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Phytochemistry and Pharmacological Activities of *Jatropha pandurifolia* Andr

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Abstract | **Review Article**

Jatropha pandurifolia is plant belonging to family *Eurphorbiaceae,* and native to West Indies, and mostly used as an ornamental plant. Number of biological activities have been reported like: antibacterial, antifungal, antioxidant, cytoxic, insecticidal activities, and traditional uses of this plant like -cancer, rheumatisms, eczema, purgative and ring worm. The main objective of this review is to cover the biological activities and chemical constituents derived from this and provide insights and further investigate the plant for further study to introduce new components that would lead to production of effective phytomedicine.
Keywords: Antioxidant, Anthocyanin, Phytomedicine, Phytoconstituents.

INTRODUCTION

The name *jatropha* derived from the Greek word ἰατρός (iatros), meaning "physician," and τροφή (trophe), meaning "nutition" and are used in traditional folklore medicine to cure various ailments in Africa, Asia and Latin America [1-3]. There are about 170 different species of jatropha. Some examples are like*: Jatropha gossypiifolia,J Jatropha multifida*, *Jatropha podagrica*, *Jatropha curcus*, *Jatropha pandurifolia*. In India, there is a vast potential for the production of biodiesel from Jatropha curcus.

In one survey which was conducted by a Karnataka State Council for Science and Technology is that the jatropha seeds contains about 20-30% of oil which has been traditionally used for lighting the lamp. Jatropha oils contains fatty acids (seed are rich in linoleic acid). But there are many uncertainties over the potential of *jatropha* as a biofuel crop.

Jatropa pandurifolia Andr

Jatropa pandurifolia is a genus of flowering plant known as spicy jatropa, in Chinies "Ri Ri Ying", which means "Every-day-flowered Cherry Blossom" [4] and belonging to the family *Euphorbiaceae.*

Synonyms: *Jatropha integerrima*, *Jatropha hastata*, *Jatropha coccinea*, *Jatropha paucifolia* [5].

Table-1: Common names [6]

1.	English	Firecracker Jatroph, Spicy jatropha, Chaya, Shanghai beauty, Cotton-leafed Jatropha, Rose - Flowered Jatropha, Fiddelhead jatropha
2.	Bengali (□□□□□)	(□□□□□): □□□□□□□ □□□□□
3.	French	Jatropha-Fleur (La Réunion), Guitare (La Réunion), Epicar (French Antilles)
4.	German	Korallenbaum
5.	Spanish	Flor roja
6.	Thai (ภาษาไทย)	Pttawia (ปัตตาเวีย)
6.	Russian	Korallovyi tesvetok
7.	Chinese	Qin ye Ying (Taiwan)
8.	Japanese	Yatorofa integrima **(日本語):** テイキンザクラ

Table-2: Morphological characteristics of plant [7]

Leaves	Leaf Retention	Evergreen	
	Mature leaf colour & texture	Green & smooth	
	Leaf type	Simple or unifoliate	
	Leaf arrangement with stem	Alternate	
	Shape	Ovate to oblong	
	Leaf venation	Pinnate	
	Foliar margin	Entire	
	Foliar apex	Acute	
	Leaf Area Index	4.5	
Flower	Colour	Red, Pink	
	Flower & Plant Sexuality	Unisexual flower	
	Flowering habit	Polycarpic	
	Flowering phase	Throughout the year	
Fruit	Colour	Raw - Green Mature - Brown	
	Fruit type	Dehiscent dry fruit	
Stem	Stem type	Woody	

Geographical distribution [6]

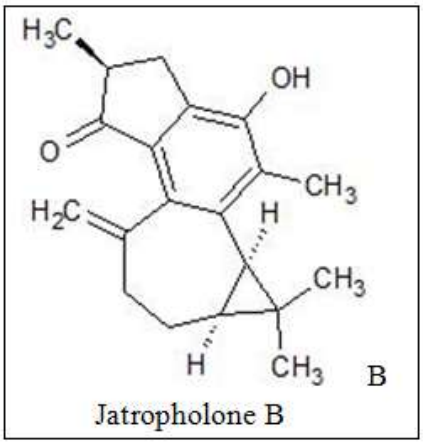
This ornamental shrub is native to West Indies and mostly found in Cuba and Hispaniola. It is extensively cultivated in tropical and sub-tropical countries for ornamental purpose.

