CASSIA FISTULA EXTRACT

SYNONYMS

Amaltash
Golden shower
Indian Laburnum

CHEMICAL STRUCTURE

Undefined (mixture of components)

CHEMICAL FORMULA

Undefined (mixture of components)

IDENTIFIER DETAILS

CAS Number	:	84848-75-9
CoE Number	:	115
FEMA	:	
EINECS Number	:	284-307-7
E Number	:	

CLP CLASSIFICATION

Ingredient CLP Classification: No

Endpoint	Classification	Category
Acute Oral Toxicity	-	-
Acute Dermal Toxicity	-	-
Acute Inhalation Toxicity	-	-
Skin Corrosive/irritant	-	-
Eye Damage/Irritation	-	-
Respiratory Sensitisation	-	-
Skin Sensitisation	-	-
Mutagenicity/Genotoxicity	-	-
Carcinogenicity	-	-
Reproductive Toxicity	-	-
Specific Target Organ Toxicity	-	-
Aspiration Toxicity	-	-

SPECIFICATIONS

Melting Point: Undefined (mixture of components)

Boiling point: Undefined (mixture of components)

PURPOSE

Flavouring substance

STATUS IN FOOD AND DRUG LAWS

CoE limits:

Beverages (mg/kg)	Food (mg/kg)	Exceptions (mg/kg)
-	-	-

Acceptable Daily Intake:

ADI (mg/kg)	ADI Set by	Date Set	Comments
-	-	-	-

FDA Status:[CFR21]

Section Number	Comments
-	-

HUMAN EXPOSURE

Natural Occurrence: A medium sized deciduous tree 6-9 meters tall with golden yellow flowers that hang in bunches up to 40 cm long. The fruits are woody cylindrical pods up to 50 cm in length that becomes blackish with maturity. It is native to India, The Amazon and Sri Lanka.

Reported Uses: Uses of Cassia fistula have included usage as a laxative; used to treat diabetes, gout and rheumatoid arthritis; has an antipyretic action; is used to treat ringworm, scabies and intestinal worms [Research Foundation, 2003].

TOXICITY DATA

In Vivo Toxicity Status

Species	Test Type	Route	Reported Dosage
Mouse	LD_{50}	Intraperitoneal	>250mg/kg [RTECS 2003]

Reproductive and Developmental Toxicity

Oral administration of extract Cassia fistula seeds to female mated rats at Days 1-5 after pregnancy, at doses of 100 and 200 mg/kg/bwt lead to 57.14% and 71.43% prevention of pregnancy. 100% prevention f pregnancy was found with a dose of 500 mg/kg/bwt. There was suggested to be a mild estrogenic activity of Cassia fistula but when administered in the presence of a strong estrogen [estrodiol] it had an anti estrogenic activity [Yadav *et al.,* 1999].

Other relevant studies

A n-heptane extraction of cassia fistula leaves has been demonstrated to have significant hepatoprotective effect in the rat. A dose of 400 mg/kg was shown to lower the levels of the transaminases SGOT and SGOT , bilirubin and alkaline phosphatase activity in rats exposed to the hepatotoxic agent carbon tetrachloride [Bhakta *et al.,* 1999].

A methanolic extract of *Cassia fistula* showed an increase in the life span of Ehrlichs ascites carcinoma bearing mice. The methanolic extract [ME] lead to a reduction in the volume and viable tumour count, with cytological changes including increased membrane blebbing intra cytoplasmic vacuoles in the treated tumour cells. Treated mice were also reported to have improved red blood cell and bone marrow counts compare to untreated animals, indicating that *Cassia fistula* has an anti tumour activity [Gupta *et al.,* 2000].

Cassia fistula has been traditionally used in Panamanian folk medicine for the treatment of diabetes. The aqueous extract produced a significant decrease in glycaemia with oral doses of 300 and 500 mg/kg in mice. This was also confirmed with a glucose tolerance test where a dose of 500 mg/kg lead to a significant decrease [Esposito Avella *et al.,* 1991].

The treatment of male hypercholesterolemic induced rats with Cassia fistula lead to a reduction in blood and liver total lipids with a significant reduction in the levels of triglycerides. There was also reported to be a significant reduction in the high activities of the serum enzymes GOT, GPT, alkaline and acid phosphatase. A significant improvement n the levels of total serum protein, albumin, globulin uric acid and creatinine levels were also improved to those of control rats [el-Saadany *et al*., 1991].

A menthol extract of Cassia fistula leaf extract was shown to have an antitussive activity when investigated as in a cough model induced by sulphur dioxide. 400 and 600 mg/kg/bwt lead to a suppression of 44.4% and 51.85% with respect to the control group [Bhakta *et al.,* 1998].

Aqueous extracts of Cassia fistula (Linn.) flowers exhibited antioxidant effects in alloxan induced diabetic rats characterized by a decrease in peroxidation products, thiobarbituric acid reactive substances, conjugated dienes and hydroperoxides in heart tissues. Levels of antioxidant enzymes including superoxide dismutase, catalase, glutathione peroxidase, glutathione reductase and glutathione also returned to normal [Manonmani *et al.,* 2005].

