



JOURNAL OF BIODIVERSITY AND CONSERVATION

Cassia fistula L.: medicinally important tree species of Odisha, India

Sangita Suna¹, Rajkumari Supriya Devi^{1*} and Nihar Ranjan Singh^{2*}

¹Ambika Prasad Research Foundation, Bhubaneswar-751006, Odisha, India

²Department of Botany, Ravenshaw University, Cuttack-753003, India

*Correspondence author. Email-Id: nihar.singh@gmail.com, supriyaapr91@gmail.com

ARTICLE INFO

Article History

Received: 10 March 2018

Keywords: Urban area, Conservation, Medicinal plants, *Cassia fistula*

Received in revised form: 5 May 2018

Accepted: 10 May 2018

ABSTRACT

Cassia fistula, a common ornamental tree, has traditionally been considered as an important source of medicine for various ailments. Its traditional uses as medicine make this plant a special and therefore it's important to conserve it in natural habitat. Hence, an attempt has been taken to gather the reported information and availability of the tree species in the urban area of Bhubaneswar. Survey was made during the January 2018 to March 2018 to locate this said species in the study areas. Results revealed that plant species is used to treat many disease and disorders. It was observed that, it is planted in most of the Gardens of the study areas which showed a positive step towards the conservation of this medicinally important tree species.

INTRODUCTION

Cassia fistula is a perennial tree with beautiful bright fragrant yellow flowers. It belongs to deciduous forest, subtropical and tropical regions. It is an ornamental tree normally grown in school campuses, road sides and in urban areas. In wild, it is found up to 1,200 metres. It was discerned to be native to Egypt and the East Indies, and had been

used as a medicine since ancient times by Arab and Greek physicians (Duraipandiyan & Ignacimuthu 2007). Some common names of *Cassia fistula* in India are Amaltus, Bharva, Garmala, Girimalah, Kakke, Kanikonna, Konna, Konni, Pela, Rajataru, Sundali, Suvarnaka etc (Barthakur et al. 1995). The species is considered to have been native to South East Asia and was introduced by man throughout

the Old and New World tropics for uses in medicine, fuel, timber, and tanning (Mussarat et al. 2014).

It is up to 20 m tall. Bark in the young tree is smooth and ash coloured which become dark brown when matured. It is a Perennial tree with nodules present and woody throughout. Stems are erect or ascending, Leaves are alternate, compound with 3-8 pairs of opposite leaflets. Leaves are absent during flowering time. Flowers are actinomorphic or somewhat irregular and arranged in drooping racemes. Fruit is a legume (Saxena & Brahmam 1995). The tree is pollinated by various species of bees and butterflies (Barrett 2010). The species possesses several traits that pose threat to native flora, including profuse production of seeds which can remain viable for more than a year and has an environmental tolerance for a wide range of soil types and climate zones (Atrzadeh et al. 2017).

Since ancient times, a number of plants have been used for many medicinal purposes. Out of it *Cassia fistula* is one of its kinds which have the potential to play an important role to develop an effective drug (Daisy & Saipriya 2012). Several mythology and literatures revealed that *Cassia fistula* has been primarily used as a laxative and used to treat constipation, abdominal pain and discomfort. But besides this, it has also been used for various other diseases like skin diseases, burning sensation, syphilis, boils, leprosy,

ringworm affection, diabetes, cardiac problems, dry cough, bronchitis, malaria and fever in Ayurveda. Plant drugs and herbal formulations are frequently considered to be less toxic and free from side effects than synthetic ones (Bhalodia & Shukla 2011; Kumar & Das 2012; Ali 2014; War et al. 2014; Esimaelidooki et al. 2016; Limtrakul et al. 2016).

Keeping the all above in view, an attempt has been taken to gather the medicinal values from the literature & local survey and richness of the species in urban areas of Bhubaneswar, Odisha. The present study highlights the importance of *Cassia fistula* and brings attention towards its conservation in urban areas to make society green.

MATERIALS AND METHODS

The survey was made to locate the *Cassia fistula* tree in the urban area of Bhubaneswar. Six locations were selected for the study. Longitudes, latitudes and altitudes were recorded. The information on *Cassia fistula* from local people was noted through a Passport Data Form. Plant parts were collected for further experimental work (Kumar et al. 2012).

