

Review

***Jatropha curcas*: Plant of medical benefits**

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Plants are a rich source of many natural products most of which have been extensively used for human welfare, and treatment of various diseases. *Jatropha curcas*, a multipurpose, drought resistant, perennial plant belonging to Euphorbiaceae family is gaining a lot of economic importance because of its several potentials in industrial application and medicinal values. *J. curcas* has been used as traditional medicine to cure various infections. Researchers had isolated and characterized numerous biologically active compounds from all parts of this plant. In addition, the mechanisms of action of these active compounds have been studied in relation to the applications in traditional medicine. Before exploiting any plant for medicinal application, it is crucial to have complete information about the medicinal uses of each part of the plant. The medicinal uses of the leaves, fruit, seed, stem bark, branches, twigs, latex and root of *J. curcas* are discussed in this review. If the full potential of the plant is to be revealed, much more research is required to develop herbal medicine using modern science and technology. A potential aspect based on markets for all of its medicinal products should be conducted thoroughly, to promote the ability of this plant to cure so many illnesses.

Key words: Medicinal plant, traditional medicine, active compounds, diseases, treatment.

INTRODUCTION

Medicinal plants have been used as a source of medicine to treat illness since time immemorial. For a long time, plants have provided a source of emerging modern medicines and drug compounds, as plant derived medicines have made large contributions to human health. Their role is twofold in the development of new drugs. They may become the base for development of a medicine, a natural blue print for the development of the new drugs or a phytomedicine to be used for the treatment of diseases (Iwu, 1993). Active compound present in the medicinal plants provide the bountiful resource of active compounds for the pharmaceutical, cosmetics and food industries, and more recently in agriculture for pest control (Rice, 1995). Herbal products from medicinal plants are preferred because of less testing time, higher safety, efficiency, cultural acceptability and lesser side effects. The chemical com-

pounds present in herbal products are a part of the physiological functions of living organisms, and hence they are believed to have better compatibility with the human body (Khanna et al., 1986). Medicinal plants like *Jatropha curcas* have played major role in the treatment of various diseases, including bacterial and fungal infections. The scientific name of physic nut is "*Jatropha curcas*." The genus name *Jatropha* derives from the Greek word *jatr'os* (doctor) and *troph'e* (food), which implies medicinal uses (Kumar and Sharma, 2008). This plant belongs to the Euphorbiaceae family, a drought resistant shrub or tree which is widely distributed in the wild or semi-cultivated areas in Central and South America, Africa, India and South East Asia (Schmook and Seralta-Peraza, 1997; Gübitz et al., 1999; Martínez-Herrera et al., 2006). All parts of *Jatropha* (seeds, leaves, bark, etc) have been used in traditional medicine and for veterinary purposes for a long time (Dalziel, 1955; Duke, 1988). Extensive public interest and expansion in the use of herbal medicine have led to new emphasis and drive in medical plant research. The research approaches taken recently include activities to develop herbal medicines

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Table 1. Chemicals isolated from different parts of the plant.

Various part	Chemical compositions	References
Leaves	<ul style="list-style-type: none"> • Flavanoids, apigenin, vitexin, isovitexin, sterol stigmaterol. β-D-sitosterol, β-D-glucoside, saponin, alkaloids, triterpenae alcohol and 1-triacontanol 	Chhabra et al. (1990)
	<ul style="list-style-type: none"> • Also contain a dimer of a triptene alcohol 	Neuwinger (1994)
	<ul style="list-style-type: none"> • A complex of 5-hydroxypyrrolidin-2-one and pyrimidine-2,4-dione isolated from the leaf • Stigmast-5-en-3β, 7 β-diol, stigmast-5-en-3β, 7α-diol, cholest-5-en-3β, 7β-diol, cholest-5-en-3fl, campesterol and 7-keto-β-sitosterol 	Staubmann et al. (1999) Mitra et al. (1970), Khafagy et al. (1977), Hufford and Oguntimein (1987)
Stem bark	<ul style="list-style-type: none"> • Saponins, steroids, tannins, glycosides, alkaloids and flavonoids • B-amyirin, β-sitosterol and taraxerol 	Igbinosa et al. (2009) Mitra et al. (1970)
Latex	<ul style="list-style-type: none"> • Tannins, saponins, wax and resin • Curcacycline A (a cyclic octapeptide) • Curcacycline B (a cyclic nonapeptide) • Curcain (a protease) 	Perry et al. (1980), Watt et al. (1962) Van den Berg et al. (1995) Catherine et al. (1997) Nath and Dutta (1994)
Seeds	<ul style="list-style-type: none"> • Curcin (a lectin) • Phorbol esters • Esterases (JEA and JEB) and lipase (JL) 	Stirpe et al. (1976) Adolf et al. (1984); Makkar et al. (1997) Staubmann et al. (1999)
Roots	<ul style="list-style-type: none"> • Steroids, alkaloids, saponins • Jatropholone A and B (diterpenoids), Jatropholol (diterpenoid) • β-Sitosterol and its β-d-glucoside, marmesin, propacin, the curculathyrans A and B and the curcusones A–D. the coumarin tomentin, the coumarino-lignan jatrophin as well as taraxerol 	Aiyelaagbe et al. (2007) Chen et al. (1988) Naengchomnong et al. (1986,1994)

