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Manilla Tamarind: A Multipurpose Plant Suitable for Dryland Areas

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Manila tamarind an underutilized and unexploited crop of the world, which has value in terms of food, fodder, fuel and green manuring. It also has high antioxidant potential, nutritive and medicinal value. The article deals with several information regarding its origin, species, varieties, nutritive value, medicinal and traditional uses. Due to hardy, drought tolerant and multipurpose use it is a potential climate smart crop for agroforestry system in dryland of Bundelkhand regions.

Manilla Tamarind or sweet tamarind is fast growing, hardy and evergreen, nitrogen fixing tree species which can resist drought and high temperature. In India, it grown in different forms such as wild, near road side, waste land plantations, farmlands, plateaus and in forests. Manilla tamarind belongs to fabaceae family and the genus contains 18 species. The genus *Pithecellobium* genus is derived from geek word "Pithecos" meaning monkey and "ellobium" means earing. Hence it is known as monkey earrings due to resemblance with twisted pod. It has wide adaptability in terms of soil and climatic requirements. The plants can resist nutritionally poor and harsh sites, and can grow in sandy, loamy, clay, acid, neutral, alkaline and saline soils (Brewbaker, 1992). It can grows at altitudes up to 1550 m and due to wide adaptability it grows well dry hot tropical and subtropical climates with maximum temperature tolerance limit of 48 °C and can grows well with annual rainfall of 700-1800 mm and survive in as low as 250 mm (Troup and Joshi, 1983; Luna, 1996, Hocking, 1993). It is a forest species whose full potential has not been utilized in terms fruit, fodder, green manure, production of lac and fuel purpose. In most of the part it is considered as forest species whereas food tree in Andaman Islands tree (Pareek and Nath, 2006). Beside these it can also produce good quality honey from its flower due to sufficient amount of nectar**.** In world, in different language it has different name which are described in Table 1

Table 1. List of different names of Manilla tamarind in different lanuages.

Language	Common names	Language	Common names
Amharic	Temar	Bengali	Amil, Dekhani Babul, Balati, Jilapi
Arabic	Tamar Hindi	Burmese	Kway-Tanyeng
English	Manila Tamarind, Monkey Pod, Madras Thorn, Blackbead Tree, Sweet Inga, Bread And Cheese Tree, Vilayati Chinch, Quamachil	Filipino	Kamatsile, Damortis, Kamanchilis
Gujarati	Vilayati Ambli, Bakhai Ambli, Goras Ambli	Hindi	Vilayati Imli, Jungli Jilebi, Jangal Jalebi, Singri, Vilayati Babul, Dakhani Babul,
Hawaian	Opiuma	Hawaiian	Opiuma
Hiligaynon	Kamunsil	Indonesian	Asam Koranji
Ilokano	Damortis or kamantiris	Khmer	Plaeh umpel tek

Javanese	Asem Londo, Asam Belanda	Khmer	Âmpül Tük
Kannada	Seeme Hunase, Ilaichi Kai, Dora Hunase, Ilach-Hunchi Kai	Lao	Sino-Tibetan
Marathi	Ingraji Chinch, Vilayati Chinch, Firangichinch	Malay	Asam Tinja, Asam Kranji
Odia	Seema Kaiyan	Spanish	Madre De Flecha, Guamuchil, Guama Americano, Quamachil
Swahili	Mkwaju Wa Kihindi, Maramata	Sindhi	Achhi gidamiri
Tamil	Kodukkappuli, Madras thorn, Kodikkai, Korkalikka	Telugu	Seema Chintakaya, Chema chinta
Tagalog	Kamachile	Tigrigna	Temri-Hindi
Thai	Makham Thet, Makham-Khong	Vietnamese	Me Keo, Keo Tây
Other name	Ape's earring, Bread and cheese tree.		

