



REVIEW ON MEDICINAL USES IF SEEDS AND FRUIT OF TAMARINDUS INDICA L.

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ABSTRACT:

TAMARIND, TAMARINDUS INDICA LINN. (Hindi – Imli) found in most of the tropical region. At present its cultivated in 54 countries of the world. India is world largest producer of tamarind product. Its slow growing , long lived massive tree under favourable condition height up to 24 to 30 meter and spread up to 12 meter. The tree mostly grow wild, although it is cultivated to a limited extend. It is particularly abundant in the India states Madhya Pradesh , Bihar, Andhra Pradesh, Karnataka, Tamil Nadu, West Bengal. In Bajapur, in the Deccan plateau, the tree is famous for its five varieties and is cultivated extensively. In some part of india it is naturally regenerated on waste land and forest land. It is a valuable wood species used in making furniture, tool handles, charcoal, rice, pounder and fuel wood. Trees can produce up to 15 tones fruits / hectare on an annual basis.

KEYWORDS: TAMARINDUS INDICA LINN., fruit, seed, Nutritive constituent

INTRODUCTION :

Scientific name: Tamarindus indica l [1]

Family: Fabaceae [1],[2]

Subfamily: Detarioideae[1]

Genus: Tamarindus[1],[2]

Order: Fabales [1],[2]

Kingdom: Plantae [1],[2]



TAMARIND, TAMARINDUS INDICA LINN. (Hindi – Imli) is a leguminous tree bearing edible fruit that is indigenous to tropical Africa and naturalized in Asia. The genus Tamarindus is monotypic, meaning that it contains only this species. It belongs to the family Fabaceae[1]. It is found in most of the tropical region. Native to tropical Africa and tree grows wild throughout sudan. It was introduced into India and from this Asiatic country it reached to Persian and the Arabs who called it tamarhindi.

Its slow growing , long lived massive tree under favourable condition height up to 24 to 30 meter and spread up to 12 meter
At present its cultivated in 54 countries of the world , 18 in it's native range and 56 countries where it's has become naturalized. The major area of production are central Africa, Pakistan, Bangladesh, Guinea, Nigeria, Sudan, Tanzania, Australia, Afghanistan, brazil, china, Colombia, Thailand, Srilanka, Philippines, Myanmar, Mexico, Malaysia, Egypt, Cuba, and India.

India is world largest producer of tamarind product [3],[5]. The tree mostly grow wild, although it is cultivated to a limited extend. It is particularly abundant in the India states Madhya Pradesh , Bihar, Andhra Pradesh, Karnataka, Tamil Nadu, West Bengal. In Bajapur, in the Deccan plateau, the tree is famous for its five varieties and is cultivated extensively. In some part of india it is naturally regenerated on waste land and forest land. Since ancient time ,india has been expartind processed tamarind pulp to western and Arab countries and more recently the USA.

It is a valuable wood species used in making furniture, tool handles, charcoal, rice, pounder and fuel wood. Almost every part of the tree is used. In inter tropic zone , tamarind pulp, leaves, flowers and seed are commonly consumed in various dishes or traditional drinks due to its high nutritive and calorific value tamarind tree bear pods fruit countaining about 10 brown seeds surrounded by an abundant acid pulp. Fruit contain about 30% pulp, 40%

seeds and 30% hull. Trees can produce up to 15 tones fruits / hectare on an annual basis. When fruit are ripe, pulp is either sun dried or mixed with sugar and stored for several month with no notable alter in quality. It used especially for food preparation and for medicinal purpose. Traditional processing for food prepared wide spread whereas it's commercially used (pactorised juices, tamarind paste)

Edible pulp of ripe fruits is used as flavouring agent in soups, jam, chutney, sauses and juices. Its richest natural source of tartaric acid and is the main acidulant uses in the preparation of food in india and other asian countries. Other industrial products include tamarind paste, conc., powder, pickles and juice. It has wide range of serious pect and disease and remained unimproved wild terr and under exploited to meet growing commercial need[3].

Tamarind seeds are flattened, glossy, and orbicular to rhomboid. They are 3-10 cm and 1.3 cm in size. The are dicotyledonous seeds are hard, red to purple brown in colour. Seed chambers are lined with a parchment like membrane. Cotyledons are thick. Seed size varies between 320-700g per kg of fruit. Tamarind seed consist of the seed coat or tester (20-30%) and the kernel or endosperm (70-75%) (shankaracharya 1998). Seed portion in tamarind is about 40% of total weight [4].

