REVIEW OF LITERATURE

PLANT PROFILE:

*Tamarindus indica* L., Family: *caesalpiniaceae*

Vernacular names

- Assam: Teteli
- Bengal: Ambli, Tentul, Tinturi, Nuli
- English: Tamarind tree
- Gujarat: Ambli, Amli
- Hindi: Imli, Amla
- Malayalam: Amlam
- Odiya: Tentuli
- Punjab: Imli
- Tamil: Ambilam, Amilam
- Telugu: Amlika, Chinta, Sinja, Sinta
- Urdu: Imli
- Nepal: Titri

DESCRIPTION OF PLANT:

A large tree 12-18 m. high, branches spreading, glabrous

Leaves: 5-12.5 cm long, rachis slender channeled, stipules linear, cadcous.

Leaflets: Subsessile, 10-20 pairs, tolerably closely set on the rachis, 8-30 by 5-8 mm. oblong, obtuse, glabrous reticulately veined.

Flowers: Few -flowered racemes at the end of the branchlets, Pedicil 6-10 mm. Long slender articulate below the calyx, glabrous, bracts concave, 6-8 mm. long, enclosing the buds. Cadcous; bracteoles small. Calyx 1.3 cm. long; tubes narrowly turbinate, 4 mm. long; segments 8 mm. long, sub equal oblong, some what oblique, obtuse or subacute. Petals 3 (an upper and 2 lateral), 1 cm. long, sub equal obovate-, oblong yellowish with pink strip. Stamens 3 fertile, connate nearly half their length; filament pubescent at the base; anther oblong. Ovary stalked; 8-12 or more style pubescent, equalling stamens. Puds 7.5 -20 cm. long by 2.5 cm. broad and
about 1 cm. thick, slightly curved, subcompressed, scurfy. Seeds 3-12 obovate-oblong, truncate at the ends, 1.6 by 0.8 cm., compressed with shallow oblong pit on the each of the flat faces, smooth, brown sining.

**THERAPEUTIC USES**

Leaves: Reduce inflammatory swelling, tumors, ring worm, diseases of blood, small pox, ophthalmia and other eye disease, ear ache, snake bite

Flower: appetizing, urinary discharges, bad odour in perspiration

Unripe fruit: Astringent, to the bowel and cure “vata”

Ripe fruit: Appetising, laxative heating, tonic to the heart, anthelmintics and cure ‘vata’ and ‘kapha’; heals wound and fracture.

Bark: Astringent, properties, heals ulcer, liver complaints.

*Tamarindus indica* Linn. was used as a traditional medicine for the management of diabetes mellitus.

**PLANTS BELONGS TO CAESALPINIACEAE FAMILY AND SHOWS ANTIDIABETIC ACTIVITY**

*Cassia alata* Linn.
*Cassia fistula* Linn.
*Cassia angustifolia* Linn
*Cassia occidentalis* Linn.
*Cassia sophera* Linn
*Cassia tora* Linn.
*Ceratonia siliqua*

**CHIEF CHEMICAL CONSTITUENTS**

- Tamarindienal
- Hordenine
- Tammarixin
1. Ramchander T et al., (2012) Studied antidiabetic activity of aqueous methanolic extracts of leaf of *Tamarindus Indica* on alloxan induced wistar rats. Aqueous methanolic extract shown significant protection and lowered increased blood glucose level.

2. Bhutkar M A et al., (2011) Studied anti-oxidative effect of ethanolic extract of *Tamarindus Indica* in alloxan induced diabetic rats. The results clearly exhibit the antioxidant property of ethanolic extract of *Tamarindus Indica*.

3. Jindal V et al., (2011) Studied hypolipidemic and weight reducing activity of the ethanolic extract of *Tamarindus indica* fruit pulp in cafeteria diet and sulpiride-induced obese rats. Results indicate that fruit pulp showed a significant weight reducing and hypolipidemic activity in cafeteria diet and sulpiride induced obese rats.

