IISRR-IJR ID- 2527(10); DOI No. 10.5281zenodo.15711923

Wild Edible Plant for Food Security & Sustainability: A Case Study by School Students

The Project Conducted by the following Students of

Behala Girls' Hogh School, (Higher Secondary)

Dr. Kaberi Chatterjee
HOI, Behala Girls' High School (H.S.)
tiya160@gmail.com

Shubhra Ghosh (Mitra)
Assistant Teacher,
Behala Girls' High School (H.S.),
shubhra7819@gmail.com

Anushka Saha Manisha Shaw Sudisha Mandal,
Saanjh Santra Amrita Paul Sayanti Paul Rashi Roy

Guide: Kaberi Chatterjee

Co Guide: Shubhra Ghosh (Mitra)

Anushka Saha (IX)

Manisha Shaw (IX)

Sudisha Mandal (IX)

Saanjh Santra (VII)

Amrita Paul (VII)

Sayanti Paul (VII)

Rashi Roy (VII)

Abstract:

Today the children of the world are facing severe global challenges including public health, climate change, nutritional deficiencies & lack of traditional knowledge. Along with sedentary lifestyle, increase in diet related disorders and increase in Body Mass Index are major public health issues in modern time. Limited access to wholesome food and relatively easier access to unhealthy food may be linked to malnutrition and ultimately leading to obesity and diet-related illness. To achieve SDG1, SDG2 and SDG13 by 2030, the students of Secondary Education under WBBSE have done field surveys to understand biodiversity which begins on our plates, fostering healthy living. Though field surveys they investigated the habitats of WEPs and their availability. They got the knowledge, awareness that WEPs are considered as useful for their multiple positive values, beneficial for nutritional level and security of food, medicinal value, easy to cultivate as they do not need any fertilizer or human care. They also noted that there is a big developmental change in landscape in the study area, and change in food consumed within a historical timeline of 70 – 80 years. They tried to find whether at present WEPs are included in the regular diet of urban people in Kolkata or not.

Key words: *Global challenges, public health, nutritional deficiencies, diet-related disorders, Body Mass Index, Obesity, SDG 1, SDG 2, SDG 13, historical timeline*

Abbreviations: *WEP = Wild Edible Plant, SDG = Sustainable Development Goals, WBBSE=West Bengal Board of Secondary Education*

1. Introduction:

WEPs are plants that can be consumed but are not cultivated by humans. They grow naturally in the forest, agricultural lands, barren lands, fallow lands, on the roadside, empty sites, in and around wetlands, etc. by simply using the available resources. WEPs provide essential nutrients but their use in our diet has been declining day by day due to change in food habits and lifestyle and changes taking place in the landscape of our locality. To achieve SDG 1, 2, 13 we should select environmentally friendly diet or "climate diet"[1] i.e. plant-based diets as they significantly lower green-house gas emissions (GHGE)[2] with vegetarian diets averaging 1.7 kg CO^2 per day compared to higher emissions from meat-based diets (Alves et al., 2023)[3]. Much of the food we eat comes from a long distance. Transportation causes depletion of petroleum-based fuels & causes Global warming or boiling & climate change. Intake of WEP is one of the best ways to take climate action plan and to improve nutritional deficiencies in public health.

2. Literature Review:

Various studies have been conducted on role of WEPs to achieve SDG viz. Borelli, T. *et. al.*[4] in their study showed that WEPs had been a vital component of food and nutrition security for centuries. They were reported as critical for livelihood resilience and for providing essential micronutrients to people enduring food shortages or other emergency situations. Review on Valorization of WEP as food ingredients and their economic value Clemente-Villalba, J. *et al*[5] in 2023, found evidence that a consumption of between 100 gm to 200 gm of some of these WEPs can cover up to 50% of the recommended daily intake of proteins and fibers, being also a natural source of macro & micro minerals. In the review of Marrelli, M. *et al*[6] in 2020, results on the in vitro and in vivo activity of the most interesting plant extract and their bioactive component highlighted the importance and beneficial health roles of wild edible species. In the study of Salvi, J.[7] (2016), commercial exploitation of the underutilized WEPs such as a source of dietary supplement, for new food formulation, biofortification, and in product development was focused. In the review work of Bharucha, Z & Pretty, J[8] in 2010, the Roles & Values of Wild Foods in agricultural systems & provision of an access to WEP Sources of food may be declining as natural habitats come under increasing pressure from development, conservation – exclusions and agricultural expansions.

