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Review Article

A REVIEW ON *CANNA INDICA LINN*: PHARMACOGNOSTIC AND PHARMACOLOGICAL PROFILE

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Abstract

In recent years, ethnobotanical and traditional uses of natural compounds, especially of plant origin received much attention as they are well tested for their efficacy and generally believed to be safe for human use. *Canna indica* commonly known as Keli is widely cultivated throughout India, tropical and sub-tropical regions of Southern United State and South to Northern Argentina & Philippines in settled areas belongs to the family Cannaceae. It widely used as a nutritive agent and possesses number of valuable pharmacological activities.

This article aims to provide information which is required to claim and explore its pharmacognostic and pharmacological profile. Every part of *Canna* has beneficial properties that can serve humanity so the whole plant can be extensively studied for further research aspects.

Keywords: Canna, hepatoprotectives, pharmacology, antioxidant activitiy, HIV type 1 reverse transcriptase inhibitor activity

Introduction

Canna (or canna lily, although not a true lily) is a genus of nineteen species of flowering plants. The closest living relations to cannas are the other plant families of the order Zingiberales, that is the Zingiberaceae (gingers), Musaceae (bananas), Marantaceae, Heliconiaceae, Strelitziaceae, etc.

Canna is the only genus in the family Cannaceae. Such a family has almost universally been recognized by taxonomists. The APG II system of 2003 (unchanged from the APG system, 1998) also recognizes the family, and assigns it to the order Zingiberales in the clade commelinids, in the monocots. The species have large, attractive foliage and horticulturists have turned it into a large-flowered and bright garden plant. In addition, it is one of the world's richest starch sources, and is an agricultural plant. The name *Canna* originates from the Celtic word for a cane or reed.[1]

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Botanical Classification[2]		**Nomenclature**[2, 3]		
Kingdom:	**Plantae**	**Language**		**Name**
Subkingdom:	**Tracheobiont**	Andes		Achira
Superdivision:	**Spermatophyta**	English	-	Canna
Division:	**Magnoliophyta**	French	-	Balisier
Class :	**Liliopsida:**	Hindi	-	Saka siri, Devkali
Subclass:	**Zingiberidae**	Marathi	-	Kardal
Order:	**Zingiberales**	Sanskrit	-	Vankelee
Family:	**Cannaceae**	Spanish	-	Chupa flor
Genus:	***Canna***			
Species:	***indica* L.**			

Origin

The first species of *Canna* introduced to Europe was *Canna indica* L, which was imported from the East Indies, though the species originated from the America. Charles de Ecluse, who first described and sketched *Canna indica* indicates this origin, and states that it was given the name of *indica*. [4]Much later, in 1658, Pison made reference[5] to another species which he documented under the vulgar or common name of 'Albara' and 'Pacivira', which resided, he said, in the shaded and damp places, between the tropics, this species is *Canna angustifolia* L.[6]

Without exception, all *Canna* species that have been introduced into Europe can be traced back to the America, and it can be asserted with confidence that *Canna* is solely an American genus. If Asia and Africa provided some of the early introductions, they were only varieties resulting from *Canna indica* and *Canna glauca* cultivars that have been grown for a long time in India and Africa, with both species imported from Central and South America. *Canna* is an American genus, as pointed out by Lamarck[7] where he argues that "*Cannas* were unknown to the ancients, and that it is only after the discovery of the New World, that they made their appearance in Europe". Since *Cannas* have very hard and durable seed coverings, [8, 9] it is likely that seed remains would have survived in the right conditions and been found by archaeologists in the Old World. If the soils of India or Africa had produced some of them, they would have been imported before the 1860s into European gardens.[10]