Conclusions:

This Documentation is forknowledge on tamarind health benefits and uses is needed to servelocal and regional promotion and domestication efforts of tamarind to prevent a further decease in tamarind tree populations. High locally use and demand for tamarind fruits and seeds in continuously should increase the development of continuous production as well as conservation efforts, in order to prevent a continued harvesting, satisfaction of local demand, and treatment of local and major disease.

Origin:

Tamarind is originated in Madagascar and is now extensively cultivated in India, Myanmar, Bangladesh, Malaysia, Sri Lanka, Thailand, several African, Central American and South American countries.[6] Several authors have proposed various geographical areas as the origin of the tamarind tree. Tamarind fruit was at first thought to be produced by an Indian palm, as the name tamarind comes from a Persian word 'tamar-i-hind', meaning 'date of India'. Its name 'amlaka' in Sanskrit indicates its ancient presence in the country (Mishra, 1997). As reported by El-Siddig et al. (2006), it was mentioned in the Indian Tamarind 513© Woodhead Publishing Limited, 2012Brahmasamhita scriptures between 1200 and 200 BC. Morton (1987) placed its origin in India, but others considered it indigenous to the drier savannahs of tropical Africa, from Sudan, Ethiopia, Kenya and Tanzania, westward through sub-Saharan Africa to Senegal (Brandis, 1921; Ridley, 1922; Dalziel, 1937; Dale and Greenway, 1961; Irvine, 1961; NAS, 1979). The tamarind tree is now considered to have originated in Madagascar (Von Maydell, 1986; Hockin, 1993). It is thought to have been introduced to South and Southeast Asia and to have become naturalized in many areas to which it was introduced (Simmonds, 1984; Purseglove, 1987; Coronel, 1991). It is now cultivated throughout semi-arid Africa and South Asia and has been planted extensively in Bangladesh, India, Myanmar, Malaysia, Sri Lanka, Thailand and several African, Australian, Central American and South American countries (Troup, 1921; Sharma and Bhardwaj, 1997) [7].

Conditions and cultivation of tamarind

Soil and climate

Grown on variety of soils ranging from poor degraded, eroded, gravelly, saline and alkaline soils. Productivity is higher in red loamy, deep well drained soils. The absolute maximum temperature varies from 36-47.50 C and the absolute minimum temperature varies from 0-17.50 C. Rainfall requirement – 750-1900 mm. Altitude – up to 100 m above MSL.

Season: June – December is found to be optimum.

Propagation: Seeds / Grafts

Nursery: Fresh seeds are sown in nursery beds in March – April. Soaking of seeds in 10 per cent cow urine or in cow dung solution (500 g in 10 l of water) for 24 hours. Two year old seedlings are transplanted to the main field.

Vegetative propagation

Softwood grafting: March- April

Air Layering: Shoots treated with IBA 4000 ppm.

Spacing: 8-10m x 8-10m is adopted.

Planting

The grafts should be planted in the pits of 1 m x 1 m x 1 m filled with FYM and top soil. Add 50 g of Methyl parathion 1.3% dust in the pit. Immediately after planting, support the graft with stakes.

Irrigation: Regular watering should be given once in seven days.

Fertilizers: Apply 200:150:250 g of NPK per tree per year along with 25 kg of FYM and 2 kg of Neem cake.

Aftercultivation

- Remove the rootstock sprouts.
- Remove the dried and diseased parts.
- Intercrops like leguminous crops, short duration vegetables, annual drumstick, sesamum and sorghum may be raised in the alley spaces up to four years.

Training: Early training is necessary to form a high head and uniform scaffold branches in all directions.

Pruning: Removal of dried, diseased and criss cross branches.

Plant protection: Pests: Leaf caterpillar (*Achaea janata*)

Leaf caterpillar can be controlled by spraying Quinalphos 25 EC 2 ml/lit .

Storage beetle (*Pachymeres gonagra*)

Storage beetles can be controlled by spraying Quinalphos 25 EC 1 ml/lit at the time of fruiting season.

Diseases: Powery mildew

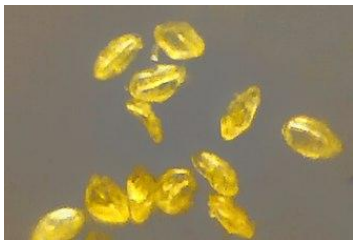
Powdery mildew can be controlled by spraying Dinocap 1 g/lit.

