Ethnobotanical Survey on Wild Edible Plants Used by Tribals & Rural People of Arjuni/Mor Taluka, Gondia District, Maharashtra State, India

Kailash S. Lokhande
Department of Botany, S.S. Jaiswal College, India

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Abstract
The study area is inhabited by Gond tribes. Tribals and most of forest dwellers mainly depend on plants and plant product for their food. This study reveals that the ethnic people and forest dwellers have considerable traditional knowledge of wild edible plants and their utilization. This paper report is based on survey, interview and field work studies on wild edible plants used by tribals and rural people of Arjuni/Mor Taluka, Gondia District, Maharashtra State, India during March 2016 - March 2018. A total of 71 plant species belonging to 63 genera and 39 families have been recorded as wild edibles in the study areas, of which trees are ranked first with 36 species, followed by herbs, climbers and shrubs with 22, 7 and 6 species respectively. Among the 71 species, 43.2% contribute as vegetables by their fruit, 22.22% by leaf, 12.34% by seed or grain, 8.64% by root or tuber, 6.17% by stem, bark or sap, 6.17% by flower and 1.23% by whole plant. It is evident from the survey that most of the species of wild edibles are used as vegetable/chutney (49.33%), followed by raw/ripe fruits (45.33%), pickles (4%), roasted seeds (1.33%).

Keywords Ethnic People, Traditional Knowledge, Forest Dwellers, Commercial Food

1. Introduction
Ethnobotany encompasses the total, natural and traditional man-plant relationships. It recognizes the important role of the ambient vegetation in the economic life of people. Ethnobotany has now contributions to an understanding of man-plant relationships, as well as for the practical applications of the biological knowledge of aboriginal people in medicine, health, agriculture and industry. [1]

From ancient time plants have been used as a source of food, shelter, clothing, medicine, fibre, gum, resin, oil, etc. Several wild plants are used as food by tribals and other local people living in and around the forest areas. [2]

Tribal and local people prefer wild vegetables over the cultivated as they grow naturally; provide better taste and good health. By selling these wild edibles to the nearby urban markets could earn them extra income. Aboriginals believed that some of the seasonal wild vegetables are good for health and also provide the immunity during the rains which is supposed to be the most suspicious period to become ill by various disorders. [3]

Now the ancient men are thoroughly acquainted with the method of excluding the harmful substances from the wild plants and preparing recipes for their meager meals. [4]

Food plants are not only supplement to the food quantity, but also an important option during starvation for survival and thus makes significant contribution to the human nutrition throughout the year. However, the century old traditional knowledge system for utilization of wild plants is depleting very quickly. Modern scientific researchers are trying to value these traditional food items to fill the gaps between growing population and food production. [5]

The present studies were conducted to explore the knowledge of wild edible plants to meet the increasing demands of the growing population. The diversity of these plant resources needs to be documented and analysis should be done for their nutritional values. Increased use of traditional vegetables can contribute to enhancing people's health and standard living as well as the economic and social status of the food producers themselves.

2. Materials and Methods
2.1. Study Area
This study was conducted in 11 villages in Arjuni/Mor
Taluka of Gondia district, Maharashtra state, India. Gondia district is situated between 20°39' to 21°38' N and 79°27' to 80°42' E (Fig. 1). The district is located in the north-eastern part of the state and is bordered by the states of Chhattisgarh and Madhya Pradesh from east and north respectively and Bhandara district and Chandrapur district of Maharashtra to the west and south.

Gondia district was under the privilege of 'Gond Raja'. The whole area was surrounded by the dense forest. 'Gond' is the main tribe of this area. [6]

Surban, Bondgaon, Gothangaon, Pratapgad, Navegaon, Dewalgaon, Khairi, Sukadi, Dabhana, Tidka, Kesori are the villages in study area. All these 11 villages are surrounded by dense forest.

2.2. Data Collection

Study was carried out during the year of March 2016 to March 2018. This Information on wild edible plant species is outcome of ethnobotanical field survey and interviews among old tribal peoples, ethnic men and women based on the standard procedures suggested by. [7] The field survey covered different seasons. Data collection was made in different places i.e. forest, bare lands, playground, roadside, agricultural farms and near localities. Plant specimens were collected and identified with the help of floras. [8-12]