Origin and distribution:

Jangal jalebi is native to Mexico, South America and Central America. It is wildly cultivated in more than 75 countries in the world and naturalized throughout the tropical region comprising the old world (Little and Wadsworth, 1964). In India, it widely grown in different parts of India i.e. Andhra Pradesh, Bihar, Chhattisgarh, Gujarat, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Punjab, Rajasthan, Tamil Nadu, Telangana,Uttar Pradesh, West Bengal, Delhi, Goa, and Andaman Island (Figure 1). The presence of Manilla Tamarind is found different districts of several state which are described in table 2.

Figure 1. Distribution of Manila tamarind in different states of India

Table 2. Distribution of Manilla tamarind in different states of India.

States/UT	District
Andhra Pradesh	Anantapur, Chittoor, Guntur, Kurnool, Visakhapatnam,
Chhattisgarh	Bemetara, Janjgir–Champa, Raipur, Bilaspur, Durg, Raigarh, Korba, Dhamtari, Mahasamund, Gariyaband, Mungeli, Bemetara, Rajnanadoan, Kanker
Gujarat	Panchamahal, Kachh, Mehsana, Porbandar,
Karnataka	Bengaluru, Davanagere, Mandya, Mysore,
Kerala	Thiruvananthapuram
Madhya Pradesh	Datia, Hoshangabad, Ujjain, mandaur
Maharashtra	Sangli, Pune, Nandurbar, Mumbai,
Orissa	Kalahandi, bolangir, sambhalpur, Cuttack
Punjab	Patiala,
Rajasthan	Ajmer, Alwar, Bharatpur, Banswara, Barmer, Bundi, Chomu, Dausa, Dungarpur, Jaipur, Karoli, Jaiselmer, Jhalawar, Kota, Mount Abu, Nagore, Sikar, Swai Madhopur, Rajsamand, and Udaipur
Tamil Nadu	Virudhunagar, Kanchipuram, Namakkal, Tiruvannamalai, Tirunelveli, Theni
Telangana	Hyderabad, Ranga Reddy
Uttar Pradesh	Agra, Jhansi, Lakhimpur Kheri, Sonbhadra, Hardoi, Unnao, Sitapur, Vanaras, Lucknow,
West Bengal	Puruliya, Bankura, Paschim Medinipur, Kolkata, North 24 Parganas

Botany

The plants are evergreen, drought resistant and grow up to 10-15 m with an elevation of 1,500 m. The leaves are greenish, pinnate and each pinna contains two ovate- oblong leaflets (2-4 cm)**.** The stipules are modified into spines. The flowers are sessile, fragrant, greenish white in color, with 4.7 inches in size and also contain nectar which attracts bees. Calyx are small, Corolla is tubular and valvate, stigma is capitate type. Stamens are monadelphous and creamish white in colour whereas style is pinkish or reddish in color. The flower produces fleshy pods, which are constricted between two seeds and form spiral shape. The pods are initially green in color which on maturity becomes light green to light pinkish. There are two types of Manilla tamarind i.e. white aril type and pinkish red aril type (Figure 2). On ripening white aril type has light greenish to light pinkish pod whereas red aril type has pinkish to red type pods. The seed are shiny black in color with circular and flat shape and usually on average in one pod 4-5 seeds are present.

Figure 2. Type of Manilla Tamarind A) White Aril type B) Red type aril

Importance and uses

Nutritional importance: Manilla tamarind pods and seeds are having high nutritive value. The aril contains different nutrient like moisture (75.8-77.8g), calories (78.8 K), ash (0.6 %), protein (12.47-23.3 g), fat (0.4-0.5 g), carbohydrate (18.2- 76.87g), fibre (1.1-1.3 g), Ca (13-21 mg), P (42-58 mg), Fe (0.5-1.1 mg), Na (3.7-19mg), K (222-377mg), Mg (40 mg), Cu (0.6), S(109 mg), Vitamin A (25 IU /15mg), thiamine (0.24 mg), riboflavin (0.1 mg), niacin 0.6 mg, and ascorbic acid (13.8-33.0 mg). Beside these the aril contains different essential amino acids which are valine (143 mg), lysine (178mg), phenylalanine (41mg), and tryptophan (26mg). The seed contains 13.5 % moisture, 17.6 % protein, 17.1 % fat, 7.8 % fibre, 2.6 % ash, and 41.4 % starch (C.S.I.R., 1948–1976; Verheij and Coronel, 1991; Singh et al., 2012).

