

## A PLANT REVIEW OF *CASSIA SOPHERA* LINN.

Aminabee SK and Lakshmana Rao A\*

Department of Pharmacology, V. V. Institute of Pharmaceutical Sciences, Gudlavalleru, Andhra Pradesh, India.

### ABSTRACT

Medicinal herbs are moving from fringe to main stream use with a greater number of people seeking remedies and health approaches free from side effects caused by synthetic chemicals. India officially recognizes over 3000 plants for their medicinal value. It is generally estimated that over 6000 plants in India are in use in traditional, folk and herbal medicine. This article aims to provide a comprehensive review on the phytochemical and pharmacological aspects of *Cassia sophera*. It is obtained from deciduous and mixed-monsoon forests throughout greater parts of India, ascending to 1300 m in outer Himalaya, is widely used in traditional medicinal system of India has been reported to possess analgesic, anticonvulsant, antioxidant, anti-inflammatory, hepatoprotective and antiasthmatic activity etc. It is known as a rich source of flavanoids and anthraquinones. The innumerable medicinal properties and therapeutic uses of *Cassia sophera* as well as its phytochemical investigations prove its importance as a valuable medicinal plant.

**Key words:** *Cassia sophera*, Analgesic, Antioxidant, Anti-inflammatory.

### INTRODUCTION

Plants have great potential uses, especially as traditional medicine and pharmacopoeial drugs. A large proportion of the world's population depends on traditional medicine because of the scarcity and high costs of orthodox medicine<sup>1</sup>. Medicinal plants have provided the modern medicine with numerous plant derived therapeutic agents<sup>2</sup>. Many plants contain a variety of phytopharmaceuticals, which have very important applications in the fields of agriculture, human and veterinary medicine. Natural products play a dominant role in the development of novel drug leads for the treatment and prevention of diseases<sup>3</sup>. The need to screen plants for pharmaceuticals is particularly urgent in the light of rapid deforestation and the concurrent loss of biodiversity throughout

the world. It is very important to have sufficient knowledge regarding herbs not only because of their wide spread uses, but also because they have the potentials to cause reactions or interact with other drugs. For example, senna (*Cassia acutifolia*) and germander (*Teucrium polium*) can induce hepatotoxicity<sup>4</sup>. Although in traditional medicine *Cassia* species have been well known for their laxative and purgative properties and for the treatment of skin diseases<sup>5</sup> there is now an increasing body of scientific evidence demonstrating that the plants possess many other beneficial properties<sup>6</sup>.

The aim of the present paper were to review the botanical description, distribution, phytochemistry of *Cassia sophera* and their biological activities, and highlight their potentials as candidates for new drugs that may be of value in the

treatment and prevention of human and livestock diseases.

*Cassia sophera*, Linn. (Caesalpinaceae) known as 'Kasondi' is an important drug of Islamic System of Medicine (Unani Medicine). The plant is found throughout India<sup>7</sup> and in most tropical countries<sup>8</sup>. It is common in waste lands, on road sides and in the forests<sup>9</sup>. Root bark is used for preparation of the medicine. It has been used by ancient Indian physicians for its efficacy in respiratory disorders<sup>10</sup>. According to the physicians of Unani medicine, three plants viz., *Cassia occidentalis* Linn., *Cassia sophera* Linn. and *Cassia sophera*, Linn. Var. *purpurea*, Roxb. are varieties of 'Kasondi' and are invariably used in similar pathological conditions. 'Kasondi' is described in unani literature to be repulsive of morbid humors, resolvent, blood purifier, carminative, purgative, digestive, diaphoretic and reported to be useful in epilepsy, ascites, dyscrasia of liver, skin disorders, piles, jaundice, fever, articular pain and palpitation. In ethno botanical literature it is mentioned to be effective in the treatment of pityriasis, psoriasis, asthma, acute bronchitis, cough, diabetes and convulsions of children. The chemical analysis of seed of *Cassia sophera*, Linn. revealed the presence of ascorbic acid, dehydroascorbic acid and  $\beta$ -sitosterol, but no scientific<sup>11</sup> study is reported on the varietal level of plant.