into quality, efficacious and safe products for human consumption. This can be an advantage for *J. curcas* to expand its potential as herbal medicines to cure many illnesses and diseases. The cure for these illnesses and diseases lies in the chemical compositions isolated from different parts of the plant. The chemical compositions in different parts of this plant are presented in Table 1. The purpose of this review is to provide information about *J. curcas* medicinal uses on

each part of this plant that could contribute to the field of research and pharmacological applications. *J. curcas* is a versatile plant with many potential uses. If the potentials of the plant are to be revealed, much more research is required to develop herbal medicine using modern science and technology approach.

A potential aspect based on markets for all its medicinal products should be conducted vigorously to promote the ability of this plant to

cure so many illnesses. The summary of the medicinal uses from different parts of *J. curcas* are shown in Table 2.

MEDICINAL BENEFITS

Leaves

The leaves and other parts of the plant are used for the treatment of various diseases. Compounds

Table 2. Summary of medicinal uses from different parts of *Jatropha curcas*.

Plant part	Therapeutic indications	Plant part and form of remedy	References
Leaves	Treatment of vaginal bleeding	Prepare an infusion from the leaves	Singh et al. (1984)
	Wound healing	Leaves applied to wounds	Staubmann et al. (1999)
	Fever	Decoction is used internally and externally	Staubmann et al. (1999)
	Rheumatism	Leaf decoction is applied externally	Staubmann et al. (1999)
	Jaundice	Application of the leaves	Staubmann et al. (1999)
	Lymphocytic leukemia	Ethanol extract defatted leaves and twigs	Thomas 1989
	Anti-parasitic activity	Sap and crushed leaves	Hufford and Oguntimein (1978)
	Malaria	Application of the leaves	Henning (1997)
	Mouth infections, guinea worm sores	Application of the leaves	Irvine (1961), Oliver (1986)
	Promote lactation	Crushed leaves applied to the breast	Parveen et al. (2007)
Dysentery and colic	The juice of the leaves is used	Parveen et al. (2007)	
Stem barks, branches, twigs	Gumboils and strengthen the gums	Twigs are used as toothbrush	Parveen et al. (2007)
	Inhibits HIV induces cytopathic effects with low cytotoxicity	Water extract of the branches	Matsuse et al. (1999)
	Strong antimicrobial agents	Extract from the branches	Igbinosa et al. (2009)
	Aid antimicrobial activities	Secondary metabolites extract from the stem bark exert antimicrobial activities through different mechanisms	Igbinosa et al. (2009)
	Gumboils and strengthen the gums	Twigs are used as toothbrush	Parveen et al. (2007)
Inhibits HIV induces cytopathic effects with low cytotoxicity	Water extract of the branches	Matsuse et al. (1999)	
Latex	Treat gum bleeding, toothache, sooth baby's inflamed tongue	The latex is used as mouth rinse. A little latex on absorbent cotton to cure toothache	Fazwishni and Kristiani (2007), Perry et al. (1980), Watt et al. (1962), Burkill (1935), Heyne (1987), Suwondo (1993), Nath and Dutta (1991)
	Wound healing	Applied latex to the wound, protease curcain isolated from the latex responsible to heal wounds	Nath and Dutta (1991)
	Inhibits classical pathway of human complement and proliferation of human T-cells	Curcacycline A isolated from latex	Van den Berg et al. (1995)

Table 2. Contd.