Harvest

Plants starts bearing from 4th year onwards and the economic yield will be achieved from 9th year onwards. Pods are harvested in March – April every year.

Yield: 150 – 200 kg of fruits/tree/year [8].

Tamarind Pollen grain



Tamarind seedlings



Tamarind flower



Tamarind fruits and leaves



Tamarind tree

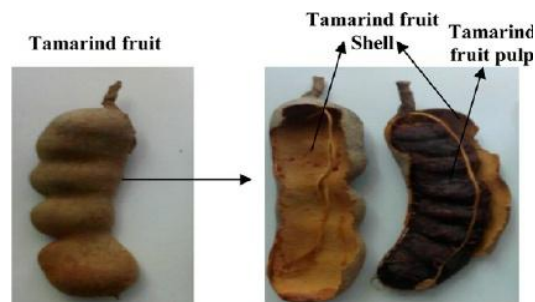


TAMARIND FRUIT

The fruit of the tamarind tree or 'Assam tree' is known as 'imli' or 'Indian date'. The sticky acidic pulp of tamarind fruit has been used as a food ingredient and medicine for many years. The edible fruits, and especially the pulp, can be eaten raw or used as sherbet or as an ingredient in curries, pickles, etc[5]. Trees can produce up to 15 tones fruits / hectare on an annual basis [3].



The fruit is a legume. The pod is long, between 5 -15cm in length; brown, thick and velvety. Each fruit contains 8-10 hard and flat seeds, surrounded by a yellow-brown edible pulp[11],[9]. Tamarind fruit contain two part tamarind fruit shell and tamarind fruit pulp. Fruit contain about 30% pulp, 40% seeds and 30% hull[3].

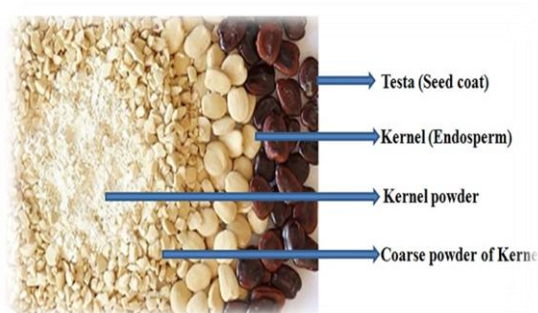


TAMARIND SEEDS:

Tamarindusindical. seed is abundantly grown plant in Aian countries. It is abundant and cheaply available by-product of tamarind pulp industry. It is rich in protein; containing high amount of many essential amino acid [13].



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Nutritive constituent of tamarind per 100 mg

Constituent	Quantity (fruit)	Quantity (seeds)
Energy	110-215 calories/100gm	353.52 kcal/100g
Moisture	28-50 gm/100gm	6.24-6.8 %
Protein	2.2-3.1 gm/100gm	16.58%
Fats	0.1 gm/100gm	7.06 %
Fiber	5.6 gm/100gm	2.27%
niacin	0.6gm/100gm	10%
Carbohydrate	51.5-67 gm/100gm	61.70 g/100gm
Invert sugar (70% glucose and 30% fructose)	30-42 gm/100gm	34gm/100gm
Ash	2.8-3.33 gm/100gm	3.59%
Calcium	80.0-465 mg/100gm	0.34%
Magnesium	24-73 mg/100gm	86.43mg/100%
Phosphorus	87-190 mg/100gm	0.29%
Potassium	60-568 mg/100gm	30.53mg/100g
Sodium	3-77 mg/100gm	12.63mg/100g
Copper	1-1.2 mg/100gm	8mg/kg
Iron	1.2-11 mg/100gm	303mg/kg
Zinc	0.6-1 mg/100gm	69mg/kg
Nickel	0.6 mg/100gm	-

