Review Article

A Review on Morphology, Traditional Uses and Pharmacological Activities and Phytochemicals of *Cucumis trigonus*

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ABSTRACT

The *Cucumis trigonus* (Family: Cucurbitaceae) is commonly known as "Thummittikai" in Tamil, "Bitter gourd" in English, and "Vishala" in Sanskrit. The fruit pulp of *Cucumis trigonus* is bitter, acrid, thermogenic, anthelmintic, liver tonic, cardiotonic, appetizer, expectorant and intellect promoting. This plant possesses main pharmacological activities like analgesic, anthelmintic, antiasthmatic, antimicrobial and antidiabetic, potentials. The aim of this review is to provide up-to- date, detailed and categorized information on *Cucumis trigonus* ethnobotany, pharmacological research and phytochemistry to explore their therapeutic potential and to assess possible opportunities for research. In addition, the discovery of scientific gaps and the opening up of new insights for future study.

Keywords: *Cucumis trigonus*; Cucurbitaceae; Pharmacological Activity; Traditional use.

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INTRODUCTION

Cucumis trigonus (Family: Cucurbitaceae) is commonly known as Jangal Indrayani, kachri in hindi or a bitter guard in English. It is distributed in India, Ceylon, Malaysia, Afghanistan, Persia and Northern Australia the plant is used for curing various ailments.[1] The fruit pulp is bitter, acrid, thermogenic, anthelmintic, liver tonic, cardiotonic, appetizer, expectorant and intellect promoting. It is used in flatulence, leprosy, fever, jaundice, diabetes, cough, bronchitis, ascites, anaemia, constipation, other abdominal disorders and amentia.[2] The roots are used as purgative and the seeds are cooling and astringent. Chhattisgarh (India) farmers use the Vegetables as Lunch and dinner, which helps them to cure indigestion and helps them to work longer in the field.[3] The alcoholic extract of the plant is reported to possess analgesic, anti-inflammatory, [4] and diuretic activity[5]. The aqueous extract of its fruit was reported to show anti-diabetic activity in streptozotocin-induced diabetic rats.[6] The ethanol extract of the fruit has therapeutic and prophylactic value in isoproterenol-induced myocardial infarction in male albino Sprague dawely rats.[7] The plant has proteolytic and serine protease activity and has been reported to be used as a meat tenderizer.[8] Phytochemical investigations in *C. trigonus* have revealed the presence of four steroidal and triterpenic compounds such as stigma-7-en-3β-ol, stigma-7-en-3β-glucoside, Alnusenone and alnusenol in its chloroform extract[9]. Cucurbitacin B was also isolated from the fruit.[10] Conservation of wild relatives of cultivated crops is important for modern agriculture as they provide a potentially useful genetic resource for breeding and improvement of related cultivated crops. Conservation of wild relatives of cultivated crops is important for modern agriculture as they provide a potentially useful genetic resource for breeding and improvement of related cultivated crops.[11] Use of biotechnological tools such as plant tissue culture for conservation of such species have been practiced.[12] Among the various strategies in vitro propagation methods of adventitious regeneration is most preferred because of its suitability for Agro bacterium-mediated gene transfer experiments. While *C. trigonus* is a wild relative of present day cultivated *Cucumis trigonus*, it is also a valuable medicinal plant.

PLANT PROFILE

General Description

Cucumis trigonus is a perennial tendrillar of the mallow family Cucurbitaceae native to India found in an upper Gangetic plain, and the latter on the lower range of western Himalayas. Also found in areas of Ceylon, Afghanistan, Persia, and North Australia.[2] Perennial climbers; stems 1.0-1.5 m, slender, angular, rough with short, rigid hairs. Leaves alternate, 3-6 cm long, suborbicular, base cordate, palmately 5-7 lobed, lobes round or ovate-oblong, often narrowed at the base, apex round, dentate or lobulate; petioles 2-6 cm long, slender, hispid. Plants monoecious. Male flowers often solitary; peduncles 0.5-1.0 cm long; calyx-tube narrow campanulate, 3 mm long; lobes subulate, 1.5-2.0 mm long; corolla yellow, 6-7 mm long, lobes ovate, oblong, acute; staminal filaments short; anthers 2 mm long, the appendage of the connective shorter than anthers; pistillode 1 mm long. Female flowers: peduncles 2-3 cm long; ovary densely hairy; style 1.5-2.0 mm long; stigmas

converging, 2.5 mm long. Fruits obovoid; seeds ca. 5 x 2 mm, 1 mm thick, oblong and white.[13]