Fodder: Due to high nutritive value of leaves (29 % crude protein, 5.6 % ash, calcium phosphorus (1.14%, 0.35 %), they are used for fodder for goats, sheeps, horse and cattle's.

Green Manure: It can also use for green manure crop due to leguminous nature. It adds 4.9 % nitrogen, 0.78 % phosphorus and 2.67 % potassium in the soil.

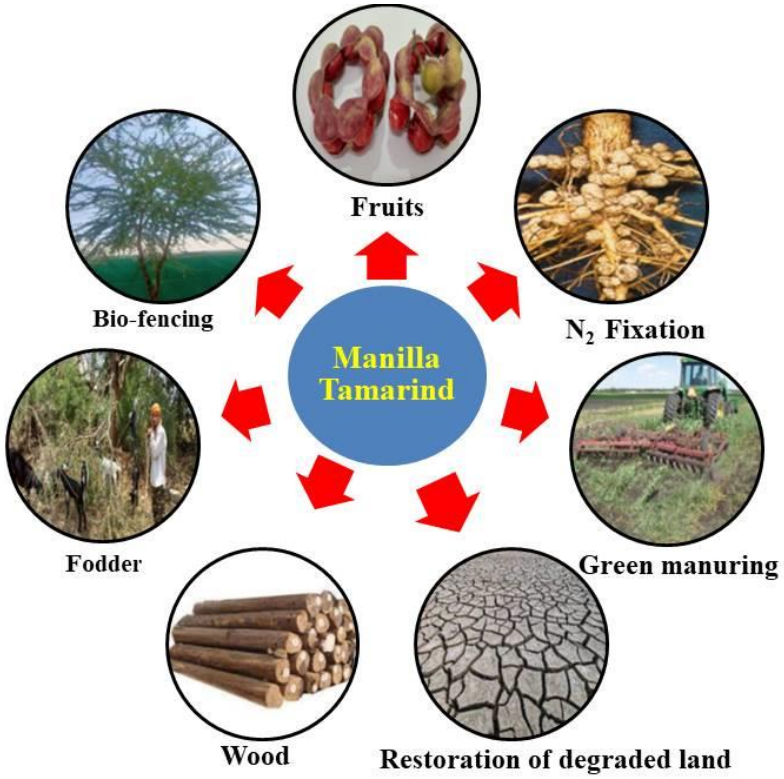
Medicinal uses: The each part of the plants. The different plant parts of Manilla tamarind such as leaves, bark, fruit, seed and roots has medicinal as well as traditional uses (Table 3).

Table 3. Medicinal and traditional uses of Manilla tamarind

Plant part	Uses
Leaves	**Medicinal uses:** gall ailments, prevent miscarriage, convulsions, venereal sores (herpes, syphilis, chancroid), reduce inflammations (leaf paste), cure indigestion (leaves + salt), **Traditional uses:** Fodder
Bark	**Medicinal uses:** Astringent (able to stop a cut from bleeding), antipyretic, dysentery, chronic diarrhea, hemostatic (stops bleeding), tuberculosis, gum ailments, toothache, and hemorrhages **Traditional uses:** Tannin extracted from the bark is used to soften leather
Fruit/Aril	**Medicinal uses:** Gum ailments, toothache, bolsters the immune system, staves off strokes and reduces phlegm, contains cancer-fighting antioxidants haemoptysis and hemorrhages **Traditional uses:** jam, beverage, and squashes