Habitat and Geographical Distribution

The *Canna* genus is native tropical and sub-tropical regions of Southern United State and South to Northern Argentina & Philippines in settled areas, occurring in waste places and near tikas *Canna* settlements.[11] In America wild species grow in the South of the United States, South America, from Venezuela to Argentina and India. Terrestrial plants usually live in tropical and subtropical rain forests, montane, premontane and gallery forests. Palustrine plants grow in forest edges, wetlands, marshes and riversides. Many taxa are nitrophilous and mostly found in humid loose soils, near streams, in uncultivated public lands or on road sides. The plant prefers light (sandy), medium (loamy) and heavy (clay) soils and requires well-drained soil. The plant prefers acid, neutral and basic (alkaline) soils. It cannot grow in the shade. It requires moist soil.[12, 13]

Varieties of *Canna* species:

19 *Canna* species have been reported true species and there have been 2 recent revisions of the genus *Canna* by botanists in recent years, firstly by Maas (in the Netherlands), and secondly by Tanaka (in Japan). The taxonomy presented below is based on the Tanaka revision.[11]

Sr. No	Species of *Canna*	Subspecies	Origin	Image	Ref.
1.	*Canna amabilis*		Northern Argentina		14
2	*Canna bangii*	*Canna bangii* Kraenzl	Peru and Bolivia at an altitude of 1,400-2,700m		14
3	*Canna coccinea*	*Canna coccinea*, Mill. *Canna coccinea f. flaviflora*	Northern Argentina, England South America		15,16
4	*Canna compacta*	*Canna compacta* Rosc. Canna *compacta* subsp. *Cinabina*	Brazil and northern Argentina, England, South America		15,17
5	*Canna discolour*	Canna discolor var. Discolour Canna discolor var. Rubripunctata Canna discolor var. viridifolia	South Mexico to Colombia,		15,18,19
6	*Canna flaccid*	*Canna flaccida* Salisb	Wetlands of south-eastern USA		14,15,19

7	*Canna glauca*		Wetlands of tropical America and was introduced to England		20,15
8	*Canna indica*	*Canna indica*var. *indica* L *Canna indica*var. *Flava* *Canna indica*var. *Maculate* *Canna indica*var. *sanctae rosea* *Canna indicavar.Warsze wiczii*	Caribbean, Tropical Americas, India		14,21
9	*Canna iridiflora*		South America Sydney gardens.		18,15
10	*Canna jaegeriana*	*Canna domingensis* *Canna leucocarpa* *Canna pertusa*	Greater Antilles and tropical South America, north and west of the Amazon Basin (Venezuela, Ecuador, Peru, and Bolivia).		14,15
11	*Canna tuerckheimii*	*Canna tuerckheimii* Kraenzl	Belize, Costa Rica, Guatemala,Honduras, Mexico, Nicaragua, Panama, Colombia and Ecuador.		14,15
12	*Canna liliiflora*	*Canna liliiflora* Warsc. ex Planch	Bolivia		14,15

13	*Canna paniculata*	*Canna paniculata* Ruiz. & Pav.	Southern Mexico, Costa Rica, and tropical South America, except for the Amazon Basin,		14,15
14	*Canna patens*	*Canna Montana Canna recurvata*	South America Sydney gardens.		14,15
15	Canna pedunculata	*Canna pedunculata* Sims	South-east Brazil at low altitudes		14,15
16	*Canna plurituberosa*	*Canna plurituberosa*	Northern Argentina.		14,15
17	*Canna speciosa*	*Canna indicavar. Speciosa* *Canna speciosa* (Roscoe) Hook	Tropical Americas, Introduced to England from South America		14,15
18	*Canna stenantha*	*Canna stenantha* Nb. Tanaka	Northern Argentina		14,15
19	*Canna jacobiniflora*	*Canna jacobiniflora* T. Koyama & Nb. Tanaka	Argentina		14,15