	Enhanced rotamase activity of cyclophilin B	Curcacycline B isolated from latex	Catherine et al. (1997)
	Fungal infections in the mouth, wasp and bee stings and digestive troubles in children	Application of latex	Watt and Breyer-Brandwijk (1962), Schmook and Serralta-Peraza (1997)
	Procoagulant and anticoagulant activities of blood	Latex of <i>Jatropha curcas</i> reducing the clotting time of human blood	Omolaja and Funmi (2003)
	Anti-inflammation	Massaging the latex to the traumatic area	De Feo (1989)
	Exhibited antibacterial activity against <i>Staphylococcus aureus</i>	Application of latex	Thomas (1989)
	Arthritis, gout and jaundice	Application of the seeds	Khafagy et al. (1977)
	Burns, convulsions, fever and inflammation	Application of the seeds	Mujumdar et al. (2000)
Fruits and seeds	Eczema, skin diseases, to sooth rheumatic pain and purgative action	Application of seed oil	Heller (1996)
	Sciatica, dropsy and paralysis	Application of seed oil	Mujumdar et al., 2000
	Pregnancy-terminating effects in rats, contraceptive, abortifacient and syphilis	Application of seed oil and the fruits	List and Horhammer (1979)
	Eczema, scabies, ringworm and gonorrhea	The root is used as decoction	Aiyelaagbe et al. (2007)
	Antimicrobial activity	Extracts from roots	Dekker et al. (1986); Aiyelaagbe et al. (2000, 2001),
	Sexually transmitted diseases (STD)	The hexane, ethyl acetate and methanol extracts of the roots	Aiyelaagbe et al. (2007)
	Anthelmintic properties	Extraction of yellow oil from the roots	Sirisomboon et al. (2007)
Roots	Dysentery and diarrhea	A dose of two tablespoons of root suspension with butter milk	Mujamdar et al. (2000)

Table 2. Contd.

Dyspepsia and diarrhea	The root is triturated with a little asafetida and given with butter milk	Desai (1975), Dymock et al. (1976), Nadkarni (1976)
Antidiarrheal activity in albino mice	Root extract from this plant	Mujamdar et al. (2000)
Inflammation	Applied locally in paste form after crushing	Joshi (1995)
Anti-inflammatory activity in albino mice	Topical application of the root powder in paste form	Mujamdar and Visar (2004)
Bleeding gums and toothache	Decoction as a mouthwash	Aiyelaagbe et al., 2007

that have been isolated from *J. curcas* leaves include the flavonoid apigenin and its glycosides vitexin and isovitexin, the sterols stigmasterol, β -D-sitosterol and its β -D-glucoside (Chhabra et al., 1990).

Furthermore, *J. curcas* leaves were reported to contain steroid sapogenins, alkaloids, the triterpenae alcohol, 1-triacontanol and a dimer of a triene alcohol (Neuwinger, 1994; Staubmann et al., 1999) had isolated a complex of 5-hydroxypyrrolidin-2-one and pyrimidine-2, 4-dione from the leaves of *J. curcas* by extraction with ethyl acetate. In the island of Tonga, in Oceania, the leaves of *J. curcas* have been used in folk medicine to treat vaginal bleeding (Singh et al., 1984).

Members of rural communities of Churu district in the Thar Desert, India, used the juice from leaves to cure diseases such as dysentery and colic (Parveen et al., 2007). The leaves were also applied to the breast to promote lactation (Parveen et al., 2007). In Southeast Asia and in some regions of Africa, the leaves are used as purgative, while in the Philippines and Cambodia the leaves are applied to wounds (Staubmann et al., 1999). In Cape Verde and Cameroon, a decoction is used internally and externally against

fever. In Cameroon, the leaves are also in use as the remedy against rheumatism and in Nigeria against jaundice (Staubmann et al., 1999). Thomas (1989) investigations turned out that the leaves are also active in lymphocytic leukaemia. An ethanolic extract of the defatted leaves and twigs of *J. curcas* have shown confirmed activity both *in vivo* and *in vitro* against P-388 lymphocytic leukemia (Hufford and Oguntimein, 1978). Fagbenro-Beyioku (1998) investigated and reported the anti-parasitic activity of the sap and crushed leaves of *J. curcas*. In Mali, the leaves are used as treatment for malaria (Henning, 1997). The leaves are utilized extensively in West Africa ethnomedical practice in different forms to cure various ailments like fever, mouth infections, jaundice, guinea worm sores and joint rheumatism (Irvine, 1961; Oliver-Bever, 1986).