Notes were recorded on local names, useful plant parts and their utilization by showing photographs of some collected specimens to local peoples. The identified plants are arranged alphabetically with family names, local names and parts used (Table 1).
Table 1. Wild edible plants used by Local people of study area

| S.N | Plant Name                      | Family       | Local Name     | Life form | Part(s) used | Mode of utilization                      |
|-----|--------------------------------|--------------|----------------|-----------|--------------|------------------------------------------|
| 1.  | *Abelmoschus moschatus* Medic. | Malvaceae    | Kasthoori bhendi | H         | Fruits      | Cooked as vegetable                      |
| 2.  | *Abrus precatorius* L.         | Fabaceae     | Gomchi, Gunja   | C         | Leaves      | Used as vegetable                        |
| 3.  | *Abutilon indicum* (L.) Sweet  | Malvaceae    | Petari          | H         | Leaves and Flowers | Cooked as vegetable |
| 4.  | *Acacia catechu* (L.f.) Wild   | Mimosaceae   | Khair           | T         | Gum         | Taken with betel leaf                    |
| 5.  | *Acacia nilotica* (L.) Wild.   | Mimosaceae   | Babul           | T         | Gum and seeds | Seeds roasted with salt and eaten        |
| 6.  | *Aegle marmelos* Corr.         | Rutaceae     | Bel             | T         | Fruit       | Raw fruit pulp is eaten                   |
| 7.  | *Alternanthera sessilis* DC    | Amaranthaceae | Jibhkati        | H         | Leaves      | Cooked as vegetable                      |
| 8.  | *Amaranthus spinosus* L.       | Amaranthaceae | Matbhaji        | H         | Leaves      | Cooked as vegetable                      |
| 9.  | *Amaranthus viridis* L.        | Amaranthaceae | Khedabbaji      | H         | Leaves      | Cooked as vegetable                      |
| 10. | *Amorphophalus paonifolius* Demst. | Araceae | Jimikanda       | H         | Tender Leaves and Corm | Cooked as vegetable |
| 11. | *Annona reticulate* L.         | Annonaceae   | Ramphal         | T         | Ripe fruits | Eaten raw                                |
| 12. | *Annona squamosa* L.           | Annonaceae   | Sitaphal        | T         | Ripe fruits | Eaten raw                                |
| 13. | *Artocarpus heterophyllus* Lank | Moraceae     | Phanas          | T         | Fruits      | Cooked as vegetable                      |
| 14. | *Antidesma ghaesembilla* Gaertn | Euphorbiaceae | Amti,Jondhurli | T         | Ripe fruits | Eaten raw                                |
| 15. | *Averrhoa carambola* L.        | Oxalidaceae  | Aamras          | T         | Ripe fruits | Eaten raw                                |
| 16. | *Azadirachta indica* A.Juss.   | Meliaceae    | Nim             | T         | Ripe fruits | Eaten raw                                |
| 17. | *Bacopa monnieri* (L.) Penn.   | Scrophulariaceae | Brahmi    | T         | Whole plant | Cooked as vegetable                      |
| 18. | *Bambusa vulgaris* Schrad.     | Poaceae      | Bans,Vadad      | T         | Tender shoots | Cooked as vegetable                      |
| 19. | *Bauhinia purpurea* L.         | Caesalpiniaee | Koilar          | T         | Leaves and Flower buds | Cooked as vegetable |
| 20. | *Bauhinia vahlii* Wight & Arn. | Caesalpiniaee | Mahulbel        | C         | Seeds      | Cooked as vegetable                      |
| 21. | *Bridelia retusa* Spreng       | Euphorbiaceae | Kasai          | T         | Ripe fruits | Eaten raw                                |
| 22. | *Buchanania cochinchinensis* (Lour.) Almeida | Anacardiaceae | Sadeka, Char | T         | Ripe Fruits and Seeds | Eaten raw                                |
| 23. | *Butea monosperma* (Lam.) Taub. | Fabaceae     | Parsa, Palas   | T         | Flower      | Cooked as vegetable                      |
| 24. | *Cajanus scarabaeoides* (L.) Du Petit-thou | Fabaceae | Ran-tur       | H         | Seeds      | Cooked as vegetable                      |
| 25. | *Cardiospermum helicacabum* L. | Sapindaceae  | Kaparphuti     | H         | Ripe fruits | Eaten raw                                |
| 26. | *Cassia fistula* L.            | Caesalpiniaee | Bahava         | T         | Flowers and seeds | Cooked as vegetable                      |
| 27. | *Cassia tora* L.               | Caesalpiniaee | Charota, Chirola | H         | Leaves      | Cooked as vegetable                      |
| 28. | *Chenopodium album* L.         | Chenopodiaceae | Awadi-dhawadi  | H         | Leaves      | Cooked as vegetable                      |
| 29. | *Cissus quadrangularis* L.     | Vitaceae     | Hadijod        | C         | Shoot      | Cooked as vegetable                      |
| 30. | *Colocasia esculenta* (L.) Schott | Araceae    | Dhopa,Aaki, Kochamati, | H         | Leaves, petiole & tuber | Cooked as vegetable                      |
| 31. | *Commenla benghalensis* L.     | Commelinaceae | Telka bhaiji   | H         | Leaves      | Cooked as vegetable                      |
| 32. | *Costus speciosus* (Koen) Sm.  | Zingiberaceae | Kevkanda        | H         | Leaves, Tuber | Cooked as vegetable                      |
| 33. | *Cryptocoryne retrospiralis* (Roxb.) Kunth | Araceae | Pakanbhed    | H         | Leaves      | Cooked as vegetable                      |
| 34. | *Dendrocalamus strictus* (Roxb.) Nees | Poaceae | Ranj, bamboo | T         | Tender shoots | Cooked as vegetable                      |
| 35. | *Dioscorea bulbifera* L.       | Dioscoreaceae | Mataru, Dangkanda | C         | Tubers, bulblis | Cooked as vegetable                      |
| 36. | *Diospyros melanoxylon* Roxb.  | Ebenaceae    | Tembhrun, Tendu | T         | Ripe Fruits | Eaten raw                                |
| 37. | *Ficus racemosa* L.            | Moraceae     | Umbar           | T         | Ripe Fruits | Eaten raw                                |
### Table 1 Continued