Manganese	--	-
Sugar	25-45%	-
Tartaric acid	8-18%	12-18%
Vitamin B6	0.066 mg	-
Vitamin C	3.5 mg	-
Vitamin K	2.8 µg	-
Vitamin E	0.1 mg	-
Vitamin A	2 µg	-
Folate, total	14 µg	-
Folate, food	14 µg	-
Folate, Dietary Fibre Equivalent (DFE)	14 µg	-
Choline, total	8.6 mg	-
Carotene, beta	18 µg	-
Tryptophan	0.018 g	-
Lysine	0.139 g	-
Methionine	0.014 g	-
Thiamin	0.428 mg	-
Riboflavin	0.152 mg	-
Vitamin B5	0.143 mg	-
saturated fatty acids	67.5 4%	20.15%
Unsaturated fatty acids	30.15%	18.95%
n-heptadecanoate	14.5%	-
Hexadecanoic acid	13%	-
Nonadecanoate	13%	-
Octadecanoic acid	6.1%	-
Pectin	2-3%.	-
Tannins	39%	0.40%
Alkaloid	4.32%	0.23-0.27%
Flavonoids	880 to 11483 mg CE /100 g	12.39-12.55mg/100g
Glycosides.	1.59%	-
Aminoacid	64-67%	10.3%
Saponins	2.2%	1.01-1.02%

Properties of Tamarind:

Tamarind is rich of phytocontituents and amino acids, and it have many properties. The properties of tamarind are given below.

- anthelminthic (expels worms) potential[14], [16],[17]
- antiviral agent[15], [17]
- antioxidant[16], [17]
- antifungal[15], [17]
- antibacterial property[15],[17]
- helpful for wound healing [17]
- carminative (relieves gas) [17]
- laxative (cures constipation)[16], [17]
- expectorant (helps clear mucus from the throat)[17]
- blood tonic (to produce more blood in the body)[17]
- antiulcer potential[17]
- anti-diabetic[17]
- anti-asthmatic[17]
- anti-pyretic (reduces fever)[17]

1. Lots of antioxidants.

The delicious pulp is packed with antioxidants. Tamarind is high in phytonutrients, which are health-protective substances that are beneficial to the heart, anti-cancer, and anti-diabetic. Its phytonutrients, including catechin, epicatechin, apigenin, and procyanidin B2, battle free radicals in the body. These, together with tartaric acid, are useful in reducing inflammatory responses and, consequently, oxidative stress. Aside from that, tamarind includes geraniol, which helps prevent pancreatic cancer.

2. Anti-cancer properties

Tamarind includes both phytonutrients and tartaric acid. They reduce oxidative stress and prevent chronic cancer. It also contains geraniol, a naturally occurring substance that inhibits pancreatic cancer. An animal study on tamarind seed extract discovered that it inhibits the cancer cell's signaling system.

3. Heart-Healthy Pulp.

Tamarind is rich in potassium and high fiber, flavonoids, and antioxidants. An animal study demonstrates that tamarind pulp lowers harmful cholesterol. It also boosts healthy cholesterol and lowers triglyceride levels. The pulp is essential for eliminating fat plaques that accumulate in arteries, increasing the risk of atherosclerosis. According to research, tamarind can help reduce diastolic blood pressure. This is a fantastic vasodilator because it contains 753mg of potassium.

4. Hepatoprotective Properties.

Tamarind pulp extract is liver-protective due to its high antioxidant content. Procyanidins, in particular, prevent oxidative damage to the liver. According to ScienceDirect, eating tamarind can reduce your risk of developing fatty liver disease.

5. Promotes weight loss.

Tamarind is an excellent addition to any quick weight loss diet. It contains hydroxycitric acid (HCA), which can reduce fat. A new study discovered that tamarind suppresses trypsin, hence reducing food cravings.

It has also been demonstrated that tamarind naturally increases serotonin levels. It effectively suppresses hunger and aids in fat loss.

6. Enhances muscle and nerve functions.

Tamarind is high in vitamin B. Thiamine is a key component of the vitamin B complex. It improves nerve and muscle function by increasing reflex activities. The researchers discovered that xyloglucan in tamarind promotes the formation of healthy brain and spinal cells. It demonstrates how tamarind cravings during pregnancy benefit both you and your unborn child.

7. Promotes Digestive Health

Tamarind serves as a natural laxative. It helps treat and even prevent diarrhea and constipation. It works by activating stomach juices, which help with digestion.