Table-3: Propagation requirements [6]

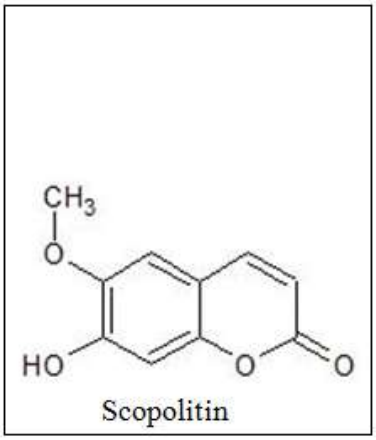
1.	Light preference	full sunlight and semi- shade
2.	Water requirement	Little
3.	Soil requirement	Sandy (semi-arid area)
4.	Growth rate of plant	Moderate
5.	Propagation method	Seed Stem cutting
6.	Planting distance	2 metres

Phytoconstituents [5]

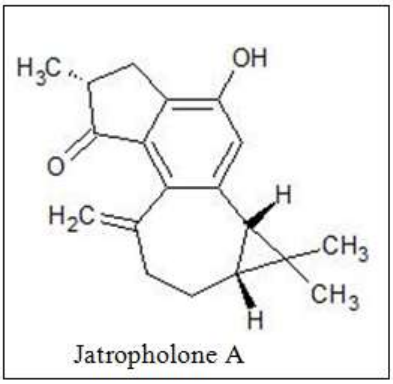
Main active principle of plant contains macrocyclic diterpenes jatrophone, jatrophatrione, jatropholone A-B,riolazatrione ,curcusones, A-D, rhamnofolate, lathyrane. Leaf and stem extracts yielded tannins,terpenoids,steroids, saponins. Methanolic extract of stem bark of plant isolated seven compounds and these are: 1) 3-O-acetylaleuritolic acid, 2) jatropholone A, 3) jatropholone B, 4)2-α-hydroxyjatropholone, 5)2β-ydroxyljatropholone, 6) scopoletin, 7) aleuritolic acid 3-p-hydroxycinnamate. Essentials oils of leaves contains pentadecanal, 1, 8) cineole and β-ionone.



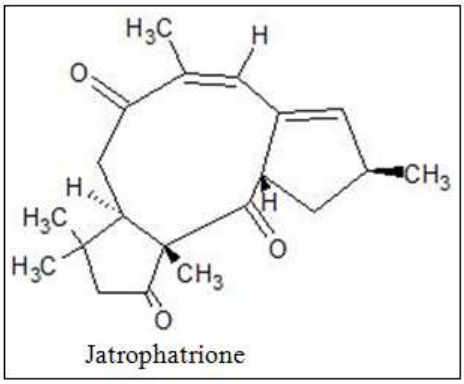
Jatropholone B



Scopolitin



Jatropholone A



Jatrophatrione

Table-4: Phytochemicals in different parts of plant

Source	Phytochemicals
Leaves	Steroids, Tannins, terpenoids, flavonoids and saponin
Seed oils	Seed oils contains methyl esters after analysing this it shows that it contains saturated and unsaturated fatty acids and also hydroxy fatty acid.
Roots	8,9- seco-rhamnofolate and a rhamnolane endoperoxide.
Leaves essential oils	Pentadecanal , 1,8-cineole, β-ionine
Stem bark	3-O-acetylaleuritolic acid, 2) jatropholone A, 3) jatropholone B, 4)2-α-hydroxyjatropholone, 5) 2β-ydroxyljatropholone, 6) scopoletin, 7) aleuritolic acid 3-p-hydroxycinnamate. Terpenes and coumarins
Latex	Cycloheptapeptide i.e integerrimides A and B

Table-5: Taxonomic Classification [8]

Kingdom	Plantae
Subkingdom	Viridiplantae
Infrakingdom	Streptophyta
Superdivision	Embryophyta
Division	Tracheophyte
Subdivision	Spermatophyta
Order	Malpighiales
Family	Euphorbiaceae
Genus	*Jatropha*
Species	*J .pandurifolia*

Uses

Jatropha is traditionally used as a purgative, warts and some types of cancer, rheumatism, herpies, scabies, eczema and ring worms [9, 10]. It has been used traditionally as a healing agent in Bangladesh.

