Ethnomedicinal uses of plants by Santal tribe of Alipurduar district, West Bengal, India

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Abstract

Objectives: To document the traditional knowledge on medicinal plants used by the Santal tribe residing at seven different villages in Alipurduar district of West Bengal, India to treat common human ailments. Methods: The field survey was conducted during July 2018 to January 2020 using guided field-walk method. Santal traditional medicinal practitioners (locally called Kabiraj) and local knowledgeable Santal men and women were interviewed with the help of pretested semi-structured questionnaires to record their knowledge on ethnomedicinal uses of local vegetation in their surroundings. The questionnaire covered aspects like local name, scientific name, family, used parts, ethnomedicinal uses, among others. Plants were collected mostly during the flowering stage and routine method of herbarium techniques was followed and the collected plants were identified using relevant sources. Findings: Altogether 73 medicinal plants of 45 families were recorded to be used to treat 38 types of diseases ranging from very common physical problems to complex diseases. Fabaceae represents the highest number (5 species) of medicinal plants. Herbs (39.73%) and trees (38.36%) represent the dominant life-forms and mostly the plants were collected from the natural habitat (56.16%). For the preparation of medicine, leaves were found to be most frequently used (47.50%) plant part than the others. In general, ethnomedicines were prepared from the fresh plant materials and were administered orally (66.25%) or topically (33.75%). Applications: Documentation of medicinal plants used by the Santals in the treatment of various diseases could further be utilised to develop new drugs and pharmaceutical products. However, to achieve sustainable development, conservation, cultivation and proper utilisation of medicinal plants should be monitored scientifically. Novelty: Utilization of medicinal plants by the Santal tribe has been documented for the first time from Alipurduar district and has enriched the existing database of medicinal plants.

Keywords: Ethnomedicine; medicinal plants; Santal; traditional knowledge; Alipurduar; West Bengal

https://www.indjst.org/
1 Introduction

India, the home of the World’s largest number of indigenous people (8.6% of the total population of India) (1) has a rich herbal heritage. It is well known that the tribal people are mostly dependent on plants than the other communities for their daily livelihood, especially for herbal medicine. Even today, in developing countries, more than 80% population is directly dependent on herbal medicine for healthcare (2,3). In India, the use of medicinal plants for the treatment of diverse variety of ailments has been recorded from ancient times (4,5) and the documentation of such traditional knowledge on ethnomedicine has developed many modern medicines (6,7).

Santals, one of the Adivasis, the third-largest tribes in India after Bhil and Gond, mainly found in the states like Jharkhand, West Bengal, Assam, Tripura, Bihar and Odisha. In West Bengal, they constitute 47.43% of the total tribal population, of which 94.02% lives in rural areas (Census India 2011; http://censusindia.gov.in/). The people from rural areas mostly depend on the herbal or traditional medicine in spite of the development of modern medicine due to low cost of herbal medicine, unavailability of primary healthcare services and the side effect of the synthetic drugs (8). Santals are the descendants of the Austroic-speaking Proto-Australoid race (9). As they have lived on this land probably for thousands of years, they are a rich depository and guardians of indigenous traditional knowledge on medicinal plants (10) and most of the knowledge passed on by verbal means from one generation to another and very rarely documented (11). So, documentation of the medicinal plants used by them can play an important role in the conservation of indigenous knowledge as well as such documentation may be a potential source of discovery of newer and effective drugs. However, day-by-day the population to carry on traditional knowledge is reducing due to the impact of Western lifestyle (12) and less interest on the usefulness of medicinal plants are available in their surroundings (13).

Several ethnobotanical studies on medicinal plants have been conducted in different districts of West Bengal over the past six decades (14–36), focusing primarily on various ethnic groups, but documentation of the ethnobotanical knowledge of Santal tribe is very scanty (37–39).

Scientific documentation of the traditional knowledge of Santal tribe in Alipurduar district of West Bengal is not made so far as per literature surveyed. Sukla and Chakravarty (40) and Raj et al. (41) have reported 18 and 140 medicinal plant species respectively, from the adjoining villages of Chilapatta Reserve Forest of Alipurduar district, West Bengal utilised by several communities like Rava, Ekka, Oraon, Mech, Nepali, Cherwa, etc. other than the Santal tribe. Chaudhury et al. (42) have documented 215 ethnomedicinal plant species used by the Lodha tribe from six different districts of West Bengal including the district Alipurduar.