Stem bark, branches and twigs

Phytochemical screening of *J. curcas* stem bark extracts revealed the presence of secondary metabolites such as saponins, steroids, tannins, glycosides, alkaloids, flavonoids and also yields dark blue dye (Igbinosa et al., 2009). These

compounds are recognized to be biologically active, hence, aid the antimicrobial activities of *J. curcas*. These secondary metabolites exert antimicrobial activity through different mechanisms (Igbinosa et al., 2009). Shimada (2006) investigated that tannins have been found to form irreversible complexes with proline rich protein resulting in the inhibition of cell protein synthesis. Parekh and Chanda (2007) reported that tannins reacted with proteins to provide the typical tanning effect which is important for the treatment of inflamed or ulcerated tissues. Herbs that have tannins as their main components are astringent in nature and are used for treating intestinal disorders such as diarrhea and dysentery (Dharmananda, 2003). From these observations, *J. curcas* is used in herbal cure remedies. The biological activities of tannins had been observed to have anticancer activity and can be used in cancer prevention, thus suggesting that *J. curcas* has the potential as a source of important bioactive molecules for the treatment and prevention of cancer (Li et al., 2003). The presence of tannins in *J. curcas* stem bark supports the traditional medicinal use of this plant in the treatment of different ailments.

Alkaloid is another secondary metabolite com

pound

observed in the stem bark extract of *J. curcas*. One of the most common biological properties of alkaloids is their toxicity against cells of foreign organisms. These activities have been widely studied for their potential use in the elimination and reduction of human cancer cell lines (Nobori et al., 1994). Alkaloids, which are one of the largest groups of phytochemicals in plants, have amazing effects on humans, and this has led to the development of powerful painkiller medications (Kam and Liew 2002). The inhibitory effect of saponins on inflamed cells was revealed by Just et al. (1998). Saponin was found in *J. curcas* stem bark extracts, thus has supported the usefulness of this plant in managing inflammation.

Steroidal compounds present in *J. curcas* stem bark extracts are in large interest due to their relationship with various anabolic hormones, including sex hormones (Okwu, 2001). Quinlan et al. (2000) worked on steroidal extracts from some medicinal plants, which exhibited antibacterial activities on some bacterial isolates. Neumann et al. (2004) also confirmed the antiviral property of steroids.

Flavonoid is another secondary metabolic compound of *J. curcas* stem bark extracts. It exhibited a wide range of biological activities like antimicrobial, anti-inflammatory, anti-angionic, analgesic, anti-allergic, cytostatic and antioxidant properties (Hodek et al., 2002). Hence, the presence of these compounds in *J. curcas* supports the antimicrobial activities observed. Members of rural communities of Churu district in the Thar Desert, India used the twigs of this plant as tooth brushes to strengthen the gum and to cure gum boils (Parveen et al., 2007). The extraction of *J. curcas* branches using water as solvent inhibited strongly the HIV-induced cytopathic effects with cytotoxicity (Matsuse et al., 1999).

It is concluded that *J. curcas* stem bark could be a potential source of active antimicrobial agents; and a detailed assessment of its *in vivo* potencies and toxicological profile is ongoing, and it makes the plant a candidate for bio-prospecting for antibiotic and antifungal drugs (Igbinosa et al., 2009).

Latex

Folklore uses of *J. curcas* latex are to cure toothache, as a mouth rinse to treat bleeding gums, as a haemostatic, wound dressing and many others (Fazwishni and Kristiani, 2007). The latex contains tannin, saponin, wax and resin (Perry and Metzger, 1980; Watt and Breyer-Brandwijk, 1932). A proteolytic enzyme, curcain, can be obtained from the latex by alcohol and acetone precipitation (Nath and Dutta, 1991) and has been reported to have wound healing activity in mice (Nath and Dutta, 1997; Villegas et al., 1997). A novel cyclic octapeptide known as curcacycline A was isolated from the latex, which inhibits the classical pathway of human