| No. | Species Name                     | Family     | Village | Plant Part | Use           |
|-----|----------------------------------|------------|---------|------------|---------------|
| 38. | Gardenia lattifolia Ait.         | Rubiaceae  | Ghogar  | T          | Ripe Fruits Eaten raw |
| 39. | Gmelina arborea Roxb.            | Verbenaceae| Siwan   | T          | Ripe Fruits Eaten raw |
| 40. | Grewia hirsuta Vahl.             | Tiliaceae  | Gaturli/Gautri | S      | Ripe Fruits Eaten raw |
| 41. | Grewia tilifolia Vahl Fruits     | Tiliaceae  | Dhaman  | T          | Ripe Fruits Eaten raw |
| 42. | Hemidesmus indicus (L.) R. Br.   | Periploceae| Khabrileha | C     | Tuber Cooked as vegetable |
| 43. | Holarrhena pubescens (Buch-Ham.) Wall.ex. G.Don. | Apocynaceae | Kudva   | S          | Flower, Fruits Cooked as vegetable |
| 44. | Ipomoea aquatica Lour           | Convolvulaceae | Karmotabhaji | H   | Leaves Cooked as vegetable |
| 45. | Lantana camara L.               | Verbenaceae| Bantulsi| S          | Ripe Fruits Eaten raw |
| 46. | Limonia acidissima L.           | Rutaceae   | Kawath  | T          | Ripe Fruits Eaten raw/used in making pickles |
| 47. | Madhuca longifolia (Koen.) Mac. Var. | Sapotaceae | Mahuva/Mahu | T     | Ripe Fruits, Petals Eaten raw/ Cooked as vegetable |
| 48. | Mangifera indica L.             | Anacardiaceae | Aamba  | T          | Ripe Fruits Eaten raw/used in making pickles |
| 49. | Minusops elengi L.              | Sapotaceae  | Massor  | T          | Ripe Fruits Eaten raw |
| 50. | Momordica dioica Roxb.ex Wild.   | Cucurbitaceae | Katwell | C          | Fruits Cooked as vegetable |
| 51. | Moringa oleifera Lam.           | Moringaceae | Munga   | T          | Fruits Eaten raw |
| 52. | Mucuna pruriens (L.) DC         | Fabaceae   | Kanjikuri/Kavaskuri | C  | Seeds Cooked as vegetable |
| 53. | Nelumbo nucifera Gaertn.        | Nelumboaceae | Kamal, Pavan | H | Seeds, Rhizomes Eaten raw/ Cooked as vegetable |
| 54. | Nymphaea nouchali Burm. f.      | Nymphaeaceae | Kamal  | H          | Peduncles, Rhizomes Cooked as vegetable |
| 55. | Nymphaea rubra Roxb.            | Nymphaeaceae | Lalkamal | H    | Rhizomes Cooked as vegetable |
| 56. | Olax pittacorum (Willd) Vahl    | Olacaceae   | Aradphari/Harduli | S   | Leaves Cooked as vegetable |
| 57. | Oryza rufipogon Griff.          | Poaceae    | Devdhan | H          | Ripe fruits Cooked as food |
| 58. | Oxalis corniculata L.           | Oxalidaceae | Khati Bhaji | H      | Leaves Cooked as vegetable |
| 59. | Phoenix sylvestris (L.) Roxb.   | Araceae    | Sindi   | T          | Ripe fruits Eaten raw |
| 60. | Phyllanthus emblica L.          | Euphorbiaceae | Amla   | T          | Ripe fruits Eaten raw/used in making pickles |
| 61. | Physalis minima L.              | Solanaceae  | Chirpoti | H          | Ripe fruits Eaten raw |
| 62. | Pithecellobium dulce (Roxb.) Benth. | Mimosaceae | Chichhilai | T | Seeds Eaten raw |
| 63. | Schleicheria oleosa (lour.) O. Ken | Sapindaceae | Kusum  | T          | Seeds Eaten raw |
| 64. | Semecarpus anacardium L.f.      | Anacardiaceae | Biba/Bhilawa | T | Thalamus Eaten raw |
| 65. | Solanum nigrum L.               | Solanaceae  | Kamuni   | S          | Leaves, fruits Fruits eaten raw and leaves cooked as vegetable. |
| 66. | Syzygium cumini (L.) Skeels     | Myrtaceae  | Jambhul  | T          | Ripe fruits Eaten raw |
| 67. | Tamarindus indica. L.           | Caesalpiniaceae | Chich, Imli | T | Leaves, fruits Fruits eaten raw and leaves cooked as vegetable. |
| 68. | Terminalia bellirica Roxb.      | Combretaceae | Behda   | T          | Seeds Eaten raw |
| 69. | Trapa natans L. var. bispinosa (Roxb.) Makino | Trapaceae | Shingara | H | Fruits Fruits eaten boiled |
| 70. | Ziziphus mauritiana Lam.        | Rhamnaceae  | Boir, Ber | T | Ripe fruits Eaten raw |
| 71. | Ziziphus oenoplia (L.) Mill.    | Rhamnaceae  | Ironi    | S          | Ripe fruits Eaten raw |