Type of biologically active component

1. Tamarind is strong in antioxidants, including vitamin C, E, and phenolic compounds. These antioxidants serve to neutralize damaging free radicals in the body, thereby protecting cells from oxidative damage and lowering the risk of chronic diseases.
2. Tamarind has natural anti-inflammatory qualities due to its polyphenolic components, including flavonoids and tannins. These substances assist to reduce inflammation in the body, which is a major underlying cause of many chronic illnesses such as heart disease, diabetes, and arthritis.
3. Tamarind promotes digestive health. It contains dietary fiber, which promotes regular bowel motions and reduces constipation. Tamarind also includes natural enzymes that help break down carbohydrates, proteins, and lipids, encouraging proper digestion.
4. Tamarind can help control blood sugar levels, according to research. It contains chemicals that can limit the function of carbohydrate digestion enzymes, causing glucose to be released into the bloodstream at a slower pace. This can be advantageous for people who already have diabetes or are at risk of getting it.
5. Tamarind can improve heart health. It contains fiber and polyphenols, which may lower cholesterol and lessen the risk of heart disease. Tamarind also includes potassium, which is required to maintain normal blood pressure levels.
6. Weight Management: Tamarind's fiber content and propensity to promote satiety make it an effective complement to a weight management plan. The fiber keeps you feeling fuller for longer, lowering your overall calorie intake. Furthermore, tamarind's natural tart flavor can lend depth to meals without the use of excessive fats or sweeteners.

7. Boosts Immunity: Tamarind contains vitamin C, which promotes a healthy immune system. Adequate vitamin C intake helps boost the body's defenses against infections and improve general health.

Tamarind Good for PCOS.

Tamarind may help people with polycystic ovary syndrome (PCOS), a hormonal disease that affects many women. Tamarind may not immediately treat or cure PCOS, however it can be an effective supplement to a well-balanced diet for treating some of the condition's symptoms.

Here's how tamarind may assist people with PCOS:

1. **Blood Sugar Regulation:** PCOS is commonly associated with insulin resistance, leading to high blood sugar levels. Tamarind has been shown to have a favorable effect on blood sugar management, potentially improving insulin sensitivity. Tamarind may indirectly benefit patients with PCOS who are at risk of developing diabetes or who are having difficulty maintaining blood sugar levels by supporting better glucose regulation.
2. **Digestive Health:** PCOS often causes digestive disorders like bloating and constipation. Tamarind provides dietary fiber, which helps to maintain regular bowel motions and promotes overall digestive health. Adequate Fiber promotes regular bowel movements and overall digestive health. Adequate fiber consumption can aid with constipation and promote gut health.
3. **Anti-inflammatory properties:** PCOS is commonly linked to chronic low-grade inflammation. Tamarind has natural anti-inflammatory qualities that may aid in reducing inflammation in the body. Tamarind, by lowering inflammatory levels, may help to alleviate certain PCOS symptoms while also boosting general health.
4. **Weight Management:** Excess weight can worsen PCOS symptoms, thus it's important to manage weight effectively. Tamarind's high fiber content can increase fullness and help control appetite, which may be good for PCOS patients who want to achieve and maintain a healthy weight.

Tamarind Good for acidity

Tamarind may provide relief for Individuals suffering from acidity or acid reflux. While tamarind can not treat the underlying causes of acidity, its natural qualities can help reduce symptoms. Here's how tamarind could perhaps help with acidity:

1. Tamarind has an alkalizing effect, despite its acidic taste. It contains potassium, which can aid to neutralize excess stomach acid and lower acidity levels. Consuming tamarind may help balance the pH levels in the stomach, relieving acidity.
2. Tamarind contains natural digestive enzymes including amylase and lipase, which help break down food and improve digestion. Tamarind may lessen the frequency of acid reflux and the likelihood of acid regurgitation by increasing digestion.
3. Tamarind has always been known for its soothing properties. It has been used to treat stomach problems. It includes chemicals that can help reduce inflammation in the digestive tract, thereby alleviating acid-related symptoms.
4. Tamarind contains dietary fiber, which helps regulate bowel motions and avoid constipation. Fiber, which promotes regularity, can help avoid gas buildup and lower the likelihood of acid reflux.

Tamarind Helps Reduce Belly Fat.

Tamarind alone cannot effectively reduce belly fat. However, including tamarind into a well-balanced diet and healthy lifestyle may help with weight control, which can contribute to a reduction in overall body fat, particularly belly fat. Here's how tamarind may help with weight management:

1. **Fiber Content:** Tamarind contains dietary fiber. Consuming foods high in fiber might help you feel satisfied for longer, lowering your overall calorie consumption. Tamarind, by increasing satiety, can help limit portion sizes and avoid overeating, which may indirectly contribute to weight loss, including a reduction in abdominal fat.
2. Tamarind has fewer calories than other snack options. Choosing tamarind as a healthy snack option over high-calorie, sugary treats

can help with calorie control and weight management.