[1] Climate diet focuses on reducing the environmental impact through our food choices.
[2]GHGE refer to the release of gases into the atmosphere that trap heat and contribute to the greenhouse effect
[3]Alves et al., 2023 Promoting the Transition to Circular Economy
[4] Borelli T et al (2020). Born to eat Wild: An integrated conservation approach to secure wild food plants for food security and nutrition, *Plants* 2020,9(10), 1299;
[5]Clemente-Villalba, J. et al (2023) Valorization of Wild Edible Plants as Food Ingredients and Their Economic Value, Foods 2023
[6]Marrelli M., Statti G., Conforti F. (2020) A Review of Biologically Active Natural Products from Mediterranean Wild Edible Plants: Benefits in the Treatment of Obesity and its Related Disorders, Molucules 2020
[7]Salvi, J (2016). A Review: Underutilized Wild Edible Plants as a potential source of alternative nutrition
[8]Bharucha, Z. and Pretty, Z. The roles and values of wild foods in Agricultural systems, Phil Trans R Soc B, Vol 365, (2010), pp 2913 – 2926

According to the work of Shirsat, et al.[9] in 2023, the current scenario of WEPs, their importance, for future food security of source of nutrients, ethnic knowledge associated with them, threats encountered by WEPs, etc. should be attempted to review. In the work of Naskar et al[10] in 2022, they recommended growing of wild medicinal plants under organized agriculture, as crops for large scale production & utilization in daily meals.

3. Research Gaps:

We have not found out any research gap from the literature review. We have started this study under our school curriculum. Environmental science and life science syllabus from class VI to X under WBBSE have chapters related with Biodiversity, Human Health &Climate change, its causes & impact. As a project work for activity-based curriculum, students of class VII & X started survey work on identification, availability, consumption of some neglected plant resources (WEP) in school yard, at household areas & nearby market places under the guidance of teachers & family members.

4. Aims & Objectives:

i) To explore, identify and documents WEP resources and traditional knowledge associated with these plants.
ii) To understand to what extent WEP are currently used in the diet of local people & if there is any dietary shift.
iii) To facilitate cooperation between students & teachers and other members of the schools.
iv) To enhance the nutritional intake of students who eat WEP.

5. Methodology:

5.1 Planning:

Students were divided into small groups. Seven group leaders had taken interview from local area with community members who were directly dependent on local biodiversity and livelihood. They also had taken interview from their family members, their parents & grandparents. They gave opinion regarding WEPs.

5.2 Tools used: Mobile phone, pen, pencil, note book

5.3 Area of the Study:

Students observed WEPs in school ground, rooftop of the school, vegetable market and areas around their houses at Behala, in Kolkata, West Bengal.

[9] Shirsat, et al. 2023. Current Scenario of Wild Edible Plants (WEPs), their importance, Possible Threats and Conservation: A Mini Review. Journal of Agriculture and Ecology Research International 24(5): 18-27. https://doi.org/10.9734/jaeri/2023/v24i5538

[10] Naskar, C. Mukherjee, S.K. and Das Datta, M. "Wild Medicinal Plants of South 24 Parganas District, West Bengal, India," Universal Journal of Plant Science (2022), Vol 9 (1), PP 1-12

5.4 Survey:

They surveyed about 20 WEPs species in the school premises, in school backyard, in the areas surrounding their houses, vegetable markets in their respective localities under Behala, Kolkata. They spoke to elderly family members, neighbors, school mates who belong to three age groups i.e. 10 to 15 years, next 20 to 50 years and then 60 to 80 years and gathered information about WEPs that they generally consumed.

During the Survey the Students asked the following questions during interviews to the Local people-

(i) Local name of the plants.
(ii) Which part of the plant is consumed?
(iii) Where does it grow?
(iv) In which season does it grow?
(v) How often is it consumed? If not, the reason behind it.
(vi) Is the plant currently available?
(vii) If not available, what is the reason?

During interview they noted date, time, age, sex, and social class of interviewee. They also visited local markets to find WEPs and their local market values.