### BOTANICAL DESCRIPTION

#### Plant Characters

Habitat	: Hill Plant, Plain land
Plant type	: Herb <sup>12</sup> , shrub
Foliage	: Evergreen
Roots	: Deep roots, tap roots
Type of stem	: Soft wooded
Leaf type	: Lanceolate, Oblong, Pinnate compound
Leaf arrangement	: Alternate
Leaf color	: Green
Leaf surface	: Glabrous
Plant height	: Very small (0-5 meters)
Actual height	: Maximum 3.0 meters Minimum 0.70meters
Plant feature	: Bushy, erect, Forest plant, Hill side plant
Plant utilities	: Industrial/commercial,

Manure crop,  
Medicinal plant  
: Perennial

Season



**Cassia sophera**

#### Fruit characters

Fruiting season	: Monsoon, Summer
Type of fruit	: True fruit
Fruit classification	: Dehiscent Fruit <sup>13</sup> , Dry Fruit, Legume, Pod, Simple Fruit
Fruit habit	: Cluster
Seeds	: Many



**Cassia sophera seeds**



**Cassia sophera fruits**

**Flower characters**

Flowering season : Summer  
 Flower color : Yellow<sup>14</sup>  
 Flower type : Hermaphrodite  
 Characteristics : Cluster flower

**Cultivation information****Climatic conditions**

Altitude (m) : 000-750  
 Rainfall (mm) : 500-3500  
 Temperature (°C) : 10-15, 35-40, 25-30  
 Climate : Hot climate,  
 Humid climate<sup>15</sup>  
 Sunlight : Full sun

**Soil features**

Soil type : Peaty Soil, Sandy Loam,  
 Alluvial Soil<sup>16</sup>, Black  
 Soil, Red Soil, Virgin Soil  
 Soil depth (m) : 0.15-0.5  
 Drainage : Well drained

**Propagation information**

Time of propagation : Monsoon<sup>17</sup>

**Irrigation information**

Crop type : Rainfed<sup>18</sup>

**Soil reaction**

Soil reaction (pH) : Slightly acidic to  
 neutral (6.3-7.3)

**Method of propagation<sup>19</sup>**

Seeds

**Distribution**

Occasional weed in settled areas at low and medium altitudes from northern to central Luzon<sup>20</sup>. Pantropic species of American origin. Also occurs in India and most tropical countries. It is common in waste lands, on roadsides and in the forests<sup>21</sup>.

**Classification**

Botanical name : *Cassia sophera*  
 Family : *Caesalpinaceae*  
 Synonyms : *Senna sophera*

**Vernacular names in India**

Telugu : Pydee tanghadu  
 Hindi : Kasaunda, Kasaundi  
 Tamil : Poonaverie  
 Manipuri : Thounam  
 Marathi : Kashawada

Bengali : Kolkasunda

**Other Species of Cassia**

*C. abbreviata*, *C. afrodistula*, *C. aldabrensis*, *C. artensis*, *C. aubrevillei*, *C. bakeriana*, *C. brewsteri*, *C. eremophila*, *C. fikifiki*, *C. fistula*, *C. grandis*, *C. javanica*, *C. marksiana*, *C. notabilis*, *C. oligoclada*, *C. pleurocarpa*, *C. roxburghii*, *C. venusta* and *C. surattensis*.

**PHYTOCHEMISTRY**

A new anthraquinone diglycoside has been isolated from *Cassia sophera* root bark and characterized as 1,8-dihydroxy-2-methylanthraquinone 3-neohesperidoside along with sitosterol, chrysophanol and physcion<sup>22</sup>. From the heartwood of *Cassia sophera* two new isomeric anthraquinones<sup>23</sup>, 1,2,7-trihydroxy-6,8-dimethoxy-3-methyl and 1,2,6-trihydroxy-7,8-dimethoxy-3. Two new anthraquinones have been isolated from the root bark of *Cassia sophera* and characterized as 1,8-dihydroxy-3,6-dimethoxy-2-methyl-7-vinylanthraquinone and 1,3-dihydroxy-5,7,8-trimethoxy-2-methylanthraquinone<sup>24</sup>.

**USES****Homeopathic uses**

The Homeopathic Council has made extensive proving of this drug and many symptoms have been clinically verified.

*Osteoarthritis*- Pain in knee joints movement, rising from seat continued motion & pressure.

*Asthma* – Dyspnoea<sup>25</sup> (breathlessness) in winters, from exposure to dust, change of weather, cold drinks, light exertion, smoke, morning, evening, night and from walking.

*Allergic Rhinitis* - Coryza with thin nasal discharge and sneezing. Nose obstructed at night.