Database Search Method

The present review of *Cucumis trigonus* on its traditional uses Phytochemistry and pharmacological activity is based on several popular databases such as ACS, PubMed, Scopus, Web of Science, Science Finder, Science Direct, Google Scholar, Springer, Wiley, Taylor, Mendeley, and other published 2materials such as books and dissertations. The literature was searched and accessed using the keywords *Cucumis trigonus* that related to the present review.

SCIENTIFIC CLASSIFICATION/TAXONOMY

The scientific classification is given as follows[2]

Kingdom:	*Plantae* -Plants
Subkingdom:	*Tracheobionta* – Vascular plants
Superdivision:	*Spermatophyta* – Seed plants
Division:	*Magnoliophyta* – Flowering plants
Class:	*Magnoliopsida* – Dicotyledons
Family:	*Cucurbitaceae*
Genus:	*Cucumis*
Species:	*Cucumis trigonus*

VERNACULAR NAME

Hindi:	Jangal Indrayani, kachri
English:	Kattummatti, bitter guard
Gujrati:	kauriitt
Marathi:	karita, katvel, shendada,
Tamil:	Kattummatti
Sanskrit:	Indravaruni, Vishala, chitra, chitraphala, chitravalli, devi, katphala,
Punjabi:	Cucumis trigiyanasa
Arabia:	kukumis trigonus
Urdu:	Cuc
Tamil:	Chukkankay, hatt-ttumatti, kattu-tumatti, kattu-tumatti, kattu-tumatti, kattuttumatti
Telgu:	Adavi, budama, adavi-puch-cha, adavi-puchcha, adavi-puchcha, kodi budama,
Bengali:	Gomuk
Konkani:	Karit
Malayalam:	Kattuvellari, certutu pekkummatti
Kannada:	Halmekki, Mekki bali ,Karanti
Assamese:	Jangli Indrayan, Ghimaru

GEOGRAPHICAL DISTRIBUTION

Cucumis trigonus is distributed throughout India and found in areas of Ceylon, Afghanistan, Persia and Northern Australia.[2]

MORPHOLOGY

Annual, herbaceous creeping herb Leaves suborbicular, 3-6cm across, scabrous, 5-7 shallowly lobed, margin dentate or lobulate, hispid; petioles 2-5 cm long slender, hispid. Stem slender, scabrous. Flowers are small, yellow, solitary or rarely in pairs or threes. Male flowers in a fascicle; peduncles 5-10 mm long. Calyx tube campanulate, 2-3 mm long, teeth subulate, corolla yellow, 2-7 mm long, and lobes ovate-oblong, acute. Anthers 1.5 mm long; an appendage of the connective shorter than the anthers; pistillode 1 mm long. Female flowers are solitary, peduncles 2-3 cm long, densely hairy. Fruits pepo, oval-round, sometimes obscurely trigonous, variable in size smooth and glabrous, 4 x 2.5 cm, longitudinally variegated with 10 green strips, Pale yellow or red when ripe. Seeds ovate-oblong, compressed smooth, pale yellow (Figure 1).[14] The morphological features are also presented in the Table 2.

Leaves

Leaves suborbicular, 3-6 cm across, scabrous, 5-7 shallowly lobed, margin dentate or lobulate, hispid; petioles 2-5 cm long slender, hispid.

Flowers

Flowers are small, yellow, solitary or rarely in pairs or threes. Male flowers in a fascicle; peduncles 5-10 mm long. Calyx tube campanulate, 2-3 mm long, teeth subulate, corolla yellow, 2-7 mm long, lobes ovate-oblong, acute. Anthers 1.5 mm long; an appendage of the connective shorter than the anthers; pistillode 1 mm long. Female flowers are solitary, peduncles 2-3 cm long, densely hairy[15].