Table-6: Biological Activities of *Jaropha pandurifolia* Andr

S. No.	Parts of plant	Biological activity
1.	Stem bark	Antifungal, Antibacterial, Cytotoxic
2.	Leaves	Antibacterial, Antifungal, Insecticidal
3.	Root	Antifungal, Antibacterial
4.	Flower	Antioxidant activity,Antibacterial
5.	Latex	Cytotoxic activity

Biological activities

Antibacterial activities

The flower, leaf, root, stem, latex and fruit have a potential of antibacterial [11] against the bacteria like *Pseudomonas aeruginosa,Envinia carotovora pv. Carotovora, Xanthomonas campestris pv. Citri, Xanthomonas campestris pv. Mangiferaeindiace.*

Envinia carotovora pv.Carotovora ,Xanthomonas campestris pv

The n-hexane extract of stem bark [9] of the plant has shown the effective antibacterial activity against gram positive bacteria *Bcillus cereus, B. megaterium, Sarcina lutea, Staphylococcus aureus* and gram negative bacteria like *E. coli, Paeruginosa, S. paratyphi, Shigella boydii, S.dysentreriae Vibro. mimicus* antifungal activity against the *C.albicans albicans , Asperragillus niger, S.cerevaceae..*

The methanolic extract and ethyl acetate extract of fresh leaf also shows the antibacterial activity against the gram positive and gram-negative microorganisms.

Insecticidal Properties

Methanolic and ethyl acetate decoction of fresh and mature leaf of plant has been found to possess insecticidal property. The extract shows insecticidal properties on larve of *Bactrocera zonata* and *Bactrocera cucurbitae*. Plant contains flavonoids due to which it acts toxic against the diptera species [12].

Antioxidant activity

The leaf extract of plant shows the antioxidant activity by using a DPPH assay [13] In which the activity was check against a standard *tert*-butyl-1-hydroxytoluene and it shows the effective IC 50 value than standard Given in Table-7.

Table-7: Antioxidant activity

Plant	Sample (Extract)	IC_{50}(µg/ml)
Standard	*tert*-butyl-1-hydroxytoluene	91.5
J. pandurifolia leaf	Methanolic extract of leaves	160
	Hexane soluble fraction of methanolic extract	165
	Carbon tetrachloride soluble fraction of methanolic extract	104
	Chloroform soluble fraction of methanolic extract	91

1% HCL-ethanol extract of flower of *J. pandurifolia* was also observed which is mainly due to the presence of anthocyanin [14].

An ultrasound- assisted extraction mehod was used for the extraction of the natural antioxidant from the plant *jatropa integerrima* and it was reported that this was effective for extraction of the antioxidant from the plants.

Cytotoxic activity

Cycloheptapeptide extracted from the latex of the *Jatropha integerrima*. Cycloheptapeptide i.e. integerrimide C (1) was isolated from the ethyl acetate extract of latex of jatropha, and in this study it was reported that the it shows the antitumor activity against the tumor KB cells.

Natural thioredoxin reductase inhibitors

Trunk of plant *Jatropha integerrima* yielded nine new diterpenoids jatrointelones A-l (1-9) and lythyranes (1-7), which showed stronger thioredoxin reductase inhibitor activity than curcumin which was used as a positive control [15].

A novel 8,9- seco-rhamnofolane and a rhmnofolane endoperoxide**,** these two were obtained from the root extract of the plant *jatropha integerrima* [16].

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