4. De et al., (2011) Studied antidiabetic potentiality of the aqueous-methanolic extract of seed of *Swietenia mahagoni* (L.) in streptozotocin-induced diabetic male Albino Rat. The results indicated that the extract of *S. mahagoni* seed for the correction of diabetes and its related complications like oxidative stress and hyperlipidemia.


6. Prashanth et al., (2010) Studied antihyperglycemic and antioxidant activity of ethanolic extract of *madhuca longifolia* bark. Finally the study indicated the ethanolic extract of *Madhuca longifolia* to be a potential antidiabetic and antioxidant properties and the extract also exhibited significant free radical scavenging activity and superoxide scavenging activity.

7. Fatima S et al., (2010) Studied antidiabetic and antihyperlipidemic activity of ethyl acetate: Isopropanol (1:1) fraction of *Vernonia anthelmintica* seeds in streptozotocin induced diabetic rats. From the present study, it is evident that, the seeds of *V. anthelmintica* possess significant antidiabetic and antihyperlipidemic property without evident toxic effects.

8. Mahmoudzadeh-Sagheb H et al., (2010) Studied a stereological study of effects of aqueous extract of *tamarindus indica* seeds on pancreatic islets in streptozotocin-induced diabetic rats. Total number of islets, pancreas wet weight and volume did not show any significant changes between control and experimental groups (P>0.05). Results suggested that aqueous extract of...
*Tamarindus indica* seeds partially restores pancreatic beta cells and repairs STZ-induced damages in rats\(^\text{20}\).

9. Li Wang et al., (2010) Have studied effect of *Vaccinium bracteatum* Thunb leaves extract on blood glucose and plasma lipid levels in streptozotocin-induced diabetic mice. The result indicated the Body weights of diabetic mice treated with *Vaccinium bracteatum* Thunb leaves extract were partly recovered\(^\text{21}\).

10. K. Karthikesan et al., (2010) Studied antihyperlipidemic effect of chlorogenic acid and tetrahydrocurcumin in rats subjected to diabetogenic agents. These results indicate that combination of chlorogenic acid and chlorogenic acid can potentially ameliorate lipid abnormalities in experimental type 2 diabetes\(^\text{22}\).

11. El-Khawaga O A Y et al., (2010) Studied hypoglycemic, hypolipidemic and antioxidant activities of *Cleome drosserifolia* in Streptozotocin-Diabetic Rats. The result indicated that the extract of *Cleome drosserifolia* extract were found to significant hypoglycemic, hypolipidemic and antioxidant be comparable with that of gliclazide\(^\text{23}\).

12. Saritha V et al., (2010) Studied toxicological evaluation of methanol extract of *Aloe vera* in rats. The toxicity profile of the methanol extract of the *Aloe vera* (*Aloe barbadensis*) gel was studied in Wistar rats. A multiple oral administration of the extract at single dose of 4, 8, 16g/kg body weights for 14 days did not produce signs of toxicity, behavioral appearances, changes on gross appearance. The sub-acute toxicity was determined by administration of graded doses (1, 2, 4, 8 and 16g/kg b.wt orally) of the extract daily for 6 weeks and the effects on body weight, organ weight, histology as well as serum biochemical parameters were estimated\(^\text{24}\).

13. Dhalwal K et al., (2010) Studied hypoglycemic and hypolipidemic effect of *Sida rhombifolia* ssp. *retusa* in diabetic induced animals. The results obtained from the experiment provide scientific evidence in favor of the traditional use of *Sida rhombifolia* ssp. *retusa* leaves for the treatment of diabetes mellitus\(^\text{25}\).

14. Lobo V C et al., (2010) Studied the antioxidant and free radical scavenging activity of *Hygrophila schulli* (Buch.-Ham.) . Results obtained in the present study suggests that the extract of *Hygrophila schulli* seed have potent antioxidant activity against free radicals, prevent oxidative damage to major biomolecules and afford significant protection against oxidative damage\(^\text{26}\).
15. Jaziri S K et al., (2010) Studied phytochemical, antimicrobial, antioxidant and antigenotoxic potentials of different extract of *Cyperus rotundus* extracts. Result indicate that extract of *Cyperus rotundus* poses significant antimicrobial, antioxidant and antigenotoxic potential.

