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Review

Prospect of bioactive molecules from *Jatropha curcas* to improve soil and microbial quality for sustainable agriculture

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Recently, there has been increased interest promoting bioenergy as an alternate renewable energy source. Biodiesel from *Jatropha curcas* is an important form of bioenergy and have potential application in transportation sector. However, there is lack of understanding on relevance of *J. curcas* influencing soil properties and agriculture important for ecological services. Review defines different bioactive molecules found in *J. curcas*, rhizospheric microbial diversity, and allelopathic effect and management of *J. curcas* for sustainable agriculture. *J. curcas* harbours arbuscular mycorrhizae like *Acaulospora* sp., *Gigaspora* sp., *Glomus* sp., *Sclerocystis* sp. and *Scutellospora* sp. Bacteria including *Azotobacter, Rhizobium, Pleomorphomonas diazotrophica, Bacillus megaterium, Bacillus thuringiensis* has been found associated with *J. curcas* rhizosphere. *J. curcas* render ecosystem service by fixing 5100-6100 kg ha^{-1} C as the aboveground plus belowground biomass. *J. curcas* biomass recycled into the soil results into significant increase in soil macro and micro nutrients. Review identifies knowledge gap and perspective research on *J. curcas* as an opportunity resolving global agriculture and environmental issues.

Key words: Bioenergy, *Jatropha curcas*, bioactive compounds, microbial diversity, agriculture.

INTRODUCTION

It is predicted that our reserve of oil, coal and gas will be diminished by 2042, 2112 and 2144, respectively (Bentham, 2014). Energy thirst has increased by 2% each year over the last three decade with the prediction of further rise with the ongoing economic rise of China and India (Wang, 2014). Worldwide, fuel demand is projected to gain 95.7 million barrels a day in 2017, from 89 million during 2011. India's annual requirement of petroleum products is approximately 124 million metric tons. Domestic production of crude oil and natural gas covers approximately 34 million tonnes during 2006-07. The difference between demand and supply can be imaginable and is met only by import. India's oil import burden has increased alarmingly from USD 37.17 billion in 2005-06 to 143 USD

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billion during 2014 (Ghosh and Kanjilal, 2014). Therefore, Government of India is attempting to develop measures urgently switching to a reliable, affordable and a clean system of energy supplies.

Bioenergy crop *J. curcas* is considered as a potential substitute to fossil fuel because of its minimal nutrient requirement, well adaptation in adverse conditions including degraded and marginal lands and capability of reversing the process of desertification (Ahad et al., 2014). It is a multipurpose large shrub or small tree believed to be of Latin American origin which has got adjusted throughout arid and semi-arid tropical region of the world (Wendimu, 2013). Africa, Asia and Latin American countries predominate in *J. curcas* cultivation. The largest *J. curcas* plantations exist in China (0.274 mha), India (0.265 mha), Malaysia (0.259 mha) and Indonesia (0.256 mha). In Africa, the major countries are Ethopia, Ghana and Burkina Faso which have the largest *J. curcas* projects. Together, these countries amount to 43000 hectares. Latin American countries mainly Mexico and Brazil have 8000 and 3100 ha *J. curcas* cultivated area, respectively (Wahl et al., 2013). Recently, cultivation of *J. curcas* in USA has been reported to be positive and the total energy inputs into the crop to the energy output ratio is estimated at 1:4-5 (Eshton et al., 2013). Today, it is cultivated in almost all tropical and subtropical countries. Adoption of the bioenergy crop *J. curcas* was initiated in southwest Florida. For the first trial, 500 gallons of oil was produced and attempt is in progress attracting larger growers (Lee, 2013). But out of unawareness regarding its proper utilization as soil enriching agent, its plantation even for biodiesel production has not reached expected level of plantation. Although there are apprehensions about negative impact of *J. curcas* on soil quality due to its allelopathic effect, but there is no scientific evidence to support it. Allelopathy generally refers to the beneficial or harmful effects of one plant on another plant, from the release of biochemicals. These chemicals (allelochemicals) are released from plant parts by leaching, root exudation, volatilization, residue decomposition and other processes in both natural and agricultural systems. Allelochemicals with negative allelopathic effects are an important part of plant defence against competitors and herbivores (Bertin et al., 2003). To exploit this crop to its full potential, there is need of better understanding of the plant and its interaction with ecosystem. Through this review, we have attempted to evaluate the *J. curcas* crop through its chemical constituents, rhizospheric biodiversity, influence on soil qualities and strategies to minimize allelopathic effect.