**Folkloric**

1. Juice of leaves made into plaster with sandal wood or mixed with lime juice, used for ringworm.
2. Also used for dhobi itch. Externally, used for washing syphilitic sores.
3. Juice dropped into ears invaded by insects.
4. Internally, used as expectorant<sup>26</sup> for coughs.

5. Root taken internally with black pepper for snake bites.
6. Infusion or decoction of leaves, with black pepper, used for asthma and hiccups.
7. Root used for snake bites.
8. Infusion of fresh leaves injected for gonorrhoea in its subacute stage.
9. Internally, used as anthelmintic.
10. Infusion of leaves used as antirheumatic and for inflammatory fevers.
11. Infusion of leaves, mixed with sugar, used for jaundice.
12. Decoction of the whole plant is used for diminishing urine and as expectorant in acute bronchitis.
13. Bruised leaves and bark of root, powdered and mixed with honey, applied externally to ringworm and ulcers.
14. Infusion of bark or powdered seeds, with honey, given for diabetes.
15. Seeds used for fever.
16. Ointment from bruised seeds, leaves and sulphur, ground into a paste, mixed with honey, used as an application for ringworm, pityriasis and psoriasis.
17. In India, used for common colds, asthma, allergic rhinitis, and other respiratory affections. Also used for osteoarthritis.
18. In Bangladesh, root juice used for fevers and as diuretic; paste from leaves used for ringworm and sores.

#### Herbal Uses

1. Boil 5-7 gm of dried *Cassia sophera* with the same amount of mint in two cups of water until the water is reduced to a half. Take out the essence and drink to cure apositia<sup>27</sup> (aloathing for food).
2. 3-4 teaspoons sap of its leaves taken twice a day with one glass of water of green coconut cures diarrhoea. After cure further dose should be stopped.

Boil 5-7 gm of dried *Cassia sophera* in two cups of water until the water is reduced to a half. Take out the essence and drink with the same amount of the sap of sacred basil and 2-3 teaspoons honey to cure asthma, cough and bronchitis. The dose should be 3-4 times a day. Besides, it cures normal ring

worms and red swelling of the skin in patches.

#### Doses

- 3-4 teaspoons sap
- 5-7 gm powder
- 8-10 drops of mother tincture

#### Precaution

No excessive dose.

### PHARMACOLOGICAL ACTIVITIES

#### ANALGESIC ACTIVITY

The central analgesic<sup>28</sup> action of the seeds of *Cassia sophera* studied by Eddy's and Leimbach using hot plate and method of Davis using Analgesimeter showed strong analgesic affect most probably of opioid type as the positive effect against the thermal nociceptive stimuli are indicative of opioid type of analgesic effect.

#### ANTICONVULSANT ACTIVITY

Anticonvulsant action of the ethanolic seeds extract of *Cassia sophera* studied by Maximum electroshock-induced seizures and Pentylene tetrazol induced seizure test. In maximum electroshock-induced seizures test, the mean duration of extensor phase of test group reduced to significant level as compared to control group. In Pentylene tetrazole induced seizure test, onset of myoclonic spasm and clonic convulsion was delayed in the test showing antiepileptic effect. Death rate was 100% in both test and control groups, while, in test group animals survived upto 45 mins after Pentobarbitone injection. This demonstrates very striking and potent antiepileptic activity in the test drug that may be useful in both types of epileptic conditions viz., grand mal and petit mal epilepsy.

#### ANTIOXIDANT ACTIVITY

The role of oxidative stress and Reactive Oxygen Species (ROS) generation in the pathophysiology of inflammation, the fractions were assessed against 1,1-Diphenyl-2-picrylhydrazyl (DPPH) radical serving as the oxidizing substrate, which can be reduced by an antioxidant compound to its hydrazine derivative *via* hydrogen donation, and as the reaction

indicator molecule. The potential hydroxyl radical scavenging ability of *Cassia sophera* fraction might be due to hydroxyl substitution and presence of the constituents with higher molecular weight and proximity of many aromatic rings and hydroxyl groups in the structure of flavanoids and glycoside like molecules which prove more important for free radical scavenging. Ethanolic leaves extract of *Cassia sophera* scavenged the DPPH and hydroxyl free radical at physiological pH more significantly as compared to other fraction of *Cassia sophera*. *Cassia sophera* exhibit dose dependent increase in reducing power in turn suggests the antioxidant<sup>29</sup> potential of the plant.