RESULTS AND DISCUSSION

The plant species found in urban areas play a significant role to maintain the urban biodiversity. They help to keep urban areas green and pollution free. The present study highlights the importance of plants in urban areas and their medicinal

applications in our day to day life. The present work is based on field survey (Table 1, Figure 1) and experimental works in the laboratory. It was observed that the maximum number of plants of *Cassia fistula* is planted in Dhauli road of study area (Table 1). The associate flora of *C. fistula* is enumerated and found that the most common associate floras are *Alastonia scholaris*, *Azadirachta indica*, *Lagerstromia parviflora*, *Terminalia arjuna* and *Saraca asoca* (Table 2, Figure 2). Many researchers reported the medicinal and pharmacological values of *C. fistula* (Table 3). The curative properties of selected plant parts date back to early civilisation (Kumar et al. 2012). Modern research might not accept these practices without clinical validation of the claims. These curative healing plants probably contain certain bioactive compounds or secondary metabolites which might be responsible for the curative properties of these plants. Therefore the qualitative and quantitative analysis of phytochemicals was carried out to substantiate with the claims. Based on the information collected (Table 3) on the medicinal values of the *Cassia fistula* from study area and literature, an attempt was made to justify the rationale behind the claims and to identify the presence of bioactive components in leaves extract through qualitative tests. The extracts of selected *Cassia fistula* were analyzed by to know the presence of the metabolites in them. The

phytochemical screening revealed that they have diverse metabolites as listed in Table 4. The secondary metabolites presents in most of the extracts of leaves were tannin, saponin, flavonoids etc (Plate 1). It is interesting to note that the saponin is found in all the plant part extracts using any of the solvents. Saponins are amphipathic Glycosides (Moses et al. 2014).

CONCLUSION

The present study highlights the importance of urban trees in the maintenance of urban biodiversity. Bhubaneswar is rich with many medicinal tree species. The field surveys indicate that *Cassia fistula* show rich population in Bhubaneswar. The experimental works give a base line data for the formulation of antibacterial agents to fight against common diseases.

ACKNOWLEDGEMENTS

Authors are thankful to the Ambika Prasad Research Foundation, India, local communities of Bhubaneswar and Forest & Environment Department, Government of Odisha.

REFERENCES

- Abo KA, Lasaki SW and Deyemi AA (1999). Laxative and antimicrobial properties of *Cassia* species growing in Ibadan. *Nigerian Journal of Natural Products and Medicine*. 3: 47-50
- Ali Md A. (2014). *Cassia fistula* Linn: A review of phytochemical and pharmacological studies.

- International Journal of Pharmacological Sciences and Research. 5(6): 2125-2130
- Atarzadeh F, Kamalinejad M, Dastgheib L, Amin G, Jaladat AM and Nimrouzi M. (2017). *Cassia fistula*: A remedy from traditional Persian medicine for treatment of cutaneous lesions of Pemphigus vulgaris. Avicenna Journal of Phytomedicine. 7(2): 107-115.
- Bhalodia NR and Shukla VJ. (2011). Antibacterial and antifungal activities from leaf extracts of *Cassia fistula* L: an ethnomedicinal plant. Jopurnal of Advanced Pharmaceutical Technology & Research. 2(2): 104-109.
- Bhalodia NR, Nariya PB, Acharya RN and Shukla VJ. (2012). In vitro antibacterial and antifungal activities of *Cassia fistula* Linn. fruit pulp extracts. AYU. 33(1): 123-129.
- Daisy P and Saipriya K. (2012). Biochemical analysis of *Cassia fistula* aqueous extract and phytochemically synthesized gold nanoparticles as hypolycemic treatment for diabetes mellitus. International Journal of Nanomedicine. 7: 1189-1202.
- Duraipandiyan V and Ignacumuthu S. (2007). Antibacterial and antifungal activity of *Cassia fistula*, An ethanomedical plant. Journal of Ethnopharmacology. 112: 590-594.
- Dutta A.K and Madharia P. (2012). In-vitro evaluation of antibacterial activity of *Cassia fistula* against different gram-positive and gram-negative bacteria. 5(1): 185-188.
- Esimaelidooki MR, Mozaffarpur SA, Mirzapour M, Shirafkan H, Kamalinejad M and Bijani A. (2016). Comparison between the *Cassia fistula*'s emulsion with polyethylene glycol (PEG4000) in the pediatric functional constipation: A randomized clinical trial. Iranian Red Crescent Medical Journal. 18(7): e33998.
- Ilavarasana R, Mallikab M and Venkataramanc S. (2005). Anti-inflammatory and antioxidant activities of *Cassia fistula* Linn bark extracts. African Journal of Traditional and Complementary Medicine. 2 (1): 70-85.
- Kumar S and Dash D. (2012). Flora of Nandan Kanan Sanctuary: Medicinal plants with their role in health care. International Journal of Pharmacy and Life Sciences. 3(4): 1631-1642.
- Kumar S, Jena PK, Sabnam S, Kumari M and Tripathy PK. (2012). Study of plants used against the skin diseases with special reference to *Cassia fistula* L. among the king (Dongaria Kandha) of Odisha, India. International Journal of Drug Development & Research. 4(2): 256-264.
- Limtrakul P, Yodkeeree S, Thippraphan P, Punfa W and Srisonmboon J. (2016). Anti-aging and tyrosinase inhibition effects of *Cassia*