BIOACTIVE COMPOUNDS FROM *JATROPHA CURCAS*

J curcas is a non-edible multipurpose shrub containing myriad of bioactive compounds that are of significance to industrial and medicinal values (Islam et al., 2011). Identification of these phytochemicals revealed that there is still untapped pool of bioactive chemicals. Almost all parts of the plant are rich source of functional chemicals (Table 1). Like other perennial plants, full grown *J. curcas* has main stem, branch and leaves. These aerial parts contain organic acids (Devappa et al., 2010; Aiyelaagbe et al., 2011), amyrin in stem bark (Misra and Misra, 2010; Islam et al., 2011), terpenes in leaves (Boateng and Kusi, 2008; Jummai and Okoli, 2014), curcins in latex (dos Santos et al., 2014; Falodun et al., 2014), phorbolesters in seeds (Agarwal et al., 2013; Bashir et al., 2013), saponins in kernel (Gámez-Meza et al., 2013; Pasha et al., 2013; Sharath et al., 2014), and sitosterol in roots (Abdelgadir and Van Staden, 2013; Khalil et al., 2013). Phytochemicals found in *J. curcas* can be explored for bio-prospecting new and novel bioactive compounds. Many studies demonstrate the efficacy of *J. curcas* against a wide array of bacteria (Sabandar et al., 2013; Paulillo et al., 2014) and fungi (Bashir et al., 2013; Colvin and Lambert, 2013). Anticancer and antitumor properties of *J. curcas* have been well acknowledged (Fernandes et al., 2013; Sabandar et al., 2013).

Ahmed and Zabar (2013) reported that leaves contained 1.99% N, 0.14% P, 1.08% K, 2.95% total carbohydrates, 12.46% protein, 2.47 mg g^{-1} total chlorophyll, 0.40 mg g^{-1} carotenoids, amino acids (0.0159 mg g^{-1} aspargine, 0.0306 mg g^{-1} proline, 0.0127 mg g^{-1} cystine and 0.0205 mg g^{-1} histidine), vitamins (0.064 mg g^{-1} B1, 0.121 mg g^{-1} B2, 0.058 mg g^{-1} pantothenic acid, 0.049 mg g^{-1} niacin, 0.229 mg g^{-1} inositol, 0.75 mg g^{-1} α-tocopherol, 0.18 mg. g^{-1} γ-tocopherol and 0.30 mg g^{-1}), 1.29 mg g^{-1} phenolic acid, 0.540 mg g^{-1} flavonoids, mg g^{-1} 0.870 tannins. Chemical composition of *Jatropha* from different geographical locations was evaluated (Martinez-Herrera et al., 2006). *J. curcas* fruit contains shell and seed. Later contains husk and kernel (Singh et al., 2008). The seed kernels were rich in crude protein (31–34.5%), lipid (55–58%) and about 6% starch and total soluble sugars. The major fatty acids found in the oil samples were oleic (41.5–48.8%), linoleic (34.6–44.4%), palmitic (10.5–13.0%), stearic acids (2.3–2.8%), cis-11-eicosenoic acid (C20:1) and cis-11,14-eicosadienoic acid (C20:2) were found in the oil (Caballero-Mellado et al., 2007; Akbar et al., 2009). Phorbolesters were present in high concentrations in the kernels (3.85 mg/g dry meal) in few samples (Gübitz et al., 1999; Martinez-Herrera et al., 2006). Trypsin inhibitors, phytates (8.5–9.3% of dry meal as phytic acid equivalent), saponins (2.1–2.9% of dry meal) and lectins (0.35–1.46 mg/ml) were found in all the seed meals. In a study, the chemical composition of seed was evaluated and it was found that it contains 66.4% oil in the seed. Triacylglycenol was the dominant lipid species, while the major triacyglyceol was 1,2 dioleoyl-3-linoleoyl-rac-glycerol. Linolenic acid was the dominant fatty acid in the oil. Ten sterols and thirteen tritepene were also identified in the unsaponifiable fraction of the oil (Adebowale and Adedire, 2006). Roots of the *J. curcas* exhibited bioactive compounds identified by physico-chemical

Table 1. Chemical composition of different parts of the bioenergy crop *Jatropha curcas* and its allelopathic activity on living systems.