Fruits

Fruits pepo, oval-round, sometimes obscurely trigonous, variable in size smooth and glabrous, 4 x 2.5 cm, longitudinally variegated with 10 green strips Pale yellow or red when ripe. Seeds ovate-oblong, compressed smooth, pale yellow [15].

Seeds

Though seed propagation is easy, fast and reliable, successful seed germination depends on numerous internal and external factors. Seeds are the principle means of regeneration and propagation of cucurbits, however; the seeds are poorly viable and undergo dormancy. The seeds are used as a flavoring agent and soup thickener. In Northern Nigeria, fermented cakes are made from the seeds. The plant has been used as a meat tenderizer in the Indian subcontinent. Minced meat for seekh-kababs is mixed with Kachri powder and left for 4-6 hours to make it tender. Cultivation of these species is

restricted only to specialized agro-geographical pockets of India, mainly by tribal and poor farming communities. These species have a huge potential to be exploited as alternative crops not only for their nutritive value but also for improving the livelihood of these tribal and poor farming communities.[16]

Fruit	Pulp	Flower

Figure 1 Fruit, Pulp and Flower of *Cucumis trigonus*

Traditional Uses

In the Traditional System of Medicine Fruit and roots of this plant have medicinal values. The fruits are used in flatulence, leprosy, fever, jaundice, diabetes, cough, bronchitis, ascites, anaemia, constipation, other abdominal disorders and amentia.[4] Also, fruit pulp is bitter, acrid, thermogenic anthelmintic, liver tonic, cardiotonic, appetizer, expectorant and intellect promoting.[2] The green fruits, slightly sour; stomachic; cures "Kapha" and biliousness; increases "Vata". The dried fruit is indigestible; astringents to the bowels; improves taste; cures "Kapha' and biliousness (Ayurveda). the pulp of the fruits is very bitter and is a drastic purgative. A decoction of the roots is preferred as being milder in its operation and causing less irritation. The seeds are cooling and astringents, and useful in bilious disorders[17].

In Indian traditional systems of medicine, the fruit pulp of the plant is used as an expectorant, liver tonic, stomachic and purgative. The fruit pulp is useful in leprosy, jaundice, diabetes, bronchitis and amentia. Fruit pounded and boiled with cow's milk and applied to the head is supposed to prevent insanity, strengthen the memory and remove vertigo. The drug is also used in snake bite.[18]

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Bark

The bark of *Cucumis trigonus* is used for flatulence, leprosy, fever, jaundice, diabetes, cough, bronchitis, ascites, anaemia, constipation, other abdominal disorders and amentia.

Root

The root of *Cucumis trigonus* is used as active flatulence and leprosy, the native boils it for steam inhalation cough, bronchitis, ascites. An infusion of the roots is taken in small doses to alleviate amentia in the root extract is used to anaemia diseases, especially to bring relief from the blood deficiency by the people of Afghanistan. The root extract is used for Diabetes and in the treatment of chronic constipation. In India, the root is used in the treatment of abdominal pain.[20]

Fruit

The fruit of *Cucumis trigonus* fruits are used in flatulence, leprosy, fever, jaundice, diabetes, cough, bronchitis, ascites, anaemia, constipation, other abdominal disorders and amentia.

Leaves

The young leaves of *C. trigonus* are cooked as vegetables in India. The leaves are commonly used as one of the ingredients in Thai remedies to control fever, blood pressure and relieve headache. In the Philippines, the leaf decoction is applied to urticaria (Tropical Plant Database, Besides, it is also used by tribal healers of the Chittagong Hill Tracts region of Bangladesh to treat liver disease. The infusion of leaves is used as a dieting aid for people who are dieting and wish to remain slim The leaves, with the mucilaginous nature, are taken as a demulcent for gonorrhea and administered as a sudorific.[21]

PHARMACOLOGICAL EVALUATION

Analgesic Activity

The extract in doses ranging from 1.25 to 10 mg/kg to i. p. showed graded analgesic activity ranging from 33.3 to 83.3%. The ED50 was found to be 2.5, 1.9 mg/kg compared to 10.0, 3.1mg/kg of pethidine.[22]

