Aim: To document and record recipes of pickles of wild edible plants prepared by the tribal of Jawhar and Shahapur forest divisions.

Materials and methods: A medico-ethnobotanical survey was carried out in Jawhar and Shahapur forest divisions during the year 2018–2019. The details of information and method of preparation of pickle recipes traditionally prepared and consumed by the tribal from Jawhar and Shahapur forest divisions of Thane forest circle were recorded through conversation and interviews and were documented digitally.

Result: A total of 11 recipes of traditionally prepared pickles which are not familiar in urban area have been identified, and the method of preparation was recorded. A maximum of nine pickles were prepared from fruit or pod, whereas shoot was used in bamboo pickle and pseudostem in kadali pickle. These traditional pickle recipes have nutritional values and are used to alleviate certain disease conditions like flatulence, diabetes, etc. and to increase strength.

Conclusion: Tribal people are proverbial with plants and fruits available in their native place. They prepared pickles using their traditional method of preparation and used them in certain ailments. Steps should be taken to identify the strength in the field of food industries and small-scale industry to prepare and sell the forest products that would be beneficial to forest department, tribes, and common population.

Keywords: Ethnobotanical survey, Jawhar, Pickle, Shahapur, Traditional recipes, Wild edible plants.

INTRODUCTION

Plants are being used as food, medicine, nutrition, shelter, protection, and as per need of tribal communities since ancient time. Tribal communities from all over the world are totally dependent on forest product. Tribal communities possess knowledge of plants, their parts, and uses for food and medicine. They collect the plant parts, namely fruit, pod, flower, seed, leaf, rhizome, root, tuber, and stem, in particular seasons and consume raw or store for privation as food or medicine.

There are some areas in India still having tribal communities who totally depend on forest and live their traditional system of dietary and medicinal practices. In Maharashtra, majority of the tribal communities are found in Jawhar, Mokhada, Palghar, and Shahapur forest divisions. Supplementary food such as pickles of five wild fruits narrated by Mahadev Koli tribe and wild edible fruits utilized by Mahadev Koli tribe was also reported.

Tribal communities from Maharashtra are consuming leaves and wild fruits. Similarly, in Kerala, seed, root, rhizome, stem, and shoot are being eaten by the tribal.

In India, about 300 plants species are reported as food resources and are being used by the tribal communities.

The present communication deals with the pickle recipes traditionally prepared and consumed by the tribes from Jawhar and Shahapur forest divisions of Thane forest circle which was not reported in the earlier literature.

Study Area

Shahapur and Jawhar forest divisions were selected for ethnobotanical survey which comprises Shenva, Dhasai, Kudshet, Shirgaon, Shilottar, Kasara, Thalgath, Dand, Umbravane, Latifvadi, Dhopibapa, Susanwadi, Pingalwadi, Kashti, Kalbhonda, Waghwadi, Sawarshet, Sajivali, and Murbibapa of Shahapur forest division and Gangodi, Kharonda, Chambarshet, Kharoni, Tilondas, Kasatwadi, and other tribes like Bhils, Gonds, Mahadev Kolis, Malhar Kolis, and Madja Gonds and other tribes like Bhils, Gonds, Mahadev Kolis, Malhar Kolis, and Kokans.

MATERIALS AND METHODS

Information Collection

The information on preparation of pickles from wild edible plants were gathered/documented from the local people or tribal dwelling adjacent to the forest area while recording interviews.

Plant Collection

Plant material, such as fruit and shoots, etc., was collected during the survey of Shahapur and Jawhar forest divisions with the help of knowledge providers and local health practitioners. The photographs of plant material, such as flowering and fruiting twigs, were collected for identification of species.
Identification and Authentication
The collected plant material of pickle preparation was identified with the help of flora.9–11

Herbarium Preparation
Herbarium specimens of the collected plant species were prepared by following the standard methodology,12 and voucher specimens were deposited in the institute’s herbarium with accession numbers as given in Table 1.

Method of Preparation of Pickles by Tribal
Selected population of tribal people from Shahapur and Jawhar forest divisions who traditionally collect the forest produce and few healers who gather the pods, fruits, and shoots of plants during the seasons from the forest areas for preparation of pickles were interviewed.