Keeping this in view, the present study is designed to explore the traditional knowledge on medicinal plants used by Santal tribe residing at seven different villages in Alipurduar district of West Bengal, India.

2 Methodology

2.1 Study area

Alipurduar district is situated on the East bank of Kaljani River on the foothills of the Himalayas (26.489°N 89.527°E), it is known for its rich floristic composition. The district is in under developing status and mostly the rural people depend on the forest plants to treat common physical problems. The present field survey was carried out at seven different villages. The villages namely, Paschim Jitpur (26°32'48.89"N 89°31'14.31"E), Dakshin Majherdabri (26°31'9.12"N 89°33'47.93"E), Jasodanga (26°31'30.45"N 89°37'34.26"E), Salsalabari (26°30'2.64"N 89°36'16.96"E) and Bheukdabri (26°29'20.69"N 89°34'33.10"E) - located at the south side of Buxa Wildlife Sanctuary; Kunjanagar (26°33'26.80"N 89°14'41.02"E) – adjoining village of Torsa Forest; and the village Kadambini Tea Garden (26°31'15.49"N 89°14'5.93"E) are mostly inhabited by Santals (Figure 1).

2.2 Data collection

A total of four field trips were completed for the documentation of traditional knowledge on medicinal plants during July 2018 to January 2020. The data were collected with the help of pretested semi-structured questionnaires (43). Two Santal traditional healers and other knowledgeable persons were interviewed. Prior Informed Consent (PIC) was taken from each informant before interview. Information about the plants were recorded with regards to their vernacular/ Santal name(s), plant parts used, uses, process of preparation of medicine either individually or in combination with other plant parts, and mode of application and dosages for the treatment of a particular disease(s). Plant specimens were collected in their flowering condition as far as possible with guided-walk. Routine methods of plant collection and herbarium techniques (44) have been followed during the study. Digital photographs of the plants were also taken wherever possible. Plant specimens were identified with the help of relevant floras and standard literatures (45–47) and the voucher specimens were kept at the Department of Botany, A. B. N. Seal College, Cooch Behar.

3 Results and Discussion

The results of the field survey have been presented in Table 1. The collected medicinal plants are arranged in alphabetical order according to families and then according to genus and species within - each family. Information regarding Santal name(s) (as recorded during the field work), scientific name, family, habit, parts used and ethnomedicinal uses for each species have also been provided. In most cases, however, the precise method of the preparation of medicine and dosage of administration were not disclosed. As the tribal healers were afraid that on disclosure of such knowledge to the outsiders, their value as a medicine man gets affected.

https://www.indjst.org/
3.1 Medicinal plants recorded and their distribution into families

The present field survey has recorded a total of 73 ethnomedicinal plants belonging to 69 genera and 45 families (Table 1; Figure 2) used by the Santal tribal healers and other Santal men and women. Distribution of plants within families shows variation. The family Fabaceae is represented by the highest number of species (5 species, 6.85%) followed by Apocynaceae (4 species, 5.48%), Acanthaceae, Amaranthaceae, Arecaceae, Cucurbitaceae, Moraceae, Piperaceae and Solanaceae (3 species each, 4.11%), Amaryllidaceae, Asteraceae, Combretaceae, Lamiaceae, Poaceae, Rutaceae and Zingiberalesae (2 species each, 2.74%) and the rest 29 families represented by single species (1.37%). The members of the family Fabaceae contain active chemical constituents like flavonoids, alkaloids, coumarins, tannins, etc., which are used extensively in the treatment of wide variety of human diseases.

Result on the growth habit of the plants shows that herb (29 species, 39.73%) and tree (28 species, 38.36%) dominates among the plant type followed by climber (9 species, 12.33%) and shrub (7 species, 9.59%). Mostly the plants were collected from natural habitat (56.16%) and the rest from the home gardens (43.84%). Besides, collection from natural vegetation, cultivation of medicinal plants in their home garden probably indicated their dependency on ethnomedicine to get relief from common physical problems.