complement and proliferation of human T-cells (Van den Berg et al., 1995). A new cyclic nonapeptide named curcacycline B, observed by Catherine et al. (1997), can enhance the rotamase activity of cyclophilin B. In Mexico, the latex is used for fungal infections in mouth, wasp and bee stings and digestive troubles in children (Schmook and Seralta-Peraza, 1997; Watt and Breyer-Brandwijk, 1932). In tropical Africa and Southeast Asia, the latex is said to effectively treat scabies, eczema and ringworm. Furthermore, it is used as a mouth rinse to treat bleeding gums and to soothe a baby's inflamed tongue. In The Philippines and Indonesia, a little latex on absorbent cotton is used to cure a toothache (Watt and Breyer-Brandwijk, 1932; Perry and Metzger, 1980; Burkill, 1935; Heyne, 1987; Suwondo, 1993). One of the reported traditional use of *J. curcas* latex is as haemostatic or styptic: for example, when the latex is applied directly to cuts and bleeding wounds, the bleeding soon stops (Dalziel, 1955; Watt and Breyer-Brandwijk, 1932; Neuwinger, 1996). These observations indicate the presence of pro-coagulant activity in this plant. Osaniyi and Onajobi (2003) were interested in investigating coagulant activity of the latex as this has great medical potentials. Investigation of the coagulant activity of the latex of *J. curcas* showed that whole latex significantly reduced the clotting time of human blood. They also discovered that diluted latex, however, exhibits anticoagulant activity. This indicates that *J. curcas* latex possesses both pro-coagulant and anticoagulant activities (Osaniyi and Onajobi, 2003). Fazwishni and Kristiani (2007) conducted mutagenicity test to evaluate the mutagenicity of the latex by Ames method and the result showed that *J. curcas* latex produces no mutagenicity activity. The latex can be used as anti-inflammation by massaging the latex to the traumatic area (De Feo, 1989).

J. curcas latex also exhibited good antimicrobial activity against *Staphylococcus aureus*, *Bacillus subtilis*, *Escherichia coli*, *Pseudomonas aeruginosa*, *Streptococcus pyogenes*, *Candida albicans* and *Trichophyton* sp. (Oyi et al., 2002). The antimicrobial activities of the latex could be due to the presence of secondary metabolite such as tannins, flavonoids and saponins which have been confirmed to be present in the latex (Levens et al., 1979). Tannins coagulate the cell wall proteins resulting in bactericidal activity in high concentrations. Saponins are surface-active agents where they alter the permeability of the cell wall, thus facilitating the entry of toxic materials or leakages of vital constituents from the cell. Flavonoids are phenolic compound in nature; they act as cytoplasmic poisons where they inhibit the activity of enzymes (Iwu, 1993; Pathak et al., 1991).

Fruits and seeds

The seeds of *J. curcas* have good potentials as a fuel substitution. However, the seeds in general, are toxic to

human and animals. Curcin is a toxic protein isolated from the seeds, and also contains a high concentration of phorbol esters (Adolf et al., 1984; Makkar et al., 1997). Two new esterases (JEA and JEB) and a lipase (JL) were isolated from the seeds (Staubmann et al., 1999). Esterases have been isolated from mammalian tissue as well as from microorganisms and plants. Because of the simple availability, microbial esterases are of interest for application in industrial processes. They are widely used for the resolution of racemic mixtures of compounds, in order to produce pure enantiomers (Staubmann et al., 1999). Lipases constitute a significant portion of enzymes that have been investigated for use in organic synthesis (Hills et al., 1990). Lipases have potential use in lipid modification to produce synthetic lipids for various industrial applications (Macrae, 1983; Svensson et al., 1992).

In Egypt, the seed is used for the treatment of arthritis, gout and jaundice (Khafagy et al., 1977). The seed of this plant has also been used traditionally for the treatment of many ailments including burns, convulsions, fever and inflammation (Osoniyi and Onajobi, 2003). The seed oil can be applied to treat eczema and skin diseases and to soothe rheumatic pain (Heller, 1996). The oil is also used externally for the treatment of sciatica, dropsy and paralysis (Mujamdar et al., 2000). The 36% linoleic acid (C18:2) content in *J. curcas* kernel oil is the possible interest for skin care (Kumar and Sharma, 2008). The oil has a strong purgative action and also is widely used for skin diseases and to soothe pain such as pain caused by rheumatism. Also, as reported, the seed oil can be a remedy against syphilis. In South Sudan, the seeds as well as the fruits are used as a contraceptive or as abortifacient (List and Horhammer, 1979).