Anthelmintic activity

Anthelmintic activity of the various crude extracts (Petroleum ether(40º-60ºC) Benzene, chloroform, ethanol and water) of the fruits of *Cucumis trigonus* roxb. Was evaluated on Indian adult earthworms, Pherentima posthumous and compared. Time of paralysis and time of death of the worms were considered as the parameters to assess the anthelmintic action. The results revealed that the ethanolic extracts of both the fruits of *Cucumis trigonus* and Cucumis sativus showed significant anthelmintic activity at a higher concentration level of 100 mg/ml on time taken for both paralysis and death of the worms when compared to other extracts. Hence the ethanolic extracts of the fruits of *Cucumis trigonus* and Cucumis sativus were also tested in various doses (80mg, 60mg, 40mg, and 20mg). The results revealed that the ethanolic extract of the fruits of *Cucumis trigonus* showed excellent anthelmintic activity compared to that of *Cucumis sativus*. Albendazole was used as a standard drug.[23]

Anti-asthmatic activity

Hydroalcoholic extract (200 and 400 mg/kg) of both fruits were evaluated for anti-asthmatic activity on oval bumming induced Asthma in rats with the help of parameters like absolute eosinophil count in BALF, total leukocyte count in the BALF, absolute eosinophil count in the Blood, IgE antibodies in serum and histopathological findings of lungs. Both plants were showed significant anti-asthmatic activity ($p < 0.001$) with doses of 200 & 400 mg/kg when compared with the disease group. The obtained results were almost similar to that of the normal group. With the same dose, C. colocynth was shown better anti-asthmatic activity than *C. trigonus*. Hence, further detailed studies are required to evaluate the efficacy of these plants on anti-asthmatic activity.[24]

Antibacterial Activity

Ethanolic extract of *Cucumis trigonus* showed significant results because it is found to be active against *E. coli, P. aeruginosa* and *B. cereus*. These findings support the traditional knowledge of local users and it is a preliminary scientific validation for the use of the plant for antibacterial activity.[18]

The extracts were screened for their antibacterial activity in comparison with standard Streptomycin (10 mg/ml) *in vitro* by agar well diffusion method. The Petri plates containing 15-20 ml of Muller Hinton Agar (MHA) medium was inoculated with 200µl of 18h old bacterial culture was evenly spread with a sterile bent glass rod. The inoculated plates are kept aside for a few minutes. A sterile cork borer was then used to make four wells (8 mm diameter) for different concentrations of the extract, on each of the plates containing cultures of the different test organisms. The four peripheral wells were filled with 100µl of each crude extracts of the concentration 50 and 100µg/ml respectively. Similarly, one agar plates for each microorganism were prepared for studying the antibacterial activity of reference compound Streptomycin (100µg/ml). For assaying antibacterial activity, plates were incubated at 37 °C for 24h. The diameter of the zone of inhibition (in mm) was recorded.[19]

The antibacterial and antifungal activities of the successive extracts (petroleum ether (40-60ºC), benzene, chloroform, ethanol and water) of the fruit of *Cucumis trigonus* Roxb. (Fam. Cucurbitaceae) have been carried out against three-gram positive bacteria, Bacillus cereus, *Bacillus subtilis*, *Streptococcus faecalis*, three-gram negative bacteria, *Pseudomonas aeruginosa*, *Klebsiella aerogenos*, *Proteaus vulgaris* and two fungi, *Candida albicans*, *Asparagillus flavans* by using disk diffusion method. Zones of inhibition of the extracts have been compared with that of the standard antibiotics. The petroleum ether (40-60ºC) and chloroform extracts showed no activity while the ethanolic extract showed more activity than the benzene and aqueous extracts. Minimum inhibitory concentration (MIC) for the ethanolic extract of the fruit of *Cucumis trigonus* has also been determined. The results indicate that *Cucumis trigonus* is a potential antiseptic for the prevention and treatment of microbial infections.[25]