3.2 Plant parts used, mode of preparation and routes of administration

For the preparation of medicine, various plant parts (Table 1; Figure 3) are found to be used by the Santals. Leaves (47.50%) are found to be the dominant plant parts used followed by fruits (11.25%), bark (10.0%), roots and seeds (6.25% each), latex (5.0%), bulb, stem, tuber
and rhizome (2.50% each) and flower, whole plant and branch (1.25% each). Most of the ethnobotanical reports confirmed that leaves are the dominant plant parts used in the preparation of medicine\(^{30,36,37,41,42,50-54}\). Use of plant parts other than leaves may harm the mother plant\(^{37,55}\) and in the present study maximum utilization of leaves indicates sustainable use of the biological resources by the Santals.

Mode of preparation of the medicine encompasses extract (32.5%), paste (21.25%), decoction (20.0%), juice (15.0%), latex (5.0%), ointment (3.75%) and cooked (2.5%), and all the time fresh plant parts were used for medicine preparation. They believe that the fresh plant materials are more effective than the dry ones as - reported earlier by Habibur Rahaman and Karmakar\(^{37}\). Majority of remedies are taken orally (66.25%) followed by topical (33.75%) administration.

![Fig 2. Family wise number of ethnomedicinal plants](https://www.indjst.org/)

![Fig 3. Percentage of plant parts used for herbal preparation.](https://www.indjst.org/)
| SN | Vernacular Name(s)             | Scientific Name           | Family           | Habit       | Parts used   | Ethnomedicinal uses                                                                 |
|----|--------------------------------|---------------------------|------------------|-------------|--------------|-------------------------------------------------------------------------------------|
| 1  | Kalmegh                        | *Andrographis paniculata* (Brum. f.) Nees | Acanthaceae      | Herb       | Leaf         | Leaf extract is taken orally for 3 days in stomach problems.                        |
| 2  | Kulekhara                      | *Hygrophila auriculata* Schumach. | Acanthaceae      | Herb       | Leaf         | Freshly prepared leaf extract is used to treat anemia.                              |
| 3  | Harbakama                      | *Justicia adhatoda* L. | Acanthaceae      | Shrub      | Leaf         | Leaf extract is given in an iron pot for purification and then taken orally to treat cough. |
| 4  | Cipcirap                       | *Achyranthes aspera* L.  | Amaranthaceae    | Herb       | Leaf, root   | i) Leaf paste is used to treat skin disease. ii) Fresh root decoction is used for abortion. Crushed whole plant is applied to snake bite. |
| 5  | Gai gandhaori                  | *Amaranthus viridis* L.  | Amaranthaceae    | Herb       | Whole plant  | The flower extract is used in dysentery.                                            |
| 6  | Kukruchubaha                   | *Celosia cristata* (L.) Kuntze | Acanthaceae      | Herb       | Flower      | The flower extract is used in dysentery.                                            |
| 7  | Peaj                           | *Allium cepa* L.          | Amaryllidaceae   | Herb       | Bulb         | The paste of the bulb is used in the treatment of joint pain.                      |
| 8  | Rasun                          | *A. sativum* L.           | Amaryllidaceae   | Herb       | Bulb         | The juice made from the bulb is used in the treatment of ear problems.            |
| 9  | Aam                            | *Mangifera indica* L.    | Anacardiaceae    | Tree       | Bark         | Juice obtained from crushed bark is orally administered for diarrhoea.            |
| 10 | Mandargom                      | *Annona squamosa* L.     | Annonaceae       | Tree       | Fruit        | Fruit is given for digestion.                                                     |
| 11 | Rote ara, Dholamanamoni        | *Centella asiatica* (L.) Urban | Apiaceae        | Herb       | Leaf         | Leaf extract is mixed with a pinch of salt and taken orally in dysentery.          |
| 12 | Chatni                         | *Alstonia scholaris* (L.) R.Br. | Apocynaceae      | Tree       | Latex        | The Latex is massaged on the fractured bone.                                     |
| 13 | Akana                          | *Colatropis gigantea* (L.) Dryand. | Apocynaceae      | Shrub      | Leaf         | Heated leaves with a layer of oil are used as heat treatment in fractured bone.    |
| 14 | Baromasia                      | *Catharanthus roseus* (L.) G.Don | Apocynaceae      | Herb       | Leaf         | Leaf decoction is used in the treatment of diabetes.                               |
| 15 | Sarpagandha                    | *Rauvolfia serpentina* (L.) Benth. ex Kurz | Apocynaceae      | Herb       | Root         | Root paste is used to treat cuts and wounds and applied on snake bite. Decoction of the root is also used to treat fever and hypertension. |
| 16 | Kachu                          | *Colocasia esculenta* (L.) Schott | Araceae          | Herb       | Leaf, tuber  | Leaf and tuber curry is taken with food to treat constipation.                    |
| 17 | Berel gua                      | *Areca catechu* L.       | Arecaceae        | Tree       | Seed         | Nuts are chewed to treat dysentery.                                                |
| 18 | Taal                           | *Borassus flabellifer* L. | Arecaceae        | Tree       | Young leaf   | The juice of young leaves mixed with water is given in cases of dysentery.         |
| 19 | Narkol                         | *Cocos nucifera* L.      | Arecaceae        | Tree       | Dry fruit    | Copra of the dry fruit is crushed to extract oil which is used for ear pain.       |
| 20 | Shatamul                       | *Asparagus racemosus* Willd. | Asparagaceae     | Climber    | Root         | Dried root extract is used to treat dysentery and urine disorder.                 |
| 21 | Ghritakumari                   | *Aloe vera* (L.) Burm.f. | Asphodelaceae    | Herb       | Leaf         | Paste prepared from leaf used for skincare.                                       |
| 22 | Tite pati                      | *Artemisia vulgaris* L.  | Asteraceae       | Herb       | Leaf         | It is used to treat nose bleeding, asthma, nervous affections.                    |
| 23 | Kusumbibaha                    | *Ta getes erecta* L.     | Asteraceae       | Herb       | Leaf         | Leaves extract is used to stop bleeding.                                           |
| 24 | Purai nari                     | *Basella alba* L.        | Basellaceae      | Climber    | Leaf         | Leaf decoction is used in the treatment of diarrhoea.                             |
| 25 | Banahata, Suri mala            | *Oroxylum indicum* (L.) Benth. ex Kurz | Bignoniaceae    | Tree       | Bark         | Stem bark paste is taken orally in the morning in an empty stomach to treat jaundice. |
| 26 | Shimul                         | *Bombax ceiba* L.        | Bombacaceae      | Tree       | Bark         | Juice made from the bark is used in excessive menstrual discharge.                |