Plant parts	Bioactive chemicals	Activity	References
Aerial parts	Organic acids (o and p-coumaric acid, p-OH-benzoic acid, protocatechuic acid, resorsilic acid), saponins, and tannins	Cytotoxic activity, antibacterial	(Devappa et al., 2010; Aiyelaagbe et al., 2011)
Stem bark	Amyrin, sitosterol, and taraxerol	Antimicrobial activity against *S aureus, P aeruginosa,* E coli, S *faecalis.* and other microbes	(Misra and Misra, 2010; Islam et al., 2011)
Leaves	Cyclic triterpenes stigmasterol, stigmast-5-en-3, 7 diol, stigmast-5-en-3,7 diol, cholest-5-en-3,7 diol, campesterol, sitosterol, 7-keto-sitosterol, d-glucoside of sitosterol. Flavonoids apigenin, vitexin, isovitexin. triterpene alcohol and flavonoidal glycosides	Anthelmintic activity against Pheretima Poshtuma. Antibacterial activity	(Boateng and Kusi, 2008; Jummai and Okoli, 2014)
Latex	Curcacycline, A, cyclic octapeptide, curcin Curcin	Antiparasitic activity	(Misra and Misra, 2010; dos Santos et al., 2014; Falodun et al., 2014)
Seeds	Curcin, a lectin phorbolesters, esterases,Phorbolesters Esterases and lipase Lipase	Antifungal against *Fusarium oxysporum, Pythium aphanidermatum, Lasiodiplodia theobromae, Curvularia lunata, Fusarium sem*itectum, Colletotrichum capsici *and Colletotrichum gloeosporioides.* Insecticidal against maize weevil (*Sitophilus zeamais*)	(Devappa et al., 2010; Agarwal et al., 2013; Bashir et al., 2013)
Kernal and press cake	Phytates, saponins and a trypsin inhibitor	Antimicrobial, anti-inflammatory	(Gámez-Meza et al., 2013; Pasha et al., 2013; Sharath et al., 2014)
Roots	Sitosterol and its d-glucoside, marmesin, propacin, curculathyranes, and curcusones, diterpenoids, jatrophol, and jatropholone, coumarin, tomentin, coumarino -lignan, jatrophin, taraxerol	Cytotoxic, activity, Antimicrobial	(Aber et al., 1993; (Abdelgadir and Van Staden, 2013; Khalil et al., 2013)

and spectral analyses. Compounds were 5α-stigmastane-3, 6-dione, nobiletin, β-sitosterol,taraxerol, 2S-tetracosanoic acid glyceride-1,5-hydroxy-6,7-dimethoxycoumarin, jatropholone A, jatropholone B, 6-methoxy-7-hydroxycoumarin, caniojane, 3-hydroxy-4- methoxybenzaldehyde, 3-methoxy-4-hydroxybenzoic acid and daucosterol (Kong et al., 1996).

IMPACT OF *JATROPHA CURCAS* PLANTATION

Latin American countries mainly Mexico and Brazil have 8000 and 3100 ha *Jatropha* cultivated area respectively (Wahl et al., 2013). Recently, cultivation of *Jatropha* in USA has been initiated in southwest Florida. For the first trial, 500 gallons of oil was produced and attempt is in progress attracting larger growers (Lee, 2013).

JATROPHA CURCAS INFLUENCE ON SOIL QUALITY

J. curcas also known for its wide use as living fences not only prohibit the unwanted access to the field but also play unique role reducing the soil erosion. These plants prevent water loss when planted parallel to the slopes to fix small earth or stone dams. The roots of *J. curcas* grow close to the surface and hold the soil like earthen bunds. This enables the soil to obstruct surface runoff during the strong downward flow of water, which in turns support water percolation into the soil and thus promotes yield (Achten et al., 2008). It has been reported that the *Azotobactor* count (the indicator of the soil's beneficial microflora) increases in the soil with aging of *J. curcas* plant (Sahoo and Das, 2009). The abundance of arbuscular mycorrhizae (AM), carbon (C), nitrogen (N), potassium (K) increases in soil with *J. curcas* cultivation (Sahoo et al., 2009; Wani et al., 2012). Earthworm presence as well as the moisture soil moisture content showed increment with the increasing age of *J. curcas* (Sahoo and Das, 2009). Being rich in N, the seed cake is also an excellent source of plant nutrients (Makkar and Becker, 2009).