Roots

J. curcas roots are used for treating eczema, scabies, ringworm and gonorrhoea where these diseases are caused by fungi and bacterial infections (Aiyelaagbe et al., 2007). Phytochemical analysis of the extracts revealed the presence of many secondary metabolites including steroids, alkaloids and saponins. Chen et al. (1988) had isolated diterpenoids jatropholone A and B and a new diterpenoid named jatropholol from the roots of *J. curcas*. Previous work (Dekker et al., 1986; Aiyelaagbe et al., 2000; Aiyelaagbe, 2001) has shown that many *Jatropha* species possess antimicrobial activities. Aiyelaagbe et al. (2007) investigated an *in vitro* antimicrobial activity against different microorganisms responsible for various infections especially sexually transmitted diseases. The results displayed potent antimicrobial activity against the target organisms giving minimum inhibitory concentration (MIC) as low as 0.75 µg/ml. It confirmed the potency of this plant in treating infections including sexually transmitted infection. The roots contain yellow oil with strong anti-helminthic

properties (Sirisomboon et al., 2007). The roots are also reported to be used as an antidote for snake bites. During an ethnobotanical survey of Raignad and Ratnagiri districts of Konkan area, a part of the West coast of India, was recorded to use *J. curcas* roots to control dysentery and diarrhea. In order to control these symptoms, a dose of two tablespoons of root suspension with butter milk is recommended, once or twice a day depending on the severity of the symptoms (Mujamdar et al., 2000). It is reported that the root is triturated with a little asafetida and given with butter milk in treating dyspepsia and diarrhea (Desai, 1975; Dymock et al., 1976; Nadkarni, 1976). Based on ethnobotanical practice, the root extract of this plant was investigated by Mujamdar et al. (2000) and Mujamdar et al. (2000) for pharmacognostic studies and evaluation of anti diarrheal activity in albino mice. The proposed mechanism of action was through a combination of inhibition of elevated prostaglandin biosynthesis and reduction in propulsive movements of small intestine (Mujamdar et al., 2000).

The roots of this plant are applied locally in paste form after crushing, for the treatment of inflammation by Bhil tribes from Rajasthan area in India on empirical basis (Joshi, 1995). Considering this information, Mujamdar and Visar (2004) evaluated for local and systematic anti-inflammatory activity using various animal models in the present investigation. Anti-inflammatory activity of topical application of *J. curcas* root powder in paste form in TPA-induced ear inflammation was confirmed in albino mice and the successive solvent extraction of these roots was carried out by ether and methanol. Resultant anti-inflammatory activity might be due to the effects on several mediators and arachidonic acid metabolism involving cyclo-oxygenase pathway resulting in prostaglandin formation, anti-proliferative activity leading to reduction in granular tissue formation and leukocyte migration from the vessels (Mujamdar and Visar, 2004). The roots can also be used in decoction as a mouthwash for bleeding gums and toothache.

Conclusions

The use of traditional medicine and medicinal plants as a normative basis for the maintenance of good health has been widely observed (UNESCO, 1996). *J. curcas* is a versatile plant with several actual and potential uses especially in medicinal uses. A lot of medicinal uses of *J. curcas* plant parts had been investigated and studied by the researchers. This plant typically contains mixtures of different chemical compounds that may act individually, additively or in synergy to improve health. Numerous biologically active substances have been isolated and characterized from all parts of the *Jatropha* plant. Their mechanisms of action have been studied in associate to a great number of applications of *J. curcas* in traditional medicines. However, the full potential of *J. curcas* plant is far from being realized both technically and economically

for several reasons. The role of *J. curcas* in medicinal uses should be taken into consideration as it shows promising potentials in the pharmaceutical field. Commercializing on the medicinal product derived from *J. curcas* may turn out to be more profitable than using *Jatropha* as fuel substitution. All non-energy uses of *J. curcas* should be tabulated to provide a wide range of options. The investigations of economics of making such products and the markets for the products should be vigorously developed. Currently, the growers of this plant are unable to achieve the optimum output in terms of economic benefits from the plant, especially for its various uses because of poor documentation and little experience in marketing its products. As a result, the growers including those in the subsistence sector do not have concrete information on the potential of this plant to exploit commercially. Promotion is needed to increase awareness to the public on this plant various potentials in medicinal uses. Some of the current strategies used to promote usefulness of *J. curcas* may be sub-optimal and could act as a deterrent instead of stimulating. Hence, it is crucial to examine the problems encountered in order to promote this plant widely. In order to re-stimulating the interest in *J. curcas*, the emphasis should be adjusted and moved away from its use as fuel substitution. The focus should be shifted to examine all the medicinal uses of this plant and to expand and develop the most profitable uses of its products.

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