Pharmacognostical Studies of *Canna* Species

Sr.no.	Pharmacognostial Properties	Plant Part	Special Features
1	Macroscopy	Leaves 	Leaves are lanceolate or ovate 10-30cm long, 10-20cm wide. Having large laminae upto 60cm long.[22]Inflorescenc is waxy-glucose erect peduncle about 30 cm long. Leaves are dark green with purplish brown margins and veins. They are carline, simple, alternate and spiral. The oblong leaves have their petioles extending downwards to form a sheathing base around the stem. The lamina is pinnately, parallely veined. Leaf margins appear smooth and wavy with acute apex. The leaves are large and foliaceous reaching up to 65-70cm in length and 30-35cm in width.
		Flowers 	Flowers are red, solitary or in pair the bract about 1.3cm long. Sepals are 1 to 1.5cm long. Corolla tube about 1cm long being red or reddish 2.5 to 3cm long. The staminodes are bright red. Flowers are hermaphrodite.[22]
		Fruits 	Fruits are capsules, green oblong or aid, softly echinate (spiny) and 2 to 2.5cm long. Capsules about 40 x 25 mm, outer tepals (sepals) persistent at the apex.[22]
		Seeds 	Seeds initially white and when mature, black with chestnut brown spots are protected with a smooth coat.[23]
		Stem 	Stem is a pseudo stem which reaches up to 1.5-2m in height. It is erect, herbaceous, sturdy and cylindrical enveloped by the sheathing leaf bases.[25]
		Rhizomes 	Young rhizomes are yellowish white or pinkish on the outside and yellowish white within. At maturity, they turn brownish externally due to a thick outer covering.[25] Rhizomes may be monopodial or sympodial, stoloniferous or tuberous rhizomes are sympodial with Y-shaped axes.[23]

		Roots 	The Indian shot has hardy, clump forming. *Canna indica* root are water soluble.[24]The roots are thick, Cylindrical and creamy white in colour with a diameter of 2-5mm with numerous root hairs. Thinner primary and secondary lateral roots are also seen.[25]
2.	Microscopy	Leaves	Leaf is typical of a monocot. A single layered epidermis made up of rectangular cells occurs is a few layers of parenchyma cells followed by a few layers of chlorenchyma, Sclerenchyma patches occur on either side of the vascular bundle. The leaves are amphistomatic. Stomatal density-2 mm.[25]
		Seeds	Seed microstructure consists of a massive chalaza, surrounded by an extremely hard, completely impermeable seed coat. The epidermis is composed by a palisade layer of long and narrow cells with very thickened walls called Malphigian cells. Integumentary tissue**:** The area around the micropyle and the micropyle itself is formed by the inner integument. The integumentary seed coat is similarly composed of 4 layers: epidermis or palisade layer, subepidermal, vascularized, and tanniferous layer.[23]
		Stem	The uniseriate epidermis is followed by an undifferentiated ground tissue. Two to three layers of regularly arranged parenchyma cells occur below the epidermis. This is followed by 2-3 layers of chlorenchymatous tissue that formed a band. A few U-shaped sclerenchymatous patches occur at regular intervals below and in contact with the chlorenchymatous zone. Vascular tissue system consists of numerous vascular bundles scattered throughout the ground tissue. Each vascular bundle is conjoint, collateral, end arch and closed.[25]
		Rhizomes	The epidermis cell walls are scarcely cutinized. Beneath the epidermis there is a three layered hypodermis, which exhibits cells with sub polygonal outline and thickened walls. The cortex is a relatively thin zone placed between the hypodermis and the endodermis. It is mainly composed by a parenchymatous tissue.[23]
3.	**Detection of compounds through thin layer chromatography**	Rhizomes	The bioactive fractions of *Canna indica* rhizome extract were analyzed through thin layer chromatography (TLC) using the method of Wagner and Bladt, 1996. About 10 µl of extract (2 mg/ml) of all the bioactive fractions were loaded on TLC plates. The plate was air dried and developed in Hexane: Diethyl ether (2:3) for 30 min. The plate was dried in a hot oven (at 80 ºC for 10 min) and detected under UV light (365 nm) and ammonia vapour. For spraying iodine solution, Natural Product/Polyethylene Glycol reagent (5% NP/PEG in ethanolic solution), ferric chloride (1% solution in 50% aqueous methanol) were used in the experiment.[25]

Phytoconstituents of *Canna indica*

Root-Root contains the chemical constituent's cannagenins. Rootstock contains enzymes, triacontanal and mixture of stigmasterol, β-sitosterol, campesterol and β lectin and traces of alkpiels.[27]