16. Arya V et al., (2010) Studied antimicrobial activity of different extract of *Cassia occidentalis* L (Leaf) against various human pathogenic microbes. The result indicated that the pattern of inhibition varied with the solvent used for extraction and the microorganism tested. Among these extracts, methanol and aqueous extracts showed significant antimicrobial activity against most of the tested microbes.


18. Gupta S et al., (2009) Studied evaluation antihyperglycemic and hypolipidemic activity of aqueous extract of *Cassia auriculata* L. leaves in experimental diabetes. The results demonstrated that *Cassia auriculata* ethanolic extract possesses potent antihyperglycemic and hypolipidemic activity.

19. Lodhi G et al., (2009). Studied ethanolic extract (50 %) of stems of *Calotropis gigantea* (Asclepiadaceae) at doses of 250 and 500 mg kg−1. The results revealed that the *C. gigantea* extract possesses significant antioxidant and hepatoprotective effect.

20. Vijaya C et al., (2009) Studied lipid lowering activity of ethanolic extract of leaves of *Aegel marmelos* (Linn) in hyperlipidemic model of Wistar albino rats. The result indicated that the extract showed significant lipid lowering effect effects hyperlipidemic rat model.

21. Gupta R et al., (2009) Studied the effect of *Pterocarpus marsupium* in streptozotocin-induced hyperglycemic state in rats. These results suggest oral administration of *Pterocarpus marsupium* may have the ability to improve streptozotocin-induced chronic diabetic stress.

22. Khatri et al., (2009) Studied the evaluation of hepatoprotective activity of aerial parts of *Tephrosia purpurea* L. and stem bark of *Tecomella undulata* Oral administration of *Tephrosia purpurea* at 500 mg/kg and *Tecomella undulata* at 1000 mg/kg resulted in a significant reduction in serum aspartate aminotransaminase, alanine aminotransaminase, gamma glutamyl transpeptidase, alkaline phosphatase, total bilirubin and liver MDA levels, and significant improvement in liver glutathione when compared with thioacetamide.
damaged rats. Histology of the liver sections of the animals treated with the extracts also showed dose-dependent reduction of necrosis\textsuperscript{34}.

23. Bong JJ et al., (2008) Studied antihyperglycemic and hypolipidemic activity of aqueous extract of \textit{Cassia auriculata} L. leaves in experimental diabetes. Hypoglycaemic and hypolipidemic properties of the ethanolic and aqueous extracts, respectively, from Chinese juniper (\textit{Juniperus chinensis} L.) berries were investigated in alloxan-induced diabetic rats. The results suggested that the ethanolic extract of Chinese juniper berries possesses a potential hypoglycaemic effect while the aqueous extract has a potential hypolipidemic effect\textsuperscript{35}.

24. Kshirsagar A et al., (2008) Studied antioxidant and hepatoprotective activity of ethanolic extract of \textit{calotropis gigantea} against paracetamol induced liver damage in mice. Results indicate that \textit{C. gigantea} possesses hepatoprotective effect on paracetmol -induced hepatotoxicity in mice\textsuperscript{36}.

25. Sharma B et al., (2008) Studied hypoglycemic and hypolipidemic effects of flavonoid rich extract from Eugenia jambolana seeds on streptozotocin induced diabetic rats. The result suggests that the flavonoid rich extract from Eugenia jambolana plant has both hypoglycemic and hypolipidemic effects which can help the cure and management of diabetes\textsuperscript{37}.

26. Frode T S et al., (2008) Studied animal models to test drugs with potential antidiabetic activity although medicinal plants have been historically used for diabetes treatment throughout the world, few of them have been validated by scientific criteria\textsuperscript{38}.