Continued on next page
| SN | Vernacular Name(s) | Scientific Name | Family | Habit | Parts used | Ethnomedicinal uses |
|----|--------------------|-----------------|--------|-------|------------|--------------------|
| 27 | Anaros             | Ananas comosus   | Bromeliaceae | Herb | Leaf | The whitish thick basal portion of the leaf is made into a paste and consumed in the treatment of fever. |
| 28 | Ganja              | Cannabis sativa  | Cannabaceae | Herb | Leaf | Leaf paste is used in bowel complaints |
| 29 | Papaya             | Carica papaya    | Caricaceae | Tree | Latex, leaf | i) Latex is used as a cleansing agent during menstruation and abortion. ii) Leaf paste is used in bone fracture. |
| 30 | Kouha              | Terminalia arjuna (Roxb.) | Combretaceae | Tree | Bark | Bathing with bark decoction reduces body pain. |
| 31 | Boyra              | T. bellirica (Gaertn.) | Combretaceae | Tree | Seed | Seeds are used to treat dysentery. |
| 32 | Sornolota          | Cuscuta reflexa  | Convolvulaceae | Climber | Stem | Juice prepared from the stem is used in stomach problem. |
| 33 | Pathorkuchi        | Bryophyllum pinnatum (Lam.) Oken | Crassulaceae | Herb | Leaf | A red hot iron rod is dipped into leaf juice and two teaspoon juice is taken orally thrice daily for a week in diuretic, muscle relaxant, tumor, abdominal pain, etc. |
| 34 | Kenduri            | Coccinia grandis (L.) Voigt | Cucurbitaceae | Climber | Leaf | Leaves extract is used to treat hypertension, diabetes. |
| 35 | Kahu botke         | Diplocyclos palma tus (L.) C. Jeffrey | Cucurbitaceae | Climber | Leaf | Leaf decoction is used in the treatment of stomach pain. |
| 36 | Karla              | Momordica charantia L. | Cucurbitaceae | Climber | Leaf, fruit | Five teaspoon of leaf or fruit extract is taken orally once daily to prevent diabetes, stomach disorder, asthma, anemia. |
| 37 | Sarjam             | Shorea robusta   | Dipterocarpaceae | Tree | Young leaf | Young leaf paste is used to treat wounds. |
| 38 | Eradom             | Ricinus communis L. | Euphorbiaceae | Shrub | Seed | Seed oil applied on belly in stomach ache. |
| 39 | Babla              | Vachellia nilotica (L.) P.J.H.Hurter & Mabb. | Fabaceae | Tree | Pods | Pods are prescribed in dysentery. |
| 40 | Murut              | Butea monosperma (Lam.) Taub. | Fabaceae | Tree | Seed | Seed are ground into powder and one teaspoon full of powder is mixed with half cup full of water and taken orally once a day in an empty stomach in the treatment of intestinal worm. |
| 41 | Raher              | Cajanus cajan (L.) Millsp. | Fabaceae | Shrub | Leaf | Leaves extract is used in jaundice. |
| 42 | Chakoda, Chakaoda  | Senna sophera (L.) Roxb. | Fabaceae | Shrub | Leaf | Leaves decoction is used as laxative. |
| 43 | Jojo dare          | Tamarindus indica L. | Fabaceae | Tree | Fruit | Fruit is used as laxative. |
| 44 | Durfa              | Leucas aspera (Willd.) Link | Lamiaceae | Herb | Leaf | Leaves are crushed and mixed with a little salt and two drops of the juice applied to the nose in headache problem. |
| 45 | Tulsi              | Ocimum tenuiflorum L. | Lamiaceae | Herb | Leaf | Leaves extract is mixed with ginger paste and honey is used to treat cough. |
| 46 | Jarul              | Lagerstroemia speciosa (L.) Pers. | Lythraceae | Tree | Bark | Bark extract is used as astringent. |
| 47 | Ulatkambal         | Abroma augustum (L.) L.f. | Malvaceae | Shrub | Root | Root extract is used to treat the menstrual disorder. |
| 48 | Neem               | Azadirachta indica A.Juss. | Meliaceae | Tree | Leaf | Take a regular bath in warm Neem water in the itching problem. |
| 49 | Kanthal            | Artocarpus heterophyllus Lam. | Moraceae | Tree | Latex | Latex is used to treat skin problem. |
| 50 | Loa                | Ficus racemosa L. | Moraceae | Tree | Latex | Latex mixed with water taken orally to treat diarrhoea. |
Table 1 continued