- fistula flower butanolic extract. BMC Complementary and Alternative Medicine. 16(1): 497.
- Manonmani G, Bhavapriya V, Kalpana S, Govindasamy S and Apparanantham T.(2005).Antioxidant activity of *Cassia fistula* (Linn.) flowers in alloxan induced diabetes rats.97(1):39-42.
- Manonmania G, Bhavapriyaa V, Kalpanaa S, Govindasamya S and T. Apparananthamb. (2005). Antioxidant activity of *Cassia fistula* (Linn) flowers in alloxan induced diabetic rats. Journal of Ethanopharmacology. 97(1):39-42.
- Moses T, Papadopoulou KK and Osbourn A. (2014). Metabolic and functional diversity of saponins, biosynthetic intermediates and semi-synthetic derivatives. Critical Reviews in Biochemistry and Molecular Biology. 49(6): 439-462.
- Souwalak P, Nongyao P, Vatcharin R and Metta O. (2004). Antifungal activity from leaf extracts of *Cassia alata*L., *Cassia fistula* L and *Cassia tora*. Songklanakarin Journal of Science and Technology 26(5): 741-748.
- War IR, Ganie SA, Agnihotri RK, Sharma B, Mahajan S and Sharma R. (2014). Antifungal activity of *Cassia fistula* Linn. Against some pathogenic fungi. International Journal of Phytomedicine 6:182-187.

Table 1: *Cassia fistula* in the selected locations of Bhubaneswar

Collected site	Number of plants	Geographical location	Elevation (MSL)
Dhaulti Road	18	20 ⁰ 11' 48.0" N 85 ⁰ 50' 36.2" E	10 m
Ashoka Stamb	8	20 ⁰ 11' 21.8" N 85 ⁰ 50' 32.5" E	20 m
Tribal Museum	15	20 ⁰ 16' 59.4" N 85 ⁰ 48' 25.4" E	52 m
Khandagiri	6	20 ⁰ 15' 46.3" N 85 ⁰ 47' 11.5" E	67 m
Udaigiri	4	20 ⁰ 15' 46.9" N 85 ⁰ 47' 07.2" E	70 m
Mukteswar Temple campus	3	20 ⁰ 14' 33.4" N 85 ⁰ 50' 24.9" E	4 m

Table 2: Associate tree species of *Cassia fistula*

Botanical Name	Local Name	Status
<i>Alastonia scholaris</i>	Chatyana	LC
<i>Azadirachita indica</i>	Nemo	LC
<i>Lagerstroemia parviflora</i>	Salora	LC
<i>Mimusops elengi</i>	Baula	LC
<i>Pongamia pinnata</i>	Karanja	LC
<i>Putranjiva roxburghii</i>	Poilundia	LC
<i>Strychnos nux-vomica</i>	Kochila	LC
<i>Syzygium cumini</i>	Jamukoli	LC
<i>Terminalia arjuna</i>	Arjuna	LC
<i>Terminalia bellirica</i>	Bahada	LC
<i>Wrightia tinctoria</i>	Koruan	LC
<i>Xantolis tomentosa</i>	Kanta Baula	LC
<i>Saraca asoca</i>	Asoka	ER

(LC: Least Concern, ER: Endangered)

Table 3: Traditional therapeutic values of *Cassia fistula*

Plant parts	Uses	Source(s)
Leaf	Antibacterial activity against gram positive and gram negative organisms	Datta & Madharia (2012)
	Methanol extract shows antifungal activity	Souwalak et al. (2004)
Bark	Exhibited antioxidant activity in in vitro assay	Ilavarasana et al. (2005)
Flower	Shows antidermatophytic activity and used for treatment of skin infection	Duraipandiyan & Ignacumuthu (2007).
Ripen fruits	It is used as an antifungal drug	Bhalodia et al. (2012)
Seeds	Methanol extract of the seed shows antitumor activity	Abo et al. (1999)
Bud	Methanol extract of the bud shows antipyretic activity	Manonmania et al. (2005)

Table 4: Phytochemical Test of selected experimental plant parts

Plant name	Plant Parts	Solvent	Photochemical detected
<i>Cassia fistula</i>	Leaves	Acetone	Tannin, Saponin, Flavonoids
		Methanol	Tannin, Saponin, Flavonoids, Terpenoid, Glycosides
		Water	Tannin, Saponin, Phenolic compounds, Glycosides

**Figure 1:** Plantation of *Cassia fistula* in study area**Figure 2:** *Cassia fistula* along with associate flora