Antidiabetic Activity

The aqueous extract exhibited significant hypoglycemic activity in STZ-diabetic rats, whilst there was no significant effect observed on normoglycemic rats. However, at the end of 21 days of treatment, there was a 56.39% decrease ($P < 0.001$) of serum glucose levels with the aqueous extract. The standard drug glibenclamide also indicated a significant decrease (28.13%) of serum glucose levels.[6]

Anti-Diuretic Activity

An alcoholic extract of *Cucumis trigonus* was studied for its diuretic activity in albino rats using hydrochlorothiazide as a standard drug for comparison. The extract exhibited a dose-dependent saliuretic effect reaching a peak at 4 hours. Unlike hydrochlorothiazide, the extract does not affect potassium excretion.[26]

Anti-inflammatory Activity

The plant is reported to possess analgesic, anti-inflammatory and diuretic activity which was attributed to a glycoside fraction contained in the alcoholic extract of these plants. Plant its proteolytic and serine protease activity has been reported.[4] The aqueous fruits extract of *Cucumis trigonus* has had beneficial effects in reducing the elevated blood glucose level and lipid profile of STZ-induced diabetic rats and also therapeutic and prophylactic value in the treatment of myocardial infarction.[6] The alcoholic fruit extract of *Cucumis trigonus* could afford highly significant protection against CCl_4 induced hepatocellular injury.

Antioxidant Activity

Different plants are used in a variety of diseases including hepatic ailments in deserts and dry areas of India.[26-28] The different concentration of alkaloid extract (20µg, 30 µg, 40 µg, 50 µg) of root, leaves and fruit samples of *C. trigonus*

were tested and found to possess *in vitro* antioxidant activity.[19]

Anti-hyperglycemic Activity

The present study was to investigate the possible anti-hyperglycemic activity of *Cucumis melo* leaf extracts in streptozotocin-induced hyperglycemia in rats. *Cucumis melo* leaf Methanolic and aqueous extracts were administered to the streptozotocin (55mg/kg) induced hyperglycemia rats for 28 days to study anti-hyperglycemic activity. Serum obtained by immediate centrifugation of blood samples using remi ultra-cooling centrifuge at 3000 rpm for 15 minutes at room temperature and was directly used for estimating serum glucose. The acute toxicity value of methanol and aqueous leaf extract after oral administration in mice were found to be 5000 mg/kg. The results concluded that *Cucumis melo* leaf Methanolic extract (500 mg/kg) have greater anti-hyperglycemic activity than aqueous extract in streptozotocin-induced hyperglycemia model and when compared with Glibenclamide treated group. Hence to conclude that the Methanolic extract of *Cucumis melo* leaf having antihyperglycemic activity.[29]

Hepatoprotective Activity

Hepatotoxicity ultimately leads to liver failure. Conventional treatment options for hepatotoxicity are limited and not safe.[30] The hepatoprotective activity was also supported by histopathological studies of liver tissue. Results of the biochemical studies of blood samples of CCl_4 treated animals showed a significant increase in the levels of serum enzyme activities, reflecting the liver injury caused by CCl_4. Whereas blood samples from the animals treated with chloroform and aqueous fruit extract showed significant and alcohol extract showed a highly significant decrease in the levels of serum markers, indicating the protection of hepatic cells. The results revealed that alcoholic fruit extract of *Cucumis trigonus* could afford highly significant protection against CCl_4 induced hepatocellular injury.[31]

Proteolytic Activity

The enzyme behaves in a manner indicative of the presence of -SH groups. The enzyme system possesses strong meat-tenderizing but no milk-clotting properties. Certain fillers and activators are proposed for an effective meat-tenderizing mixture based on the powdered enzyme extract. An arbitrary name “Cucumis” is suggested for this newly discovered proteolytic factor.[32]

WOUND HEALING ACTIVITY

The control tetracycline and paste base groups ($p<0.05$). Fewer inflammatory cells were observed in PHP 10%-treated animals and this group demonstrated better re-epithelialization with remarkable neovascularization. Besides, the PHP 10% formulation exhibited antioxidant activity. *In vivo* and histopathological examinations showed considerable wound healing in PHP 10% group. This finding could probably be due to the antioxidant, anti-inflammatory and antimicrobial activities of phytoconstituents of *A. Vera, B. carteri* and *C. myrrh*. [33]