H- Herbs; C-Climbers; S-Shrubs; T-Trees
Figure 2. Classification on the basis of usage

Figure 3. Classification on the basis of plant parts used

Figure 4. Wild edible plant species in different categories
Figure 5. Flowers of Holarrhena pubescens (Buch-Ham.) Wall.ex. G.Don.

Figure 6.hoots of Cissus quadrangularis L.

Figure 7. Fleshy flowers of Madhuca longifolia (Koen.) Mac. Var.

Figure 8. Fruits of Averrhoa carambola L.

Figure 9. Fruits of Pithecellobium dulce (Roxb.) Benth.

Figure 10. Fruits of Terminalia bellirica Roxb.

Figure 11. Leafy vegetable of Cryptocoryne retrospiralis (Roxb.) Kunth

Figure 12. Leafy vegetable of Oxalis corniculata L.
3. Results

Table 2. Family wise distribution of the wild edible plants of Study Area

| Rank | Family         | Genera | Species |
|------|----------------|--------|---------|
| 1    | Fabaceae       | 4      | 4       |
| 2    | Araceae        | 4      | 4       |
| 3    | Caesalpinia     | 3      | 5       |
| 4    | Poaceae        | 3      | 3       |
| 5    | Anacardiaceae  | 3      | 3       |
| 6    | Euphorbiaceae  | 3      | 3       |
| 7    | Mimosaceae     | 2      | 3       |
| 8    | Amaranthaceae  | 2      | 3       |
| 9    | Malvaceae      | 2      | 2       |
| 10   | Rutaceae       | 2      | 2       |
| 11   | Moraceae       | 2      | 2       |
| 12   | Oxalidaceae    | 2      | 2       |
| 13   | Sapindaceae    | 2      | 2       |
| 14   | Verbenaceae    | 2      | 2       |
| 15   | Solanaceae     | 2      | 2       |
| 16   | Sapotaceae     | 2      | 2       |
| 17   | Annonaceae     | 1      | 2       |
| 18   | Nymphaeaceae   | 1      | 2       |
| 19   | Rhamnaceae     | 1      | 2       |
| 20   | Tiliaceae      | 1      | 2       |
| 21   | Dioscoreaceae  | 1      | 1       |
| 22   | Ebenaceae      | 1      | 1       |
| 23   | Rubiaceae      | 1      | 1       |
| 24   | Chenopodiaceae | 1      | 1       |
| 25   | Vitaceae       | 1      | 1       |
| 26   | Commelinaceae  | 1      | 1       |
| 27   | Zingiberaceae  | 1      | 1       |
| 28   | Meliaceae      | 1      | 1       |
| 29   | Scrophulariaceae| 1      | 1       |
| 30   | Periplocaea    | 1      | 1       |
| 31   | Apocynaceae    | 1      | 1       |
| 32   | Convolvulaceae | 1      | 1       |
| 33   | Cucurbitaceae  | 1      | 1       |
| 34   | Moringaceae    | 1      | 1       |
| 35   | Nelumbonaceae  | 1      | 1       |
| 36   | Myrtaceae      | 1      | 1       |
| 37   | Combretaceae   | 1      | 1       |
| 38   | Trapaceae      | 1      | 1       |
| 39   | Olacaceae      | 1      | 1       |