3. Hydration: Tamarind contains natural hydrating properties. Staying hydrated is vital for overall health and weight management. Replace sugary beverages with hydrating options such as tamarind-infused water or unsweetened tamarind juice to cut calories and enhance good hydration.

4. Tamarind's tart flavor can give depth to dishes. Add flavor to foods without using too much fat or sugar. By using tamarind in your cooking, you can improve the taste of your dishes while perhaps reducing your need on calorie-dense flavor enhancers.

Tamarind is a blood thinner

Tamarind contains several compounds that may have a minor blood-thinning impact. It contains chemicals known as coumarins, which have anticoagulant effects. However, tamarind's blood-thinning effect is milder than that of approved anticoagulant drugs. Here's what you should know.

1. Coumarins: Tamarind naturally contains coumarins, which have been shown to have anticoagulant properties. Coumarins function by reducing the action of specific enzymes involved in blood coagulation. This may avoid excessive clotting and improve healthy blood flow.

2. Tamarind has a mild blood-thinning effect that is less effective than prescription blood thinners such as warfarin or aspirin. It is usually thought to have a minor effect on blood coagulation.

3. Consult with Healthcare Professional: If you are taking blood-thinning medications or have a bleeding disorder, it is important to consult with your doctor before adding tamarind to your diet. They can offer individualized advice based on your medical condition and drug regimen.

4. Moderation and Balance: As with other foods and supplements, moderation is essential. Consuming tamarind in moderation as part of a well-balanced diet is generally safe for people who do not have any underlying medical issues. However, excessive intake may result in potential adverse effects, including as Increased chance of bleeding.

Tamarind Water Benefits:

Tamarind water, often called tamarind-infused water or tamarind decoction, has various possible health benefits. It is a delicious

beverage created by soaking tamarind pulp or pods in water to extract their tastes. Here are some of the advantages of tamarind water:

1. Tamarind water is a great method to remain hydrated. It offers a tasty alternative to plain water, making it more fun to drink and encouraging proper fluid consumption throughout the day.

2. Vitamin C: Tamarind contains vitamin C and when infused in water, it adds this nutrient to the beverage. Vitamin C is essential for maintaining a healthy immune system, increasing collagen formation, and functioning as antioxidant.

3. Tamarind is traditionally used to promote intestinal health. Tamarind water can help with digestion, indigestion, and constipation. It contains natural enzymes and dietary fiber, which encourage regular bowel motions and general gut health.

4. Tamarind has high levels of antioxidants, such as polyphenols and flavonoids. These substances serve to protect the body's cells from oxidative stress generated by damaging free radicals. Regular tamarind water drinking can aid to support overall antioxidant levels and sustain cellular health.

5. Tamarind water can boost satiety and aid with weight management. Tamarind's fiber content can lead to improved satiety and lower calorie intake, aiding in portion control. Practice good eating habits.

6. pleasant Flavor: Tamarind water's sweet and tart taste is very pleasant during hot weather. It provides a tasty alternative to sugary beverages, hence reducing overall sugar consumption.



1. Tamarind jam



6. Tamarind pickle

Price: 99₹ (300gm)

1. Tamarind syrup

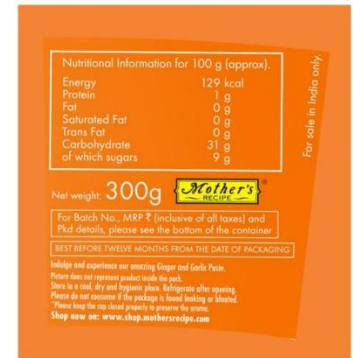
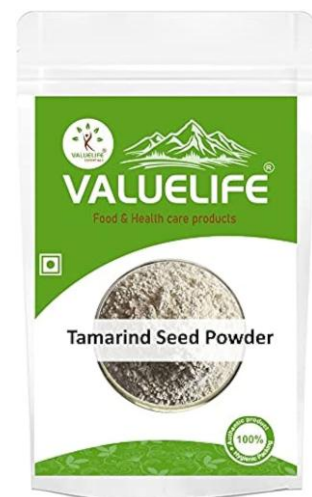
8. Tamarind champoy



Price: 300₹ (250ml)



Price: 149₹ (250gm)

9. Tamarind sauce**Price: 199₹ (200gm)****11. Tamarind juice drink****Price: 185₹ (500ml)****10. Tamarind paste****Price: 52₹ (200gm)****12. Tamarind seeds powder****Price: 285₹ (990gm)**

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