Acute toxicity

An acute toxicity study was performed for the ethanolic extract of the fruits of *Cucumis trigonus* as per OECD guidelines. Albino rats received 2000 mg/kg bw ip of the ethanol extract. The animals were observed for toxic symptoms continuously for the first 4 h after dosing. The rats were continuously observed for their mortality and behavioral response for 48 h and thereafter once in a day for 14 days. There was no mortality recorded. Therefore the drug should be free from toxicity.[34]

Table 1: Traditional uses of *Cucumis trigonus*

Parts of plant	Traditional Uses	Reference
Fruit	Chronic Jaundice, Flatulence, leprosy, jaundice, diabetes,	35
Leaves	fever, anaemia	36
Seed oil	Skin disease	37
Root	Cough and Constipation	19
Bark	Bronchitis, ascites, anaemia, constipation, other abdominal disorders and amentia.	38

Table 2: Morphology of *Cucumis trigonus*

Parts of Plant	Size	Shape	Color	Reference
Whole Plant	50.0-300 89mm	Erect, Branched	Green	10
Fruit	1.5-2.0 mm	Small, egg	White and Green	39
Seed	5 x 2 mm	Oval shape	Only white	40
Leaves	3-6 cm	Sinuate, Pinnately lobed	Dull, Darkish or green	36
Stem	1.0-1.5 mm	Slender, Angular and abnormally wide	Light green to purple	41

Table 3: Pharmacological Activities of *Cucumis trigonus*

Activities	Plant parts	Extract type	Model/ Assay	Animal	Result	Reference
Analgesic and Anti-inflammatory	Fruit	Fresh fruit of *Cucumis trigonus* were skinned to remove cuticle and were dried in the sun for 7 or more days until the weight of the dried fruits was constant.	The extract showed significant anti-inflammatory activity against both educative and proliferative manifestations of inflammation and the activity.	Mice	Removal of the solvent from the alcoholic extract of *C. trigonus* yielded a thick, dark brown residue. The yield was 18.6% by weight.	[4]
Diuretic Activity	Fresh fruits	The alcoholic extract of *Cucumis trigonus was* therefore investigated for its diuretic effect and the results of experiments on albino rats are reported.	An alcoholic extract of *Cucumis trigonus was* studied for its diuretic Activity in albino rats using hydrochlorothiazide as a standard drug for comparison.	Rat	Removal of the solvent from the alcoholic extract of *C. trigonus* Yielded a thick dark-brown residue. The yield was 18.6%.	[5]
Antidiabetic activity	Fruit	Fruit samples were	extract of *Cucumis trigonus* fruit was evaluated by using normal and streptozotocin-induced-diabetic rats.	Rat	The statistical data indicated a significant increase in body weight, liver glycogen and serum insulin level and decrease in the blood glucose, glycosylated hemoglobin levels, total cholesterol and serum triglycerides.	[6]
Hepatoprotective Activity	Fruit	The collected fruits were shade dried at room temperature. The two hundred grams of dried powdered fruits of *Cucumis trigonus* were extracted	The extracts of the plant material were screened for various classes of natural products using standard qualitative methods as described by Harborne	Rats	The yield of dried extract was pet. ether (40-60^{0}C)10.4(%), chloroform 2.25(%), alcohol 1.8 (%) and aqueous 11.7 (%.). The alcohol and chloroform extracts were found to be positive for the presence of steroids, triterpenoids, saponins and glycosides.	[31]
Antibacterial Activity	Fruit	-	-	-	The result of this study showed that the antibacterial activity of ethanolic fruit extract of *C.*	[18]
Antimicrobial Activity	Fruit	The dried fruit powder (500 gm) was successively extracted using petroleum ether (40°-60°C), benzene, chloroform, ethanol and water by using the Soxhlet apparatus.	The antimicrobial activity was determined by the Paper disc Diffusion method4. A suspension of the organism was added to the sterile nutrient agar medium at 45°C.	-	*In vitro* preliminary screening of the antimicrobial activity of the various extracts of the fruits of *Cucumis trigonus* Roxb.	[25]
Antioxidant Activity	Root and Fruit	The alkaloid was estimated by the method of Harborne. The acetic acid (5%) extract of the plant material was warmed up to 70 °C.	The alkaloid extracts were dissolved in dimethyl sulfoxide (DMSO) and the final concentrations of the crude extract solution	-	The yield of alkaloid extracts was 5.14% to 11.36% and could be ranked from high to low *i.e.,* fruit>root>leaf respectively	[19]