Rhizomes:-Rhizomes yield fat, traces of an alkaloid, gum and starch. Phytochemical screening yielded phenols, sterols, flavonoids and saponins. Composition of the unsaponifiable matter from *Canna indica* rhizome are 5, 8 Henicosdiene, 7- Henicosyne, 3, 15- Dihydroxy-2-octadecene, 6-Hydroxy eicosane, Tricosane, Tetracosane.[2,26]

Leaves:-The major constituents normally occur in *Canna* leaf extract sucrose, amino acids, sorganic acids, citric, malic, glyceric, succinic, and lactic acids, and the aspartic, glutamic, glutamine, and alanine. Leaves also contains lignin, furfural, hemicelluloses.[28]

Flowers:-The flowers of *Canna indica*are brightly red. The appearance of red color is due to presence of flavonoids, phenols and anthocyanins. Flowers contain lutein, ß – carotene, violxanthin, lutein, Zeaxanthin, β-Cryptoxanthin.[29, 30]

Pharmacological studies of *Canna indica*

AIDS / HIV1-RT Inhibition: *Canna indica* was one of medicinal plants used to treat AIDS tested for their HIV type 1 reverse transcriptase inhibitor activity. *Canna indica* rhizomes showed HIV-1 RT inhibition ratio higher than 90% at 200 bug/ml concentration. Further study of C. indica and two proteins isolated showed significant HIV-1 RT inhibition.[31]

Cannagenin / Molluscicidal: (1) Study yielded cannagenin, which had a highly synergistic with chlorophyll on the morality of snails.

(2) Study showed *Canna indica* to have time and dose dependent mollusicidal activity in a dose that was not toxic for the fish Colisa fasciatus, which shares the same habitat as the snail L acuminata.[24]

Hepatoprotective: (1) Study showed the methanol extract of aerial parts of *Canna indica* has liver protective effect against carbon tetrachloride-induced hepatotoxicity.

(2) Study of hydro-alcoholic extract showed significant antioxidant and hepatoprotective activity. Results were compared with reference drug Silymarin.[32]

Cytotoxicity / Anticancer: Study yielded two pure compounds, stigmasterol and 6-beta-hydroxystigmasta-4, 22-diene-3-one and two other toxi c minor components. They showed cytotoxicity against P388 leukemia cells.[33]

Antioxidant: Study results clearly indicate the aerial parts of *Canna indica* are effective in scavenging free radicals and have the potential to be a powerful antioxidant.[30]

Flower Anthocyanins / Antioxidant / Pigment Source: Study of red flowers of *Canna indica*isolated anthocyanins. Four anthocyanin pigments were isolated from quercetin and lycopene. The compounds showed good antioxidant activity. Results suggest a promising pigment source for food applications.[29]

Studies on antioxidants enzymes: The efficient scavenging of hydrogen peroxide was performed by normal (control level) activities of both ascorbate peroxidase and catalase in leaf and increased activity of only catalase in root, preventing its accumulation at toxic concentration and subsiquient damage of membrane lipids by peroxidation. Together these ensured normal dry weight of leafs and roots, indicating tolerance of *Canna indica*plant to copper induced oxidative stress.[34]

Surfactant-enhanced anaerobic acidogenesis of *Canna indica* L. by rumen cultures:

Polyoxyethylene sorbitan monoolate (Tween 80) was used to enhance the anaerobic acidogenesis of *Canna indica* L by rumen culture. Dose of Tween 80 at 1 ml/l enhanced the volatile fatty acids (VFA) production from the acidogenesis of *Canna* compared to the control. However, Tween 80 at higher dosages than 5 ml/l inhibited the rumen microbial activity and reduced the VFA yield. Response surface methodology was successfully used to optimize the VFA yield. A high VFA production was achieved from *Canna* presoaked with Tween 80, suggesting that the structure of *Canna* was disrupted by Tween 80.[35]

