Linn: review of nutritive value and biological properties. Journal of food science and technology, 52, 3977-3985.

[31]. Ranganna, S. (1986). Handbook of analysis and quality control for fruit and vegetable products. Tata McGraw-Hill Education.

[32]. Reyad-ul-Ferdous, M., Shahjahan, D. S., Tanvir, S., & Mukti, M. (2015). Present biological status of potential medicinal plant of Amaranthus viridis: a comprehensive review. Am. J. Clin. Exp. Med, 3(5), 12.

[33]. Roshan Adhikari, R. A., Kumar, H. N., & Shruthi, S. D. (2012). A review on medicinal importance of Basella alba L.

[34]. Saini, R. K., Nile, S. H., & Park, S. W. (2015). Carotenoids from fruits and vegetables: Chemistry, analysis, occurrence, bioavailability and biological activities. Food Research International, 76, 735-750.

[35]. Santosh, J., & Manojkumar, P. (2016). A review on: Nyctanthes arbortristis Linn. Rejuvinating herbs. Int J Res Pharm Pharm Sci, 1(1), 54-62.

[36]. Savadi, S., Vazifedoost, M., Didar, Z., Nematshahi, M. M., & Jahed, E. (2020). Phytochemical analysis and antimicrobial/antioxidant activity of Cynodon dactylon (L.) Pers. rhizome methanolic extract. Journal of Food Quality, 2020(1), 5946541.

[37]. Saxena, S. (2023). Comparative antioxidant profiling and mineral estimation of Portulaca oleracea L. and Portulaca quadrifida L.

[38]. Shad, A. A., Shah, H. U., & Bakht, J. (2013). Ethnobotanical assessment and nutritive potential of wild food plants. J Anim Plant Sci, 23(1), 92-99.

[39]. Singh, A., Dhakad, A., Singh, A. E., Pandey, A., & Mani, G. A Review: Medicinal Properties and Health Benefits of Bael (Aegle marmelos).

[40]. Singh, D., Singh, B., & Goel, R. K. (2011). Traditional uses, phytochemistry and pharmacology of Ficus religiosa: A review. Journal of ethnopharmacology, 134(3), 565-583.

[41]. Srivastav, S., Singh, P., Mishra, G., Jha, K. K., & Khosa, R. L. (2011). Achyranthes aspera-An important medicinal plant: A review. J Nat Prod Plant Resour, 1(1), 1-14.

[42]. Uddin, M. K., Juraimi, A. S., Ali, M. E., & Ismail, M. R. (2012). Evaluation of antioxidant properties and mineral composition of purslane (Portulaca oleracea L.) at different growth stages. International journal of molecular sciences, 13(8), 10257-10267.

[43]. Zahidin, N. S., Saidin, S., Zulkifli, R. M., Muhamad, I. I., Ya'akob, H., & Nur, H. (2017). A review of Acalypha indica L. (Euphorbiaceae) as traditional medicinal plant and its therapeutic potential. Journal of ethnopharmacology, 207, 146-173.

[44]. Zhao, J., Fan, Y., Cheng, Z., Kennelly, E. J., & Long, C. (2024). Ethnobotanical uses, phytochemistry and bioactivities of Cymbopogon plants: A review. Journal of Ethnopharmacology, 118181.