Preparation and Preservation of Material
Pods, fruits, shoots, and stem parts collected from the forest were washed with water, dried on cotton cloths, and chopped in required size with the help of knife/chopper. Later, they stored these pieces in a plastic container by adding required amount of edible salt and little amount of water to make salt water. It will be stored for 1 or 2 years in the salt water. As per the requirement, the preserved material will be taken out and mixed with pickle spices especially prepared for the preparation. Among the oils, in general, they used soybean, sunflower, or mustard oil for the preparation. Oil is first heated and then cooled to room temperature and utilized in the preparation. Spices used for the pickle preparations vary for respective pickle preparation.

Pickle Preparation from shyonak—Oroxylum indicum (L.) Kurz. (Bignoniaceae)

Table 2: Ingredients required

| S. no. | Ingredient | Botanical name | Family       | Quantity |
|--------|------------|----------------|--------------|----------|
| 1      | Shyonak—tender green pods | Oroxylum indicum (L.) Kurz | Bignoniaceae | 1 kg     |
| 2      | Fenugreek seed | Trigonella foenum-graecum L. | Fabaceae    | 20 g     |
| 3      | Red chili powder | Capsicum annuum L. | Solanaceae | 20 g     |
| 4      | Edible salt | – | – | 60–70 g |
| 5      | Sunflower oil | Helianthus annuus L. | Asteraceae | 500 mL   |
| 6      | Achar masala contains the following ingredients: the quantity of individual ingredients is not given on packet | – | – | 250 g |

Table 1: Details of herbarium and accession numbers

| S. no. | Local name | Sanskrit name | Botanical name | Family       | Accession number | GPS location |
|--------|------------|---------------|----------------|--------------|-----------------|--------------|
| 1      | Tentu      | Shyonaka      | Oroxylum indicum (L.) Kurz | Bignoniaceae | 14268            | N 19°56.751; E 073 06. 302 (3 m) |
| 2      | Kharshingi | Svetapatala   | Radermachera xylocarpa (Roxb.) Roxb. ex K.Schum. | Bignoniaceae | 14225            | N 19°25.227; E 073 26. 790 (3 m) |
| 3      | Bamboo     | Vamsha        | Bambusa arundinacea (Retz.) Willd. | Poaceae     | 14356            | N 19°43.733; E 073 07. 110 (3 m) |
| 4      | Banana     | Kadali        | Musa × paradisiaca L. | Musaceae    | 4262             | N 19°51.821; E 073 17. 378 (3 m) |
| 5      | Rai avala  | Lavali        | Phyllanthus acidus (L.) Skeels | Phyllanthaceae | 14449            | N 19°53.200; E 073 10. 599 (4 m) |
| 6      | Awala      | Amalaki       | Phyllanthus emblica L. | Euphorbiaceae | 14049            | N 19°24.348; E 07324. 007 (3 m) |
| 7      | Toran      | Ghonta        | Ziziphus rugosa Lam. | Rhamnaceae  | 14382            | N 19°24.548; E 073 23. 675 (3 m) |
| 8      | Pendharun  | Mahapindi     | Gardenia turgida Roxb. | Rubiaceae   | 14390            | N 19°41.608; E 073 09. 793 (3 m) |
| 9      | Bhokar     | Slesmataka    | Cordia dichotoma G. Forst. | Boraginaceae | 14118            | N 19°58.879; E 073 02. 163 (3 m) |
| 10     | Kakad      | Kinikirath    | Garuga pinnata Roxb. | Burseraceae | 14313            | N 19°46.884; E 073 11. 973 (3 m) |
| 11     | Karvanda   | Karmarda      | Carissa congesta Wight. | Apocynaceae | 14115            | N 19°26.134; E 073 24. 234 (4 m) |
Pickle Preparation from *Kharshingi*—*Radermachera xylocarpa* (Roxb.) Roxb. ex K. Schum. (Bignoniaceae)

**Table 3: Ingredients required**

| S. no. | Ingredient                     | Botanical name                  | Family       | Quantity |
|--------|--------------------------------|---------------------------------|--------------|----------|
| 1      | Kharshingi—tender green pods   | *Radermachera xylocarpa* (Roxb.) Roxb. ex K. Schum. | Bignoniaceae | 1 kg     |
| 2      | Fenugreek seed                 | *Trigonella foenum-graecum* L. | Fabaceae     | 20 g     |
| 3      | Red chili powder               | *Capsicum annuum* L.            | Solanaceae   | 20 g     |
| 4      | Edible salt                    | —                               | —            | 60–70 g  |
| 5      | Sunflower oil                  | *Helianthus annuus* L.          | Asteraceae   | 500 mL   |
| 6      | *Achar masala*: ingredients as above | —                               | —            | 250 g    |

**Procedure**

Washed and dried pods are cut into small pieces of 3–4 cm size, and required amount of salt is added in it and stored for further procedure (Fig. 1A). While making pickle, take the pieces (1 kg) from the salt water and then add 20 g of fenugreek seed, 20 g of red chili powder, 70 g of salt, and 250 g of *achar masala*. Mix well and add 500 mL of sunflower oil and store it in an airtight container (Fig. 1B and Table 3).