Differential Activation of Glucose Transport in Cultured Muscle Cells by Polyphenolic Compounds from *Canna indica* L. Root

Effect of extracts of a plant, which has been used as a traditional medicine for treating

diabetes on glucose transport activity, was evaluated in cultured L8 muscle cells. The aqueous extract of *Canna indica* root (CI) at doses of 0.1—0.5 mg/ml, which contains total phenolic compounds equivalent to 6—30m g of catechin caused a dose- and time-dependent induction of 2-deoxy-[3H]glucose (2-DG) uptake activity. The induced 2-DG uptake was significantly increased within 8 h and reached a maximum by 16 h. The *Canna indica* extract increased the amount of glucose transporter isoforms 1 (GLUT1) and 4 (GLUT4) at the cell surface and enhanced expression of GLUT1 protein.[36]

Antinociceptive and anthelmintic activity of Canna indica

Dried, coarsely powdered leaves, flowers, rhizomes and seeds of *Canna indica*were successively extracted with benzene and methanol in Soxhlet apparatus. The effect of benzene and methanol extracts of various parts of *Canna indica* on nociceptive response using writhing test and hot plate method in mice was examined. All the extracts of *Canna indica* showed significant central and peripheral analgesic activity in hot plate method and acetic acid-induced writhing test, respectively, at the dose of 50 mg/ kg(-1) intraperitoneally. Methanolic extract of leaves of *Canna indica* showed highest increase in reaction time in hot plate method while benzene extract of leaves of *Canna indica* showed more inhibitory effect on writhing induced by acetic acid. Anthelmintic activity of these extracts was evaluated on Pheritima posthuma. Results showed that the methanolic extract of rhizomes of the plant took less time to cause paralysis of the earthworms.[37]

Non- pharmacological studies on *Canna* plant

Microbial community variation in phytoremediation of triazophos by *Canna indica*Linn. in a hydroponic system-

Phytoremediation of triazophos (*O, O*-diethyl-*O*-(1-phenyl-1, 2, 4-triazole-3-base) sulfur phosphate, TAP) pollution by *Canna indica* Linn. in a hydroponic system has been well studied, whereas the microbial mechanism on TAP degradation is still unknown. The variation in microbial community compositions was investigated by analyzing phospholipid fatty acids (PLFAs) profiles in microbes under TAP exposure. The TAP exposure resulted in an increase in proportions of fatty acid 16:0 and decrease in fatty acid 18:2ω9,12c, indicating that TAP may stimulate the reproduction of microorganisms and inhibit the growth of fungi to some degree. Significant correlation was found between the ratio of fungi to bacteria and TAP removal ($r2 = 0.840$, $p < 0.01$). In addition, the microbial community in the phytoremediation system with *Canna indica* was dominated by Gram negative bacteria, which possibly contributed to the degradation of TAP.[38]

Interactive effects of N and P on growth but not on resource allocation of *Canna indica* in wetland microcosms-

The interactive effect of three levels of N (mM) (low 0.36, medium 2.1 and high 6.4) and two levels of P (mM) (low 0.10 and high 0.48) on growth and resource allocation of *Canna indica* Linn. were studied in wetland microcosms. After 91 days of plant growth, there was a significant interactive effect of N and P on plant growth, but not on resource allocation (except for allocation of N to leaves and allocation of P to the stems). The plant growth positively responded to the relatively higher nutrient availability (taller plants with more stems, leaves and flowers.[39]

Chemical fractionation and translocation of heavy metals in *Canna indica*L. grown on industrial waste amended soil-

A pot experiment was carried out to assess the effect of different amendments of industrial sludge on the growth of *Canna indica* L. as well as the translocation potential of heavy metals of this plant. The accumulation of metals (Cr, Fe, Cd, Cu, Ni, Zn, Mn and Pb) in different parts of *Canna indica* L. grown on industrial sludge-amended soil increased with time and increasing doses of sludge amendments.[40]

From salmon pink to blue natural sensitizers for solar cells: *Canna indica*L., Salvia splendens, cowberry and Solanum nigrum L.-