PHYTOCHEMICALS

Secondary metabolites are present in the fruits present in the fruits of *Cucumis trigonus* are presented in the Table 4.[42] Also, the phytochemical isolated from fruits are presented in the Table 5.

Table 4: Quantitative determination of secondary metabolites

S. No.	Metabolites	Amount (mg/kg)	Reference
1.	Total Alkaloids	0.87	43
2.	Total flavonoids	1.59	44
3.	Tannin	0.16	45
4.	Lignin	0.12	25
5.	Glycosides	0.12	46
6.	Serpentines	0.09	47
7.	Terpenoids	0.08	48
8.	Saponins	0.05	49
9.	Phenols	0.22	19
10.	Total carbohydrates	0.87	6

Table 5: Isolated compound from *Cucumis trigonus*

S. No.	Isolated compounds	Chemical Formula	M.W.	Appearance	Type of Extraction	Activity	Reference
1.	Demeclocycline	$C_{21}H_{21}ClN_2O_8$	464	Fruit	petroleum ether	Antimicrobial	50
2.	Glycodeoxycholic acid	$C_{26}H_{43}NO_5$	449	Fruit	Ethanol	Detergent to solubilize fat.	51
3.	3α,7α,12α Trihydroxycoprostanic acid	$C_{27}H_{46}O_5$	450	Fruit	Ethanol	Used in digestive	50
4.	Chlortetracycline	$C_{22}H_{23}ClN_2O$	478	Fruit	Ethanol	Antimicrobial.	50
5.	Azafrin methyl ester	$C_{28}H_{40}O_4$	440	Fruit and root	Alkaloid	Antioxidant, Anti-inflammatory, Ant arthritic Lowering hypertension, Anticancer,	27
6.	Giganteumgenin N	$C_{30}H_{50}O_6$	506	Fruit	-	Antimicrobial, Anti-inflammatory, Ant arthritic, Anti-asthma, Diuretic.	25
7	Phorbol 12,13-dihexanoate	$C_{32}H_{48}O8$	560	Fruit	-	Antimicrobial, Anti-inflammatory.	25
8	Astaxanthin	$C_{40}H_{52}O_4$	596	Fruit	-	Antioxidant, Anti-inflammatory, Ant arthritic, Lowering hypertension, Anticancer, Drug for eye problems Natural color pigment	29
9	Tetrahydrospirillo xanthenes	$C_{42}H_{64}O_2$	600	-	-	Anticancer, Drug for eye problems Natural color pigment	29

CONCLUSIONS AND PERSPECTIVES

Due to its many uses and wide variety of pharmacological scientific area, Cucumis trigonus is a valuable botanical source. For several illnesses, it has a long history of usage in traditional medicine systems. An description of the botany, common uses, phytochemistry, pharmacology and toxicity of Cucumis trigonus is provided in the current paper. Many traditional uses of the Cucumis species have been confirmed by pharmacological and phytochemical research carried out in recent decades.

In addition, certain pharmacological activities do not apply to conventional uses of the species Cucumis trigonus, such as anti-oxidant activity and its uses. A significant number of bioactive compounds have previously been isolated but not evaluated, so these compounds need to be biologically examined in greater detail.

In order to evaluate ethnomedical claims, additional in vitro and in vivo genotoxic tests of Cucumis trigonus are also necessary, and some of the pharmacological activities of Cucumis trigonus recorded in vitro and animal studies have been observed at doses that can hardly be translated into clinical settings. Therefore, to ensure the safety of such therapeutic applications, extensive and systematic studies and clinical evaluation of Cucumis trigonus are imperative in the future.

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