In a rehabilitation program of dry and degraded land ecosystem, effect of *J. curcas* cultivation on soil quality was studied. *J. curcas* plantation increased mean weight diameter and macro-aggregate turnover of the soil by 11 and 2% over control. Plantation improved soil quality by maintaining organic carbon and nitrogen stock and displayed a potential to increase carbon sequestration rate (Ogunwole et al., 2007). *J. curcas* render ecosystem service by fixing 5100-6100 kg ha^{-1} C as the above ground plus belowground biomass. Huge amount of C additions and root activity favours microbial population, respiration rate and microbial biomass C and N in soil. Average of *J. curcas* biomass 4000 kg ha^{-1} year^{-1} recycled into the soil results net 85.5 kg nitrogen, 7.67 kg phosphorus, 43.9 kg potassium, 5.20 kg sulphur, 0.11 kg boron, 0.12 kg zinc and other nutrients (Bailis and Baka, 2010; Wani et al., 2012).

JATROPHA CURCAS AND COMPLEX RHIZOSPHERIC MICROBIAL COMMUNITY

Previously, we described the complex chemical composition of different parts of the plants. Leaves and roots are the major sources of different bioactive compounds and we presume that these compounds regulate plant’s adaptation to harsh environment and competence with other plants. Possibly, in the presence of these complex compounds rhizosphere of this crop is highly networked with microbial groups (Mohanty et al., 2013). Rhizospheric microbes play critical role in plant nutrient use for growth, and its adaptation to ecosystem. The plant has direct influence on the rhizosphere microbial community because of root exudates and residue chemistry which act as nutrients for the microbes is distinct from those present in the bulk soil; and in turn, the microbes break down complex forms (plant biomass) of macronutrients which become readily available to the plants and aid their growth (Zhu and Cheng, 2013; Carrillo et al., 2014). Rhizosphere of *J. curcas* has been observed to consist of high number of total heterotrophs, nitrogen fixers, phosphate solubilizers (Mohanty et al., 2013). Prevalence of different microbial groups in the rhizosphere of the *J. curcas* has been described in the next section.

Prevalence of arbuscular mycorrhizae (AM) associated with rhizosphere of *J. curcas* has been studied from different ecological regions of India taking spores as taxonomical key features as explained elsewhere (Pérez and Schenck, 1990). *Acaulospora* sp., were found more abundant followed by *Gigaspora* sp., *Glomus* sp., *Sclerocystis* sp. *and Scutellospora* sp. Relation between AM root colonization and spore number in *J. curcas* was studied and it was observed that, spore number was negatively correlated with percentage of root colonization (Lakshman, 2009). Similarly, *J. curcas* was found to harbour *Acaulospora* sp., more followed by *Gigaspora* sp., *Glomus* sp., *Sclerocystis* sp. and *Scutellospora* sp. (Venkatesh et al., 2009). Functional groups of AM associated with *J. curcas* which increase the crop yield was mainly two species, *Scutellospora heterogama* (CMU33) and *Entrophospora colombiana* (CMU05). Spores of these AM were abundant (>50 spores/100 g soil) and heavily colonized the roots of the *J. curcas* plant (Charoenpakdee et al., 2010). In other study done at Guantanamo, twenty AM fungal sequence types were identified: 19 belong to the Glomeraceae and one to the Paraglomeraceae (del Mar Alguacil et al., 2012). An experiment AM from 120 plants of *J. curcas* grown in different agro-ecological regions of India, revealed the presence of 5 different species of AM belonging to Acaulospora (Sharda and Rodrigues, 2008). Highest frequency of AM was *A. scrobiculata* (100%), followed by *A. denticulata* (33%), and *A. mellea* (17%). Apart from plant nutrition, AM contribute to soil structure stability. The fungal extra radical hyphae act as a skeleton to the soil structure holding the soil particles together that control plant growth and act as source of organic nutrients for the bacteria (Andrade et al., 1998; Wright et al., 2007).