Pickle Preparation from *Bamboo*—*Bambusa arundinacea* (Retz.) Willd. (Poaceae)

**Table 4: Ingredients required**

| S. no. | Ingredient                     | Botanical name                  | Family       | Quantity |
|--------|--------------------------------|---------------------------------|--------------|----------|
| 1      | Bamboo—tender shoots           | *Bambusa arundinacea* (Retz.) Willd. | Poaceae     | 1 kg     |
| 2      | Fenugreek seed                 | *Trigonella foenum-graecum* L. | Fabaceae     | 20 g     |
| 3      | Red chili powder               | *Capsicum annuum* L.            | Solanaceae   | 20 g     |
| 4      | Edible salt                    | —                               | —            | 60–70 g  |
| 5      | Soybean oil                    | *Glycine max* (L.) Merrill.     | Leguminosae  | 500 mL   |
| 6      | *Achar masala*: ingredients as above | —                               | —            | 250 g    |
Traditional Pickle Recipes Prepared by Tribal of Jawhar and Shahapur Forest

Procedure
Take 1 kg, 3- to 4-cm-long pieces of tender shoots of bamboo and then add 20 g of fenugreek seed, 20 g of red chili powder, 70 g of salt, and 250 g of *achar masala*. Mix well and add 500 mL of soybean oil and store it in an airtight container (Fig. 1C and Table 4).

Pickle Preparation from *Keli*—*Musa paradisiaca* L. (Musaceae)

Table 7: Ingredients required

| S. no. | Ingredient | Botanical name | Family | Quantity |
|--------|------------|----------------|--------|----------|
| 1      | Keli—tender inner pseudostem | Musa × paradisiaca L. | Musaceae | 1 kg |
| 2      | Fenugreek seed | Trigonella foenum-graecum L. | Fabaceae | 20 g |
| 3      | Red chili powder | Capsicum annuum L. | Solanaceae | 20 g |
| 4      | Edible salt | – | – | 60–70 g |
| 5      | Sunflower oil | Helianthus annuus L. | Asteraceae | 500 mL |
| 6      | Achar masala: ingredients as above | 250 g |

70 g of salt, and 250 g of *achar masala*. Mix well and add 500 mL of sunflower oil and store it in an airtight container (Table 7).

Pickle Preparation from *Rai avala*—*Phyllanthus acidus* (L.) Skeels (Phyllanthaceae)

Table 8: Ingredients required

| S. no. | Ingredient | Botanical name | Family | Quantity |
|--------|------------|----------------|--------|----------|
| 1      | Rai avala—mature fruits | Phyllanthus acidus (L.) Skeels | Phyllanthaceae | 1 kg |
| 2      | Fenugreek seed | Trigonella foenum-graecum L. | Fabaceae | 20 g |
| 3      | Red chili powder | Capsicum annuum L. | Solanaceae | 20 g |
| 4      | Edible salt | – | – | 60–70 g |
| 5      | Soybean oil | Glycine max (L.) Merrill. | Leguminosae | 500 mL |
| 6      | Achar masala: ingredients as above | 250 g |

Procedure
Take fresh 1 kg of washed and cleaned fruits of *rai avala* and then add 20 g of fenugreek seed, 20 g of red chili powder, 70 g of salt, and 250 g *achar masala*. Mix well and add 500 mL soybean oil and then store it in a plastic container (Table 8).