Pod Peel	pods are also relished by livestock and chickens
Seed	**Medicinal uses:** clean ulcers, reduce chest congestion (seed juice is inhaled into the nostrils) **Traditional uses:** Seeds are edible & eaten in curries in India (Parrotta, 1991), the pressed seed is used to form seed cake and used as a seed meal for stock feed.
Stem & branches	**Medicinal uses:** Combats dysentery **Traditional uses:** It used as avenue tree and topiary (Indonesia), wood of branches and stem used for furniture implements, fuel
Root	**Medicinal uses:** Diarrhea and dysentery.
Flower	**Traditional uses:** Excellent quality honey is produced from the high quality nectar and pollen of flowers

Other uses: Beside these it has diverse uses i.e. fences in farms (also due spiny nature and fast growth), yield gum, wood (for furniture and implements), fuel (due to high calorific value), windbreak and shelterbelts.

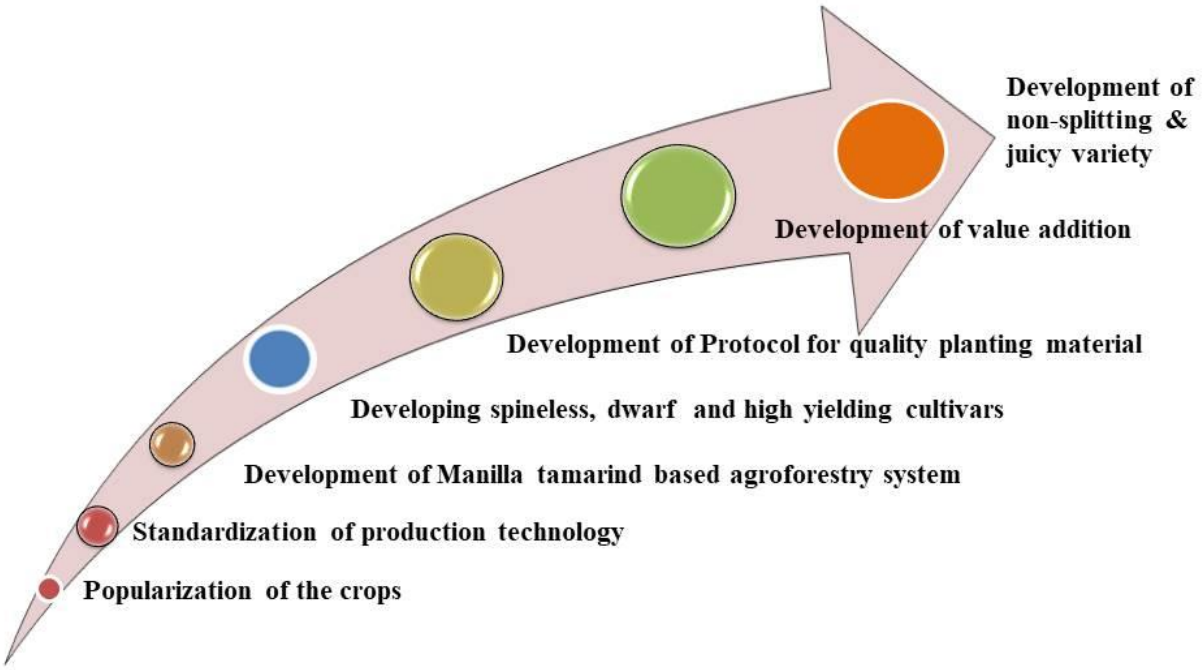


Figures 3. Multipurpose uses of Manila tamarind

Conclusion and future prospects

The increase in climate induced stress in present era had led to serious loss in plant and animal biodiversity. Due to huge yield losses and increased in the population pressure every year, it is impossible to feed to the population in coming era. Now days, due to harsh climatic conditions, the plants are unable to survive and to overcome this it is become essential to introduce the new crops in our diet which can not only provide food but also give fodder and energy. The introductions of these under-utilized crops are not only having the wider adaptability to harsh climatic conditions but also have ability to fight against the malnutrition problems. The several future prospect of the Manilla

tamarind are described in figure. Hence, Manila tamarind potential need to be utilized fully in terms of food, fodder, fuel and green manuring.



Figures 3. Future Prospects of Manila tamarind

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