#### **ANTI-INFLAMMATORY ACTIVITY**

*Cassia sophera* has both peripheral and central analgesic properties. Its peripheral analgesic activity was deduced from its inhibitory effects on chemical induced nociceptive stimuli. The acetic acid induced abdominal contractions elucidate peripheral activity, while formalin test investigate both. Acetic acid causes increase in prostaglandins such as PGE<sub>2</sub> and PGF<sub>2</sub>, serotonin and histamine in the peritoneal fluid which brings about characteristic writhing in mice. Drugs that primarily act on the central nervous system inhibit both phases equally while peripherally acting drugs inhibit the last phase. The formalin test is very useful method for not only assessing antinociceptive<sup>30</sup> drugs but also helping in the elucidation of the action mechanism. The neurogenic phase is probably a direct result of stimulation in the paw and reflects centrally mediated pain with release of substance P while the late phase is due to release of histamine, serotonin, bradykinin and prostaglandins. Ethanolic leaves extract of *Cassia sophera* block both phases of the formalin response but the effect was more prominent in the second phase.

#### **HEPATOPROTECTIVE<sup>31</sup> ACTIVITY**

The ethanolic extract of leaves of *Cassia sophera* could effectively control the AST, ALT, ALP and total bilirubin levels and increase the protein levels in the protective studies. The histopathological studies

substantiate the activity of the drug. This scientifically supports the usage of this plant in traditional medicine for treatment of liver disorders and as a tonic.

#### **ANTI-ASTHMATIC<sup>32</sup> ACTIVITY**

*Cassia sophera* leaves possess significant antiasthmatic activity. The anti asthmatic activity can be attributed to bronchodilating, antihistaminic, antiallergic, anti-inflammatory and adaptogenic activity suggestive of its potential in prophylaxis and management of asthma.

#### **HYPOGLYCEMIC ACTIVITY**

The antidiabetic principles present in 90% ethanolic leaf extract of *Cassia sophera* exhibits significant hypoglycemic activity by increasing peripheral glucose while streptozosin and the antidiabetic principles may be due to  $\beta$ -cell restoration of pancreas against streptozosin induce damage. It also has antilipidemic activity. The investigation validates use of *Cassia sophera* as herbal drug for antidiabetic<sup>33</sup> and antilipidemic activity.

#### **CASSIA SOPHERA SEED MUCILAGE<sup>34</sup> IN TABLET FORMULATION**

As per pharmacopoeia, disintegration time of uncoated tablets should be < 15 mins. It was found that the tablets prepared using 12.0% w/v concentration of isolated *Cassia sophera* seeds mucilage exhibited disintegration time and hardness within the standard limit. Formulations of 3.0, 6.0 and 9.0% w/v mucilage exhibited less hardness and disintegration time, when compared with 12% w/v acacia binder formulation, but the formulations have enough hardness to withstand the mechanical shocks of handling in manufacturing and packing. The studies reveal a good potential of *Cassia sophera* mucilage as a binder for conventional tablet formulations. It can also be used for sustaining the drug release from tablets at higher concentration, since the prepared tablets using *Cassia sophera* seed mucilage produce a sticky film of hydration on the surface. Economically binding property of 12.0% w/v *Cassia sophera* mucilage is almost equivalent to 12.0% w/v acacia.

**CONCLUSION**

A new anthraquinone diglycoside has been isolated from *Cassia sophera* root bark and characterized as 1,8-dihydroxy-2-methylantraquinone 3-neohesperidoside along with sitosterol, chrysophanol and physcion. From the heartwood of *Cassia sophera* two new isomeric anthraquinones, 1,2,7-trihydroxy-6,8-dimethoxy-3-methyl and 1,2,6-trihydroxy-7,8-dimethoxy-3. Two new anthraquinones have been isolated from the root bark of *Cassia sophera* and characterized as 1,8-dihydroxy-3,6-dimethoxy-2-methyl-7-vinylantraquinone and 1,3-dihydroxy-5,7,8-trimethoxy-2-methylantraquinone. *Cassia sophera* leaves possess antiasthmatic activity, hepatoprotective activity, anti-inflammatory activity, antidiabetic and antioxidant activity. Seeds of *Cassia sophera* possess anticonvulsant and analgesic activity and the mucilage obtained from the seeds is used as a binder in tablet formulations.

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