Study on dye-sensitized solar cells (DSSCs) with extracts of *Canna indica*L, *Salvia splendens*, *Solanum nigrum* L. as sensitizers is firstly reported in this paper. DSSCs were assembled by using natural dyes extracted from *Canna indica*L, *Salvia*

splendens, cowberry and *Solanum nigrum* L. as sensitizers. The energy conversion efficiency of the cells sensitized with dyes of *Canna indica* L, *Salvia splendens*, cowberry and *Solanum nigrum* L. was 0.29%, 0.26%, 0.13% and 0.31%, respectively. A novel technique was taken to fabricate TiO2 electrode films by electrophoresis. We present FTIR and UV–vis spectroscopy studies of structures and light absorption of these four kinds of natural dyes. The electrochemical impedance spectroscopy (EIS) was used to analyze the interface resistance of cells. The result indicated that high resistance existed in the interfaces of cell with cowberry extract as sensitizer.[41]

Optimization of anaerobic acidogenesis of an aquatic plant, *Canna indica* L., by rumen cultures-

Anaerobic acid genesis of *Canna indica* L. (canna) by rumen cultures was investigated in this study. Fractional factorial design (FFD) was used to explore the roles of the growth factors such as substrate concentration and pH in such a bioconversion, whereas response surface methodology (RSM) was employed for optimizing this acidogenic process. The optimum substrate concentration and pH for the acidogenesis of *Canna* were found to be 8.2 g vs l.1 and 6.6, respectively, and the corresponding degradation efficiency of *Canna* was 52.3%. Volatile fatty acid yield peaked at 0.362 g, 1 VS degraded at a substrate concentrationof 6.9 g vs l, 1and pH 6.7.[42]

Nitrogen nutrition of *Canna indica*: Effects of ammonium versus nitrate on growth, biomass allocation, photosynthesis, nitrate reductase activity and Nitrogen uptake rates-

The effects of inorganic nitrogen (N) source (NH4+, NO3_ or both) on growth, biomass allocation, photosynthesis; N uptake rate, nitrate reductase activity and mineral composition of *Canna indica* were studied in hydroponic culture. The relative growth rates (0.05–0.06 g), biomass allocation and plant morphology of *Canna indica* were indifferent to nutrition.[43]

Phytoremediation of BTEX contaminated soil by Canna generalis-

Bioaccumulation experiments showed that the *Canna* (*Canna generalis*) could accumulate BTEX (benzene, toluene, ethylbenzene and xylenes) from root zone and rhizome zone soil and translocate these compounds to the shoot. A comparison among the compounds showed that the sequences for accumulation in the root, rhizome and shoot were strongly related to their physicochemical properties (i.e. Kow values and molecular weight). For removal efficiency,the canna could remove about 80% of BTEX in the root zone and rhizome zone soilin 21days. In addition the removal efficiency in BTEX contaminated soil with 40% water content was a little higher than that found with 20% soil water content. This result indicated that the soil water content should also be considered when phytor- emediation is employed.[44]

Removal of nutrients from waste water with *Canna indica* L. under different vertical flow constructed wetland conditions-

Constructed wetlands are becoming increasingly popular worldwide for removing contaminants from domestic waste water. This study investigated the removal efficiency of nitrogen (N) and phosphorus (P) from waste water with the simulated vertical-flow constructed wetlands (VFCWs) under three different substrates (i.e., BFAS or blast furnace artificial slag, CBAS or coal burn artificial slag, and MSAS or midsized sand artificial slag), hydraulic loading rates (i.e., 7, 14, and 21cmd−1), and wetland operational periods (0.5, 1, and 2 years) as well as with and without planting *Canna indica* L.[45]