6. Data Collection and Analysis of collected data:

6.1 Data Collection:

Table No. 1: List of currently available WEPs with information taken during survey of plants through interview in study area (Image 1& 2)

Sl no	Name of WEP	Common name (in Bengali)	Family	Parts used	Occurrence	Reported medical value
1	*Colocasia esculenta* (L.) Schott	Kochu Shak, Kochu (Image 2)	Araceae	Leaves, Tubers	In wet areas, edges of ponds, in moist rich soil	Relieves constipation, blood purifier
2	*Amaranthus viridis* L.	Bon Notay (Image 2)	Amaranthaceae	Shoot	In roadside, fields, waste areas & cultivated land,parks	Relieved to cure stomach ailments
3	*Coccinia grandis* (L.) Voigt	Kudri	Cucurbitaceae	Fruits	In areas with sufficient sunlight, well-draining moist soil	Used to treat jaundice
4	*Bacopa monnieri*	Brahmi	Scrophulariaceae	Shoot	In wet or marshy habitat	Used as brain tonic
5	*Centella asiatica* (L.) Urban	Thankuni (Image 1)	Apiaceae	Leaves	In humid & shady environment	Used to stop diarrhoea, treat digestive problem
6	*Ipomoea aquatica*Forsk	Kalmi (Image 2)	Convolvulaceae	Leaves	In wet fertile soils, marshy area	Carminative agent, anti-inflammatory
7	*Hygrophila spinosa* T. Ander	Kulekhara (Image 1)	Acanthaceae	Leaves & shoot	In moist places,on the banks of ditches	Renal tonic & improves haemoglobin level

8	*Murrayakoenigii*(L.) Spreng	Karipata (Image 1)	Rutaceae	Leaves	It thrives in warm, humid conditions & prefers well drained soil	Treatment in constipation, colic &diarrhoea
9	*Ficusracemosa* L.	Dumur (Image 1)	Moraceae	Fruit	Prefers moist areas	Useful to treat diabetes, liver disorders, anaemia
10	*Alocasia indica* (Lour.) Koch	Dudh Man Kochu	Araceae	Tuber, petioles	Moist wetland environment	Relieves constipation
11	*Enhydra fluctuans*Lour.	Helencha/ Hinche	Asteraceae	Shoot	Moist place, along roadside, whole moisture accumulates	Useful for renal problem, kidney stone, ascites, dropsy & anasarca
12	*Mentha arvensis* L.	Pudina	Lamiaceae	Leaves, Shoot	Wet environment, moist soil, also grow in full sunlight	Useful for digestive problem, headache, skin disease
13	*Nymphaea alba* L,	Shaluk	Nymphaeaceae	Pedical	Freshwater pond, lakes, canals, ditches	Used to treat diarrhoea
14	*Trichosanthescucumerina* L.	Chichinga (Image 1)	Cucurbitaceae	Fruit	In warm climate with good sunlight & well drained soil	Relief for stomach problem
15	*Glinusopposi tifolius* (L.) Aug.DC	Gima Shak	Molluginaceae	Whole plants	Roadsides, wet areas, riverbanks	Useful to treat skin disease, earache, digestive problem
16	*Cucurbita maxima* Duchesne	Kumro Shak (Image 1)	Cucurbitaceae	Leaves	Warm, sunny place, fertile, moist soil	Relieves constipation
17	*Adhatodavasica*Hees.	Basak	Acanthaceae	Leaves, flowers	Sunny roadsides, ditches, in waste dry areas	Used to treat cough & cold

Image-1: Students' survey work on WEP in Schoolyard and Household Areas

Image-2: Students' survey work on WEP in Household Areas

6.2. Analysis of Collected Data:

Seven student representatives of class VII & IX took interview of about eighty people of three generations having age group from 10 to 15 years, 20 to 50 years and 60 to 80 years. They received the following information from interviewee regarding WEPs and their uses. These are

(i) Of the total number they spoke to 80 people, about 60 people were aware of WEPs.
(ii) Those who did not know about some of the WEPs, they are younger generations of age group 10 to 12 years.
(iii) They did not find any one who never consumed WEP.
(iv) About 14 types of WEPs that the students able to document through this activity.
(v) Except Colocasia, students were able to set up WEP garden in the school easily.
(vi) Students did not able to document Sushni, Kudri may be due to habitat destructions.