Plant growth promoting rhizobacteria (PGPR) constitutes a special class of microorganisms which benefits plant by various mechanisms. PGPR with ACC deaminase activity promote plant growth under a variety of stressful conditions. Secondly, PGPRs exert plant growth-promoting response by depriving native microflora of iron by producing extra-cellular siderophores (microbial iron transport agents) which efficiently complex environmental iron, making it less available to certain native microflora (Kloepper et al., 1980). *Azotobacter, Rhizobium* found in soil of *J. curcas* are well characterized from the rhizospheric of many plants (Ahmad et al., 2005). Recently a novel *Pleomorphomonas diazotrophica* sp. nov., an endophytic N-fixing bacterium has been isolated from the root tissue of *J. curcas* L. (Madhaiyan et al., 2013). Two species of Bacillus (*Bacillus megaterium* and *Bacillus thuringiensis)* has been isolated from the inner tissue of *J. curcas* roots. These isolates enhanced vegetative parameters of the crop by inducing phosphate solubilisation level and IAA production (Rajkumar et al., 2013).

JATROPHA CURCAS AS BIOCONTROL AGENT

J. curcas possess different biological activities against different organisms and has scope to be used as bio control agent for agriculture (Boateng and Kusi, 2008; Reddy et al., 2009). The majority of the effects studied are from the aqueous or non-aqueous extracts of *J. curcas* root, bark, leaf, stem, oil, and seed or from direct feeding of plant parts (Table 1). *J. curcas* seed extracts were found to inhibit and control maize weevil (*Sitophilus zeamais*) in the stored maize grains, and treatment did not adversely affect germination (Constance et al., 2013). It is reported that *J. curcas* oil offered 12 week protection for treated cowpea seeds (Boateng and Kusi, 2008). In another study, when *J. curcas* oil was used as an emulsifiable concentrate, it produced toxicity toward insects *S. zeamais* (on corn) and *Callosobruchus chinensis* (on mung bean), inhibiting their oviposition when sprayed on them. The methanol extract of *J. curcas* oil containing phorbol esters was also found to exert potent insecticidal effects against *Busseola fusca* and *Sesamia calamistis* larvae (Makkar and Becker, 2009). Oil of *J. curcas* at 0.1 and 5% concentrations exhibited oviposition deterrence activity and inhibited hatching of eggs in potato tuber moth (*Phthorimaea operculefla*) (Devappa et al., 2010). Crude methanol extract from *J. curcas* oil when mixed in artificial diet inhibited growth of tobacco hornworm larvae (*Manduca sexta*) after 5 days (ED50 and ED100 of 0.125 and 2.5 mg phorbol ester extract/g artificial diet) (Sauerwein et al., 1993). Topical application of *J. curcas* oil at 1% also exhibited insecticidal activity (100% in 6 days) against *Mycus persicae* and *Tetranychus urticae* (spider mite), as well as insecticidal activity against American cockroach (*Periplaneta Americana*), German cockroach (*Blatella germanica*), and milkweed bug (*Oncopeltus fasciatus*) (Wink et al., 2000). The majority of the studies involving *J. curcas* plant parts or extracts demonstrated their inhibitory effects on infectious or harmful microorganisms. The antibacterial effects of dichloromethane, methanol and hexane extracts of *J. curcas* leaves has been exhibited against pathogenic strains of Gram positive bacteria (*Staphylococcus* sp.) and Gram negative bacteria (*Pseudomonas aeruginos* and *Aeromonas hydrophila*) and the dichloromethane extract to be most effective (Ogundare, 2007). In addition, the *J. curcas* seed extracts (containing enzyme *β*-1,3-glucanase) exerted *in vitro* antifungal activity against *Rhizoctonia solani* and *Gibberella zeae* (Qin et al., 2010).

ALLELOPATHIC EFFECTS OF *JATROPHA CURCAS*

Allelopathic crops reduce growth, development and yield of other crops growing simultaneously or subsequently in the fields. In general, the chemical substances potentially involved in allelopathy are liberated from plants by leaching of foliage by rain, abscission and litter fall, volatilization and root exudation. Crop allelopathy may be useful to minimize problems affecting agricultural production such as environmental pollution, unsafe products, human health concerns, depletion of crop diversity, soil sickness and reduction of crop productivity (Batish et al., 2001). Presence of various toxic chemicals in different parts of *J. curcas* indicates possible allelopathic nature. In this context, allelopathic crops that cover/smother and are used as manure hold a good promise as well as challenge for the future as they have a potential to suppress noxious weeds.