Arabinoxylan from Canna edulis Ker by-product and its enzymatic activities-

Arabinoxylan (AX) was extracted and purified from *Canna edulis* Ker by-product. Through column chromatography, AX was further separated, leading to the isolation of two single compounds, namely, AXI and AXII. Moreover, the structures of AXI and AXII were characterized by GC, GC–MS and NMR. The result indicated that arabinose and glucuronic acid occurred at 1,4-linked xylose units as back bone at positions 3 and 2 in both AXI and AXII with varying ratios, respectively. Furthermore, the effects of AX on enzymatic digestibility of lactoglobulin and tributyrin hydrolysis by lipase were evaluated. The results showed that AX had obvious inhibition effects on pepsin and lipase

activities, and decreased lactoglobulin digestibility and tributyrin hydrolysis as well. It indicates that *Canna edulis* AX could be used as a functional food ingredient.[46]

Pharmacological, Traditional and non- pharmacological Uses of *Canna indica*

Sr .No.	Plant part used	Traditional uses	Pharmacological uses	Non-pharmacological uses
1.	**Rhizomes**	Decoction of fresh rhizome is used as jaunditic symptoms fevers, dropsy and dyspepsia. In the Philippines, decoction of rhizome used as diuretic, antipyretic. Macerated rhizomes are used to alleviate nose bleeds. In Thailand, rhizome has been used with other herbs for cancer treatment. In Costa-rica infusion of rhizomes used as emollient.[22] In Gabon the rhizome is used in enemas against dysentery and intestinal worms[46.47] An aqueous decoction is taken in Congo by women with irregular menses.[48]	In vitro HIV type 1 reverse transcriptase inhibitor activities.[31] Antimicrobial activity, antioxidant activity.	The rhizome of cannas is rich in starch, and it has many uses in agriculture.[1]
2.	**Leaves**	In Costa Rica infusion of leaves used as diuretic. In southwest Nigeria, leaves used for malaria.[22,45]	Used in malaria.[47]	A fibre obtained from the leaves is used for making paper. Smoke from the burning leaves is said to be insecticidal.[51]
3.	**Flowers**	Decoction of flowers used for external wound bleeding.[22]	The flower are said to cure eye disease, antioxidant activity, antibacterial activity.[30]	
4.	**Whole plant**	In Bangladesh, paste of plant used for tonsillitis.[22]	Aerial part of *Canna indica*shows hepatoprotective activity, antioxidant activity.[29,30]	In more remote regions of India, cannas are fermented to produce alcohol. The plant yields a fibre from the stem. young shoots used as a vegetable.[52]

5.	**Root**	A decoction of the root with fermented rice is used in the treatment of gonorrhoea and amenorrhoea. The powdered root is taken in Nigeria as a cure for diarrhoea and dysentery.[49] In India the roots are recognized as diaphoretic. and diuretic, diaphoretic, stimulant and demulcent and are administered in fevers and dropsy.[50]	Molluscicidal activity, acrid and stimulant.[24]	The roots are starchy. Starch has been extracted in a small way in Indochina. They are eaten in Asia, and have been eaten in W Africa in time of dearth entry.
6.	**Seeds**	Considered as cordial and vulnerary.[22]		The seeds are used as beads in jewellery also used in mobile element. Musical instruments. A purple dye is obtained from the seed.[51,53,54]

Conclusions

In recent years, ethnobotanical and traditional uses of natural compounds, especially of plant origin received much attention as they are well tested for their efficacy and generally believed to be safe for human use. They obviously deserve scrutiny on modern scientific lines such as phytochemical investigation, biological evaluation on experimental animal models, toxicity studies, investigation of molecular mechanism of actions of isolated phyto-principles and their clinical trials. Very little effort of traditional and folk claims has been made by researchers to explore the therapeutic potential of *Canna indica* plant. It is interesting to note that *Canna indica* possessing a wide range of phytochemicals almost in every part of it like flavonoids, tannins, alkaloids, starch etc. and has been reported to posses various activity like anthelmintic activity, antibacterial Activity, HIV type 1 reverse transcriptase inhibitor activity, antimicrobial activity, antioxidant activity, antifungal activity, molluscicidal activity antioxidant activity, hepatoprotective activity. Since the global scenario is now changing towards the use of nontoxic plant product having traditional medicine use.

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