Pickle Preparation from *Awala*—*Phyllanthus emblica* L. (Phyllanthaceae)

Table 9: Ingredients required

| S. no. | Ingredient | Botanical name | Family | Quantity |
|--------|------------|----------------|--------|----------|
| 1      | Awala—fresh and salted dried fruits | Phyllanthus emblica L. | Phyllanthaceae | 1 kg |
| 2      | Fenugreek seed | Trigonella foenum-graecum L. | Fabaceae | 20 g |
| 3      | Red chili powder | Capsicum annuum L. | Solanaceae | 20 g |
| 4      | Edible salt | – | – | 60–70 g |
| 5      | Soybean oil | Glycine max (L.) Merrill. | Leguminosae | 500 mL |
| 6      | Achar masala: ingredients as above | 250 g |
**Procedure**

Take 1 kg of awala fruits either fresh or dried after adding salt; if salted dried pieces (fruits are cut into small pieces and coated with edible salt dried under sunlight and preserved in an airtight container) are used, then first dip in water to moisten it and add 20 g of fenugreek seed, 20 g of red chili powder, 70 g of salt, and 250 g of achar masala. Mix well and add 500 mL soybean oil. Store it in earthen pots or in an airtight plastic container for 15 days and then it will be ready to use (Fig. 1D and Table 9).

**Pickle Preparation from Toran—Ziziphus rugosa Lam. (Rhamnaceae)**

**Table 10:** Ingredients required

| S. no. | Ingredient                  | Botanical name        | Family      | Quantity |
|--------|-----------------------------|-----------------------|-------------|----------|
| 1      | Toran—imma-ture fruits      | Ziziphus rugosa Lam.  | Rhamnaceae  | 1 kg     |
| 2      | Fenugreek seed              | Trigonella foemum-grae-cum L. | Fabaceae | 20 g    |
| 3      | Red chili powder            | Capsicum annum L.     | Solanaceae  | 20 g    |
| 4      | Salt                        | –                     | –           | 60–70 g |
| 5      | Sunflower oil               | Helianthus annus L.   | Asteraceae  | 500 mL  |
| 6      | Achar masala: ingredients as above | –                     | –           | 250 g    |

**Procedure**

Take 1 kg of washed and cleaned fresh fruits of toran and then add 20 g of fenugreek seed, 20 g of red chili powder, 70 g of salt, and 250 g of achar masala. Mix well and add 500 mL sunflower oil. Store it in earthen or plastic pots for 15 days and then it will be ready to use (Table 10).

**Pickle Preparation from Pendharun—Gardenia turgida Roxb. (Rubiaceae)**

**Table 11:** Ingredients required

| S. no. | Ingredient                  | Botanical name        | Family      | Quantity |
|--------|-----------------------------|-----------------------|-------------|----------|
| 1      | Pendharun—unripe fruits     | Gardenia turgida Roxb. | Rubiaceae  | 1 kg     |
| 2      | Fenugreek seed              | Trigonella foemum-grae-cum L. | Fabaceae | 20 g    |
| 3      | Red chili powder            | Capsicum annum L.     | Solanaceae  | 20 g    |
| 4      | Salt                        | –                     | –           | 60–70 g |
| 5      | Sunflower oil               | Helianthus annus L.   | Asteraceae  | 500 mL  |
| 6      | Achar masala: ingredients as above | –                     | –           | 250 g    |

**Procedure**

Take 1 kg of fresh and cleaned fruits of pendharun; cut into two pieces and remove the seeds; and add 20 g of fenugreek seed, 20 g of red chili powder, 70 g of salt, and 250 g of achar masala. Mix well and add 500 mL of sunflower oil. Store it in an airtight container (Table 11).

**Pickle Preparation from Karvanda—Carissa congesta Wight. (Apocynaceae)**

**Table 12:** Ingredients required

| S. no. | Ingredient                  | Botanical name        | Family      | Quantity |
|--------|-----------------------------|-----------------------|-------------|----------|
| 1      | Karvanda—unripe fruits      | Carissa congesta Wight. | Apocynaceae | 1 kg     |
| 2      | Fenugreek seed              | Trigonella foemum-grae-cum L. | Fabaceae | 20 g    |
| 3      | Red chili powder            | Capsicum annum L.     | Solanaceae  | 20 g    |
| 4      | Salt                        | –                     | –           | 60–70 g |
| 5      | Sunflower oil               | Helianthus annus L.   | Asteraceae  | 500 mL  |
| 6      | Achar masala: ingredients as above | –                     | –           | 250 g    |

**Procedure**

Take 1 kg of unripe fruits of karvanda, wash in water and then cut into two pieces, and again place it in water to remove white latex of fruits and drain the water through a sieve. Add 20 g of fenugreek seed, 20 g of red chili powder, 70 g of salt, and 250 g of achar masala. Mix well and add 500 mL of sunflower oil. Store it in an airtight container (Table 12).