Kalantari *et al*., (2010) investigated the hepatoprotective effect of Cassia fistula fruit extract in mice. Animals were divided into six groups receiving normal saline (1), bromobenzene (460 mg/kg) alone (2) and together with increasing doses (200, 400, 600, 800 mg/kg) of a crude hydro-alcoholic extract of Cassia fistula fruit (3-6, respectively). All administrations were carried out orally, daily, for 10 days. On the 11th day, animals were sacrificed. Serum activities of aspartate aminotransferase (AST), alanine

aminotransferase (ALT), alkaline phosphatase (ALP) and gamma glutamyl transpeptidase (γGT) were determined; serum levels of direct and total bilirubin were measured; furthermore, livers were prepared for histological examination. The results showed that bromobenzene treatment alone elicited a significant increase in activities of AST, ALT, ALP (but not γGT), and it significantly elevated the levels of direct and total bilirubin. Co-treatment with Cassia fistula fruit extract, however, significantly and dose-dependently decreased the above-mentioned enzyme activities (with exception of γGT) and bilirubin levels, producing a recovery to the naive state. The protective effect of Cassia fistula fruit extract against liver injury evoked by bromobenzene was confirmed by histological examination as well. The authors summarised that Cassia fistula fruit extract has significant hepatoprotective effect in mice [Kalantari *et al*., 2010].

Kalantari *et al*., (2011) assessed the efficacy of a crude hydro-alcoholic extract of Cassia fistula (golden shower tree) fruit to protect the kidney against bromobenzene-induced toxicity. Negative control mice received normal saline; positive control mice were given 460 mg/kg of bromobenzene; Cassia fistula treated mice received 200, 400, 600 and 800 mg/kg of Cassia fistula fruit extract followed by 460 mg/kg bromobenzene (daily by oral gavage for 10 days). On the 11th day, the mice were sacrificed, blood samples were obtained to assess blood urea nitrogen (BUN) and creatinine levels, and kidneys were removed for histological examination. The group found that bromobenzene induced significant nephrotoxicity reflected by an increase in levels of BUN and creatinine that was dose dependently prevented by the Cassia fistula fruit extract. The nephroprotective effect of the Cassia fistula fruit extract was confirmed by the histological examination of the kidneys [Kalantari *et al*., 2011].

The hypoglycemic effect of Cassia fistula was investigated in an alloxan-induced diabetic model at two dose levels, 200 and 400 mg/kg, respectively. The petroleum ether and ethanol extracts of C. fistula and the water-soluble fraction of ethanol extract were found to exhibit significant antihyperglycemic activity. The extracts, at the given doses, did not produce hypoglycemia in fasted normal rats, and the fraction exhibited weak hypoglycemic effect after 2 h of the treatment. Treatment of diabetic rats with ethanol extract and water-soluble fraction of this plant restored the elevated biochemical parameters significantly (p<0.05) to the normal level. No activity was found in the petroleum ether extract of the plant. [Jarald *et al*., 2014].

Behavioural Data

No data identified.

In Vitro Toxicity Status

Carcinogenicity and Mutagenicity

Additional information concerning the *in vitro* mutagenicity of this material may be found in “An Interim report on data originating from Imperial Tobacco

Limited's Genotoxicity testing programme September 2003" or "An updated report on data originating from Imperial Tobacco Limited's external Genotoxicity testing programme – Round 2 August 2007".

The mutagenicity of the smoke condensate was assayed in the *Salmonella* plate incorporation [Ames] assay with the tester strain TA98 in the presence of an S9 metabolic activation system. The cytotoxicity of the cigarette condensate was determined in the neutral red uptake assay and the (3-(4,5-dimethylthiazol-2-yl)-5-(3-carboxymethoxyphenyl)-2-(4-sulfophenyl)-2H tetrazolium, inner salt assay (MTS assay) with the human hepatocellular liver carcinoma cell line, HEP-G2. It was concluded that the *in vitro* mutagenicity and cytotoxicity of the cigarette smoke was not increased by the addition of the ingredients, which included *Cassia fistula extract* at levels up to 15 ppm.

Other relevant studies

An extract of Cassia fistula demonstrated a low level of radical scavenging activity in an assay assessing the damage caused by 1,1, diphenyl-2-picylhydrazyl with an EC_{50} of 59.0 μg/ml. In the deoxyribose protection assay C fistula afforded 30% protection at a concentration of 125 μg/ml. In the *in vivo* assay using Wistar rats, a dose of Cassia fistula at 120 mg/kg afforded a 11.6 % reduction in the lipid peroxidation of the heart [Munasinghe et al., 2001].

Aqueous of all extracts of Cassia fistula was demonstrated to have nematocidal activity with the seeds having the most activity against *Meliodogyne javanica* [Khurma *et al.,* 1999].

Hussain *et al*., (2004) describe *in vitro* testing of the extracts of medicinal plants collected from Islamabad and the Murree region on insulin secretagogue activity was carried out. Dried ethanol extracts of all plants (ZH1-ZH19) were dissolved in ethanol and DMSO, and tested at various concentrations (between 1 and 40 microg/mL) for insulin release from INS-1 cells in the presence of 5.5 mM glucose. Glibenclamide was used as a control. Promising insulin secretagogue activity in various plant extracts at 1, 10, 20 and 40 microg/mL was found, while in some cases a decrease in insulin secretion was also observed. *Artemisia roxburghiana*, *Salvia coccinia* and *Monstera deliciosa* showed insulin secretagogue activity at 1 microg/mL ($p < 0.05$) while *Abies pindrow*, *Centaurea iberica* and *Euphorbia helioscopia* were active at 10 microg/mL ($p < 0.05$). Extracts of *Bauhinia variegata* and *Bergenia himalacia* showed effects at 20 microg/mL ($p < 0.05$), and *Taraxacum officinale* and *Viburnum foetens* at 40 microg/mL ($p < 0.05$). Insulin secretagogue activity could not be detected in the extracts of *Adhatoda vasica, Cassia fistula, Chrysanthemum leucanthemum, Morus alba, Plectranthus rugosus, Peganum harmala* and *Olea ferruginea*. The results suggest that medicinal plants of Islamabad and the Murree region of Pakistan may be potential natural resources for antidiabetic compounds [Hussain *et al.,* 2004].

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