| SN | Vernacular Name(s) | Scientific Name | Family | Habit | Parts used | Ethnomedicinal uses |
|----|--------------------|-----------------|--------|-------|------------|---------------------|
| 51 | Sahora             | *Streblus asper* | Moraceae | Tree  | Twig/branch | Used in toothache, also used as tooth brush. i) Mature leaves are boiled and taken orally to treat high blood pressure. ii) Bark extract is used to treat epilepsy. |
| 52 | Chainna            | *Moringa oleifera* | Moringaceae | Tree  | Leaf, bark  | The sap obtained by injuring the lower side of the stock is used in liver problem. Juice is made from bark and taken orally in stomach ache and gastric problem. |
| 53 | Kayra              | *Musa paradisiaca* | Musaceae | Herb  | Stem       | Leaves are made into a paste and taken two teaspoons for 2-3 days for stomach ache or 10-12 days for gastric problems. |
| 54 | Kodedare           | *Syzygium cumuni* | Myrtaceae | Tree  | Bark       | i) Decoction of dried fruit juice is used in the treatment of diarrhoea, dysentery and anemia. ii) Leaf decoction is used to treat fever. |
| 55 | Tandi chatam ara   | *Oxalis corniculata* | Oxalidaceae | Herb  | Leaf       | Dried fruit decoction is used to treat cough, dysentery. |
| 56 | Amla, merel        | *Phyllanthus emblica* | Phyllanthaceae | Tree  | Fruit, leaf | Leaf juice is used externally for head-ache. Also used for easy delivery. |
| 57 | Pan                | *Piper betle* | Piperaceae | Climber | Leaf       | i) Fruit decoction is used to treat dysentery. ii) Bark extract is used to reduce lethargy. |
| 58 | Ralee              | *P. longum* | Piperaceae | Climber | Fruit, bark | Dried fruit decoction is used to treat cough, dysentery. |
| 59 | Golmirac           | *P. nigrum* | Piperaceae | Climber | Fruit      | The leaves of the plant are crushed and taken orally to treat blood dysentery. |
| 60 | Chini daare        | *Scoparia dulcis* | Plantaginaceae | Herb  | Leaf       | Leaves are made into a paste (by teeth) and used to stop bleeding. |
| 61 | Dhubi ghas         | *Cynodon dactylon* | Poaceae | Herb  | Leaf       | The root paste is used to treat vaginal disease. |
| 62 | Kharkosa, Patoaghas | *Eleusine indica* | Poaceae | Herb  | Root       | The leaf extract is taken orally to prevent pregnancy. |
| 63 | Jiyeti             | *Persicaria barbata* | Polygonaceae | Herb  | Leaf       | Paste of seeds is good for leucorrhoea. |
| 64 | Kul                | *Ziziphus mauritiana* | Rhamnaceae | Tree  | Seed       | Leaf decoction is used to treat aphthae. |
| 65 | Kodom              | *Neolamarckia cadamba* | Rubiaceae | Tree  | Leaf       | i) Fruit juice is taken orally in stomach problem. ii) Leaf paste used to treat fever. |
| 66 | Singedaro          | *Aegle marmelos* | Rutaceae | Tree  | Ripe fruit, leaf | Fruit juice is used to treat intestinal worm. Leaves are made into a paste, warmed and applied on the abscess. |
| 67 | Jambir             | *Citrus medica* | Rutaceae | Tree  | Fruit      | Leaf decoction is given orally to the snake-bite patient. |
| 68 | Dhutra             | *Datura metel* | Solanaceae | Tree  | Shrub      | Boiled tubers are taken with a little salt in stomach pain. |
| 69 | Tamakur            | *Nicotiana tabacum* | Solanaceae | Herb  | Leaf       | Leaf decoction is taken orally with sugar for nerve stimulant. |
| 70 | Alu                | *Solanum tuberosum* | Solanaceae | Herb  | Tuber      | Rhizome paste is used to treat cuts and wounds. |
| 71 | Cha                | *Camellia sinensis* | Theaceae | Tree  | Leaf       | The rhizome paste is used to treat cough. |
| 72 | Shasang            | *Carcuma longa* | Zingiberaceae | Herb  | Rhizome    | |
| 73 | Ada                | *Zingiber officinale* | Zingiberaceae | Herb  | Rhizome    | |