**Result and Discussion**

During the survey, it was observed that Shahapur and Jawhar forest divisions of Thane forest circle cover a large area of forest which includes a variety of medicinal and edible plants like pendharun, kakad, kharsingi, shyonaka, bholar, banana stem, rai awala, awala, and toran. The main staple foods of these areas are rice, millet, niger, black gram, and pigeon pea. These areas are rich source of wild products which are collected by the local tribal for their additional nutritional value, taste, and medicinal value. Pickles prepared by the tribes are stored for 2–3 years and used as supplementary food and medicine. The preparation of pickles from Oroxylum indicum (L.) Kurz is used in the meal to alleviate flatulence, from Radermachera xylolarca (Roxb.) Roxb. ex K.Schum. is used to control blood sugar levels, whereas from Bambusa arundinacea (Retz.) Willd., Ziziphus rugosa Lam., Carissa congesta Wight, and Cordia dichotoma G. Forst are being eaten to increase strength of human body. These recipes are known to only selected tribal people, and due to employment in the nearby urban areas, many of the young generations are shifting from their natural habitat and knowledge of preparations of recipes and identification of plants are vanishing from their tribal community. Therefore, the forest department should take some steps to organize the tribal camps to develop a small-scale industry to prepare and sell the forest products that would be beneficial to the forest department, tribes, and common population to obtain these unconventionally prepared nutritious forest products. Many workers from India reported that the list of plants that are eaten/consumed raw or cooked by the tribal people should be compiled and a standard operating procedure should be prepared, documented, and commercialized. It would be a great achievement toward the preservation of this vanishing knowledge.
**Conclusion**

Tribal people are proverbial with plants and fruits available in their native place. They prepare pickles using their traditional method of preparation and use them in certain ailments. Steps should be taken to identify the strength in the field of food industries and small-scale industry to prepare and sell the forest products that would be beneficial to forest department, tribes, and common population.

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हिंदी सारांश

जव्हार और शहापुर वन प्रभाग के आदिवासियों द्वारा निर्मित पारंपरिक अचार रेसिपी का अन्वेषण

उद्देश्य: जव्हार और शहापुर वन प्रभाग के आदिवासियों द्वारा जंगली खाद्य पादपों से निर्मित अचार रेसिपी का प्रलेखन करना एवं संकलन करना।

सामग्री एवं विढियाँ: वर्ष 2018-2019 के दौरान जव्हार और शहापुर वन प्रभाग में चिकित्सा-प्रजाती वानस्पतिक सर्वेक्षण किया गया। वार्तालाप और साक्षात्कार के माध्यम से यथार्थ वन सर्किल के जव्हार और शहापुर वन प्रभाग के आदिवासियों द्वारा पारंपरिक रूप से निर्मित और उपयोग की गई अचार रेसिपी की जानकारी और इसे बनाने की विधि को संकलित किया गया तथा इनका डिजिटल तौर पर प्रलेखन किया गया।

परिणाम: पारंपरिक रूप से निर्मित अचार की कुल 11 रेसिपियाँ जो शहारी क्षेत्रों में प्रचलित नहीं हैं, की पहचान की गई और इसे बनाने की विधि को रिकॉर्ड किया गया। अधिकतम नौ अचार फल या पॉड से बनाये गए जबकि बांस के अंचार में शूट और केले के अंचार में सुडोस्टेम का प्रयोग किया गया। ये पारंपरिक अचार पोषक है और इनका प्रयोग कुछ रोगवश्याओं यथा आँगाह आध्यात्म, मधुमेह आदि में किया जाता है तथा बलवधनार्थ भी प्रयोग करते हैं।

निष्कर्ष: आदिवासियों को अपने निवास स्थान के पास उपलब्ध पादपों और फलों की जानकारी है। ये अपनी पारंपरिक विधि का प्रयोग कर अचार बनाते हैं और कुछ रोगों में उसका प्रयोग करते हैं। वन विभाग, आदिवासी और सामाजिक जनता के लाभ हेतु खाद्य उद्योग और लघु उद्योग के क्षेत्र में इसे निर्मित करने की क्षमता को पहचानने और इन वन उत्पादों को बेचने के लिए कदम उठाए जाने चाहिए।

मुख्य शब्द: प्रजाती वानस्पतिक सर्वेक्षण, जव्हार, अचार, शहापुर, पारंपरिक रेसिपी, जंगली खाद्य पादप।