7. Interpretation of results:

WEPs include wide variety such as annual and perennial herbs, shrubs and trees and provide resources for human nutrition & health. Lack of knowledge of about WEPs in younger generations (from 10 to 12 years) may be due to urbanization, modernization, lifestyle & lack of use at home. Most of the knowledge about WEPs flows from elderly people of family. Students found that WEPs are well known in their study areas. Most of the students documented about 14 types of WEPs out of 20 listed or interviewed. They gave opinion that habitat destruction and urbanization are reducing availability of WEPs in their surroundings.

Findings:

(i) Nutritional contribution of WEPs: Knowledge of local people about WEPs supports the nutritional contributions of WEPs. WEPs are the rich sources of essential nutrients, including vitamin, minerals and antioxidants. These plants often fill nutritional gaps specially during lean seasons when cultivated crops are scarce.
(ii) Economic impact: Income generation by WEPs – Availability in the local market proves that WEPs contribute significantly to the income of many households, in urban and especially in rural areas. In India the sale of WEPs generates substantial income of Rs. 100/- to Rs. 200/- per day approximately.
(iii) Environmental impact of WEPs: In study area, students identified diversities of WEPs which support their role in climate change adaptation. Availability throughout the year ensures their sustainability, self-sufficiency, making them a resilient food source in the scenario of climate change.
(iv) Threats to WEPs: Students understood that despite their importance, WEPs face several threats, including over exploitation, habitat loss and climate change.
(v) Conservation & Sustainable utilization: Students found WEPs at some household areas and at kitchen garden in school. They understood that, to ensure the continued contribution of WEPs to food security, sustainable harvesting and conservation practices are essential. Community based conservation strategies, such as planting WEPs in home garden or kitchen garden at school and community spaces also help their conservation strategies.

(vi) Challenges: Knowledge gaps & documentation - Younger students (age group from 10 to 12 years) understood their lack of knowledge associated with some of the WEPs.

9. Conclusion:

In this survey, after taking interview, students gathered information about diversities, occurrence, availability and importance of WEPs. They understood WEPs are vital component of local diet and livelihood. They got practical knowledge about identification and importance of WEPs when they talked with older people. They found that WEPs are quite common in urban market in Kolkata, as they noticed one or two sellers in each vegetable market. They could correlate with the landscape change with non-availability of WEPs. They understood that WEPs offer a resilient and sustainable food source, but their conservation and sustainable utilization required urgent attention. WEPs should be brought to big shopping mall or Big Bazar. Policy makers, researchers and local communities must work together to document, conserve and promote WEPs to ensure their continued contribution to food security and livelihoods during climate change.

References:

Alves, et al (2023). Promoting the Transition to a Circular Economy: A study about behaviour, Attitudes and Knowledge by University Students in Portugal. Sustainability, 16(1),343. http://doi.org/10.3390/su16010343.

Bharucha, Z. and Pretty, Z. The roles and values of wild foods in Agricultural systems, Phil Trans R Soc B, Vol 365, (2010), pp 2913 – 2926

Borelli, T. et al (2020). Born to eat Wild: An Integrated Conservation Approach to Secure Wild Food Plants for Food Security and Nutrition, *Plants* 2020,9(10), 1299; https://doi.org/10.3390/plants9101299

Clemente-Villalba, J. et al (2023). Valorization of Wild Edible Plants as Food Ingradients and Their Economic Value, Foods 2023, 12(5).1012; https://doi.org/10.3390/foods12051012

Marrelli M., Statti G., Conforti F. (2020). A Review of Biologically Active Natural Products from Mediterranean Wild Edible Plants: Benefits in the Treatment of Obesity and its Related Disorders, Molucules 2020 – 25(3):649, DOI:10.3390/molecules25030649

Naskar, C. Mukherjee, S.K. and Das Datta, M. "Wild Medicinal Plants of South 24 Parganas District, West Bengal, India," Universal Journal of Plant Science (2022), Vol 9 (1), PP 1-12

Salvi, J (2016). A Review: Underutilized Wild Edible Plants as a potential source of alternative nutrition. www.botanyjournals.com Vol 1; Issue 4; My 2016: Page No.32-36

Shirsat, Rupali, Tripty Jagtap, Ashwini Sirsat, Shubham Rathod and Dipak Koche. 2023. Current Scenario of Wild Edible Plants (WEPs), their importance, Possible Threats and Conservation: A Mini Review. Journal of Agriculture and Ecology Research International 24(5): 18-27. https://doi.org/10.9734/jaeri/2023/v24i5538