3.3 Diseases treated

Altogether 38 types of physical problems (Figure 4) were found to be treated by the use of the documented medicinal plants. Most of the herbal preparations are found to be used by the Santals to treat dysentery (11 species, 15.07%), followed by abdominal pain and skin diseases (6 species, 8.22% each), stomach problems and female disorders (5 species, 6.85% each), cough and cold, diarrhoea and fever (4 species, 5.48% each).
each), anemia, bone fracture, cuts and wounds, diabetes, hypertension, snake bite (3 species, 4.11% each), among others. This clearly suggests the great extent of traditional knowledge possessed by the healers and the other tribal people to treat several diseases. This knowledge is passed down by verbal means from one generation to another. In the study area, the traditional knowledge is also taught to the interested younger ones (only Santals) by the elders in a 5-days custom (starts on Maha Panchami of Durga puja festival) called Dasabionga. However, recent generations are less aware regarding the importance of the rich traditional knowledge on medicinal plants in their elders. This observation is corroborated with the previous studies as reported by Khatun and Rahman\(^{12}\) and Uniyal et al.\(^{13}\).

![Figure 4. Number of plants used for treating various diseases.](https://www.indjst.org/2028)

### 4 Conclusion

Scientific documentation of traditional knowledge of Santal tribe from the district Alipurduar is done for the first time which will definitely enrich the database. Their knowledge on ethnomedicinal plants is no doubt very rich in the treatment of very common physical problems to complex diseases. This knowledge may be helpful for the development of modern drugs. Day-by-day due to various reasons the natural vegetation degradation is rampant, it will be helpful for further research. Cultivation and sustainable utilization of the threatened taxa is utmost necessity in order to maintain their population in nature.

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