J. curcas exhibit both beneficial and allelopathic effect. Application of *J. curcas* cake as a fertiliser (0.75-3 t ha^{-1}) has been proven beneficial to increase seed yield (13-120%) of *J. curcas* plantation over the control plantation (zero input) (Ghosh et al., 2007). Similar results were observed when the seed cake was applied to edible crops such as pearl millet (5 t ha^{-1}), cabbage (2.5 t ha^{-1}), rice (10 t ha^{-1}), resulting in 46, 40–113 and11% increases in yield (Achten et al., 2008).

The effect of aqueous extracts of *J. curcas* on four traditional crops (*Phaseolus vulgaris*, *Zea mays* and *Hibiscus esculentus*) was examined. All the crops were affected by the different concentrations of aqueous extracts. The most pronounced effect was on *H. esculentus*, where germination, radicle and plumule length were reduced by a range of 58.34-97.92, 35.84-94.33 and 1.65-87.55%, respectively. Extract at higher concentrations of *J. curcas* had a strong inhibitory effect on germination, radicle and plumule length of all the test crops (Abugre and Sam, 2010). The allelopathic effects of leaf leachates and residues of *J. curcas* amended into soil were examined on growth of marigold (*Tagetes erecta*). The application of leaf leachates of *J. curcas* in the soil significantly inhibited the shoot and root length of marigold as compared to unamended soils. The *J. curcas* residues incorporated into soil were more phytotoxic to the foot than shoot growth of marigold seedlings (Wang et al., 2009). It is important to understand how we can cultivate *J. curcas* along with other crops minimizing its allelopathic effect. Several studies examined the possible strategies for such agricultural practice. *J. curcas* cultivation as a sole crop under plantation program can have ill effects on the local biodiversity, but as live fence or in agroforestry systems as an intercrop or on boundaries of farms, may benefit the companion crops. In a field study at Manjhawali village, Faridabad, India the effect of the *J. curcas* on wheat was explored (Sahoo et al., 2009). In the village, wheat production normally varies between 20 to 24 quintals per acre of land and after plantation of *J. curcas* plants on the bunds, the agricultural production remained same but there was an additional biomass and seed production from these plants. Study also claimed that it also supports the growth of other natural vegetation and different economically important crop and confirm that bund plantation of *J. curcas* does not affect wheat crop yield and can be an additional source of income. Block plantation of *J. curcas* allowed intercropping of medicinal plants with it. *Ocimum sanctum* and *Aloe vera* intercropped in each gap between two *J. curcas* plants in the block plantation showed growth at par with the control ones (monocultures of the two medicinal plants, a block each, of *O. sanctum* and *A. vera*) (Mollik et al., 2010). *J. curcas* has also been grown successfully along with Mulbery, *Moringa oleifera* (Munga), *Leucaena leucocephala*, *Pongamia pinnata* (Karanj), *Acacia* sp., *Emblica officinalis* (Aonla), *Azadirachta indica* (Neem) etc. plants at the plantation site (Sahoo et al., 2009).

CONCLUSIVE REMARKS

Importance of the bioenergy crop *J. curcas* has been recently understood. It leads the global bioenergy sector as a potential source of biodiesel. Our review concluded that apart from being rich source of biodiesel, *J. curcas* is also the source of many important bioactive compounds that has tremendous industrial and medicinal values. We also learnt that *J. curcas* do have allelopathic effect inhibiting growth of different crops. But it can be managed easily by certain agronomic measures. Rhizosphere of *J. curcas* possess high microbial diversity predominated by arbuscular mycorrhizae, PGPRs, N fixers, P solubilizers. It is not clear how and why the microbial diversity is high and organized in the rhizosphere of this crop. There is need for further studies to define the plant-microbial-environment interaction to link microbial diversity in the rhizosphere and sustainability mechanism. *J. curcas* extracts are used as biological control agents to protect agricultural lands from pests, weeds and diseases causing agents. But due to lack of knowledge and awareness, the utility of this plant is still not exploited. The bottom line is that research projects on this important crop are patchy even in the countries where it is accepted for mass cultivation. Reframing research on *J. curcas* certainly can resolve global energy crisis and contribute to food security and environment protection.

Conflict of interest

The authors did not declare any conflict of interest.

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