In the present study there are around 71 species of angiosperms belonging to 63 genera and 39 families have been recorded (Table.1, Figures 5-16). Among the 39-
families, the most widely utilized plant species belong to Caesalpiniaceae (5), Fabaceae (4), Araceae (4), followed by Poaceae (3), Anacardiaceae (3), Euphorbiaceae (3), Mimosaceae (3), Amaranthaceae (3). Malvaceae, Rutaceae, Moraceae, Oxalidaceae, Sapindaceae, Verbenaceae, Solanaceae, Sapotaceae, Annonaceae, Nymphaeaceae, Rhamnaceae, Tiliaceae are with two species each, and the rest of the nineteen families with single species (Table.2). Among the 71 species, 43.2% of plant species contribute as vegetables by their fruit, 22.22% by leaf, 12.34% by seed or grain, 8.64% by root or tuber, 6.17% by stem, bark or sap, 6.17% by flower and 1.23% by whole plant (Fig.3). While analyzing the life forms of the wild edible vegetable species, it was noticed that 36 (50.70%) species were trees, 22 (30.98%) herbs, 07 (9.85%) climbers and the remaining 06 (8.45%) were shrubs (Fig.4).

It is evident from the Fig.2 that most of the wild edible species are used as vegetable/chutney (49.33%), followed by raw/ripe fruits (45.33%), pickles (4%), roasted seeds (1.33%).

This study reveals that tribal and rural people living in particular area depend on wild edible plants and have rich knowledge of their utilization.

4. Discussion

Many rural parts of the world depend on wild edible plants for their food.[13] Several attempts have been made to list out the wild edibles of Vidharbha region of Maharashtra State. [2,3,14]

Vegetable contain large quantity of vitamin C, Vit. A and Vit. B complex as well as good amount of dietary fibers and phytochemicals. The contents of the wild vegetables also protect our body against various malnutrition, and nutrient disorders that is why they are called as protective food. [15] Such unconventional wild edible plants are sources of proteins, fats, rich source of micro-nutrients and trace elements. [16,17,18]

Critical evaluation of the literature reveals that the adequate vegetable consumption can be protective for some chronic diseases such as cancer, obesity, diabetes, cardiovascular diseases, metabolic syndrome, as well as improve risk factors related with these diseases. [19]

In the present study many wild vegetables are also being consumed for various medicinal purposes. *Azadirachta indica*, *Butea monosperma*, *Syzygium cumini* were commonly used to treat deadly disease diabetes. [20] *Cassia fistula*, *Acacia nilotica* and *Mangifera indica* are also used as medicinal plants to cure various women related problem like menstrual disorder, Urinary problems and Leucorrhoea. [21] The tribal people and other villagers residing study area also uses *Cassia tora*, *Dendrocalamus strictus*, *Grewia tilifolia*, *Hemidesmus indicus*, *Semicarpus anacardium* for the treatment of various diseases. [22]

Ethenobotanical surveys of wild plants indicate that more than 7000 species have been used for human food at some stage in human history. [23] But this important knowledge is slowly diminishing day by day due to invasion of alien cultures. Documentation of wild edible plants from ethnobotanical approach is important for enhancing the understanding of indigenous knowledge system. [24-26]

5. Conclusions

Demand of food and vegetables of increasing population cannot be fulfilled unless we cannot find out the ways and means to increase the production of vegetables and other substitute like wild plants. So it is of the immense need to document the indigenous knowledge of wild edibles for future generations and to encourage the peoples for cultivation of wild edible plants in their home gardens. Further research on cultivation and utilization of wild vegetables would help the tribal and rural people to have better nutrition.

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