27. Daniyan S Y et al.,(2008) Studied evaluation of the antimicrobial activities and phytochemical properties of extracts of \textit{Tamaridus indica} against some diseases causing bacteria Crude aqueous and ethanol extracts of \textit{Tamaridus indica} were investigated for antibacterial activity. The ethanol extracts produce strong antibacterial activity against \textit{Escherichia coli, Klebsiella pneumoniae, Salmonella paratyphi A} and \textit{Pseudomonas aeruginosa, Staphylococcus aureus} was resistant to the extracts\textsuperscript{39}.

28. Vanithadevi B et al., (2008) Studied effect of rosmarinic acid on insulin sensitivity, glyoxalase system and oxidative events in liver of fructose-fed mice. Results indicated rosmarinic acid posses significant antioxidant action and it increase insulin sensitivity\textsuperscript{40}.
29. Setty S R et al., (2007) Studied hepatoprotective activity of *Calotropis procera* flowers against paracetamol-induced hepatic injury in rats. Results indicated that *Calotropis procera* posses significant hepatoprotective activity\(^{41}\).

30. Dincel A S et al.,(2007) Studied the effects of *in vivo* antioxidant enzyme activities of myrtle oil in normoglycaemic and alloxan diabetic rabbits. The major finding of this new study is that, myrtle oil may not offer any protection against oxidative stress during acute studies in normoglycemic and diabetic groups\(^{42}\).

31. Chandan B K et al., (2007) studied the hepatoprotective potential of *Aloe barbadensis* Mill. against carbon tetrachloride induced hepatotoxicity . The present study shows that the aqueous extract of *Aloe barbadensis* is significantly capable of restoring integrity of hepatocytes indicated by improvement in physiological parameters, excretory capacity of hepatocytes and also by stimulation of bile flow secretion\(^{43}\).

32. Akhila J S et al., (2007) Studied Acute toxicity studies and determination of median lethal dose \(^{44}\).

33. Maruf Iftekhar AS et al, (2006) Effect of *Tamarindus indica* fruits on blood pressure and lipid-profile in human model , Fruits of *Tamarindus indica* were evaluated for their effects on lipid profile, systolic and diastolic blood pressure and body weight in human subjects\(^{45}\).

34. Doughari J H et al., (2006) Studied antimicrobial activity of *Tamarindus indica* Linn *Tamarindus indica* is a plant that is used in traditional medicine for the treatment of cold, fever, stomach disorder, diarrhea and jaundice and as skin cleanser. Result indicates that *Tamarindus indica* has broad spectrum antibacterial activity and a potential source of new classes of antibiotics that could be useful for infectious disease chemotherapy and contro\(^{46}\).

35. Martinello F et al., (2006) Studied hypolipemic and antioxidant activities from *Tamarindus indica* L. pulp fruit extract in hypercholesterolemic hamsters. The results indicate the potential of tamarind extracts in diminishing the risk of atherosclerosis development in humans\(^{47}\).

36. Maiti R et al., (2004) Studied antidiabetic effect of aqueous extract of seed of *Tamarindus indica* in streptozotocin-induced diabetic rats. Result indicates that aqueous extract of seed of *Tamarindus indica* poses significant antidiabetic activities \(^{48}\).
37. Sabu M. C. et al (2004) Studied antidiabetic activity of *Aegle marmelos* and its relationship with its antioxidant properties. These results indicate that *Aegle marmelos* extract effectively reduced the oxidative stress induced by alloxan and produced a reduction in blood sugar\(^{49}\).

38. Ayse C et al., (2004) Studied effect of *Aloe vera* leaf gel and pulp extracts on the liver in type-II diabetic rat models. It was concluded that *Aloe* gel extract has a protective effect comparable to glibenclamide against hepatotoxicity produced by diabetes if used in the treatment of type-II diabetes\(^{50}\).

39. Meral et al., (2001) Studied effect of *Nigella sativa* on glucose concentration, lipid peroxidation, anti-oxidant defence system and liver damage in experimentally-induced diabetic rabbits. Result indicated that *Nigella sativa* might be used in diabetic patients to prevent lipid peroxidation, increase anti-oxidant defence system activity and also prevent liver damage\(^{51}\).