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A comparative study on the antimicrobial activity and the presence of phytochemicals in the petioles and callus of *J. curcas.*

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Abstract
In the recent years J. *curcas* have gained lot of importance due to property to produce biodiesel. Another reason because of which this plant has gained importance is due to its medicinal properties. The latex of J. *curcas* has anticancer properties due to the presence of alkaloid 'Jatrophine`. The juice of leaf is used to treat piles and bark yields a blue dye for coloring cloths. The latex, leaf, bark, and fruits contain several glycosides, tannins, phytosterols, flavonoids and steroidal sapogenins that exhibit wide ranging medicinal properties. Commercial exploration for biopharmaceuticals, antimicrobial activity and bioenergy production are some of the prospective future potential of this plant. But the question arises, whether the concentration of these secondary metabolites and antimicrobial activity is same in the fresh sample as well as tissue cultured callus. To test the same, present study was planned. For this the petioles of fresh leaves if J. c*urcas* were cultured in the tissue normal tissue culture MS media. The callus so obtained was used for further photochemical screening and antimicrobial activity testing. The results indicate that secondary metabolites like alkaloids, glycosides, flovonoids, tannins, and phlobatannis were present in the fresh samples as well as the cultured callus but the concentration of alkaloids and glycosides were higher in the callus. Both showed antimicrobial activity. By this study we conclude that increased production of secondary metabolites can be obtained by tissue culture technique.

Keywords: Jatropha, scondary metabolites, antimicrobial activity

INTRODUCTION

Jatropha is a large genus comprising over 170 species. Commonly occouring species in India are *J. curcus, J. giandulifera, J. gossypifolia, J. multifida, J. nana, J podagrica* etc. *J curcas* is mainly grown for bio-diesel because of higher oil content (upto 48%). It is a shrub or small tree with smooth grey bark which exudes whitish colored watery latex when cut. The presence of phytochemicals in the plants of Jatropha has been well established. The leaf, fruits, latex and bark contain glycosides, tannins, phytosterols, flvonoids and steroidal sapogenins that exhibit wide range of medicinal properties. Khafagy et.al. (1977) have done phytochemical screening from the leaves of Jatropha *curcas* and isolated two new flavonoidal glycosides. Soomro (2002) have studied the phytochemical properties, medicinal uses and economic value of J. *curcas*. Apart from medicinal properties this plant has been shown to possess insecticidal as well as microbial properties (Adebowale and Sdedire, 2006, Adamu & Suleiman 2006, Kisangu et al 2007, Acharya et al (2009). Analgesic & anti-inflammatory effects of menthol extracts of J. *curcas* have also been studied. Igbinosa et. al., have studied the antimicrobial activity and phytochemical parameters in the stem bark extracts of *J curcas.*

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Commercial exploration by the method of plant tissue culture for antimicrobial activity, biopharmaceuticals and bio-energy production are some of the prospective future potential of this plant. It is used as an important tool in both basic and applied studies. *In vitro* culture of plant cells or tissues has many applications in crop improvement, preservation and breeding in industries. Reports are there where many scientists have successfully done *in vitro* culture of *J. curcas* Kisangan *et al.,* (2007), Kalimathu *et. al.,* 2007), Deore and Johnson (2007), Yang *et al.,* (2009). But the question arises, whether the concentration of these secondary metabolites and antimicrobial activity is same in the fresh sample as well as tissue cultured callus? There are no reports regarding comparative studies between them . Therefore, to find out the answer to this question present study was planned.

MATERIAL AND METHODS

Present study was planned to test the above objective. For this the petioles of fresh leaves of J. c*urcas* were cultured in the normal tissue culture MS media using standard tissue culture techniques.

Extraction for phytochemical screening

For the extraction purpose soxhlet apparatus was used. Alcoholic extraction was used for the phytochemical screening. The alcoholic extraction procedure was carried out for three days for both the field plant and the callus simultaneously. The solvent thus recovered was used for further analysis.

Antimicrobial activity test

A comparative study of antimicrobial activity was done by performing the antimicrobial test with the alcoholic extracts obtained from petioles of *Jatropha curcas and* callus grown from it.
Antimicrobial activity tests were done by

A. Agar well diffusion methods by (Holder and Boyce, 1994)

B. Agar disc diffusion method (Biedenbach et al., 1993)

Phytochemical screening

For phytochemical analysis following tests were performed.

For Alkaloids

Mayer's Test, Wagner's test, Murexide test for purine alkaloid test were performed.

For Glycoside

General test A & B were performed

For cardiac glycosides

Deoxysugars test (Killer Killiani test) was performed

For Anthraquinone glycoside

Borntrager's test was performed

For saponin glycosides

Foam test and Heamolytic test were done. General test for Tanins, phenols, flavonoids and phlobatanins were done. Standard methods used for all the phytochemical screening tests were taken from the Khandelwal (2008) and Kokate (2008)

Optical density

Optical density were taken for the concentration of Phytochemicals present, by Digital Photo colorimeter at 540nm. A comparative study was done in between the results obtained for petioles of wild plant and callus.

RESULTS

- Results of phytochemical screening show the presence of alkaloids, glycosides, tannins and phenols, flavonoids and phlobatannins in fresh as well as in callus extracts.
- Higher values in the optical densities in the callus sample were observed. (table -1)
- Both the samples showed antimicrobial activity (fig.-1)

Table 1. Optical densities of the extracts obtained from the J. *curcas*

Sl. No	Phytochemical	OD (Petiole extract)	OD(Callus extract)
1	Alkaloids(mayer's test)	+ve , 0.15	+ve , 0.18
2	Alkaloids (wagner's test)	+ve , 0.33	+ve , 0.49
	Glycoside A	+ve , 1.05	+ve , 1.21
4	Glycoside B	+ve , 0.78	+ve , 1.58
5	Tannins	+ve , 0.34	+ve , 0.56
6	Flavonoids	+ve , 0.28	+ve , 0.38
7	Phlobatannins	+ve , -	+ve ,-

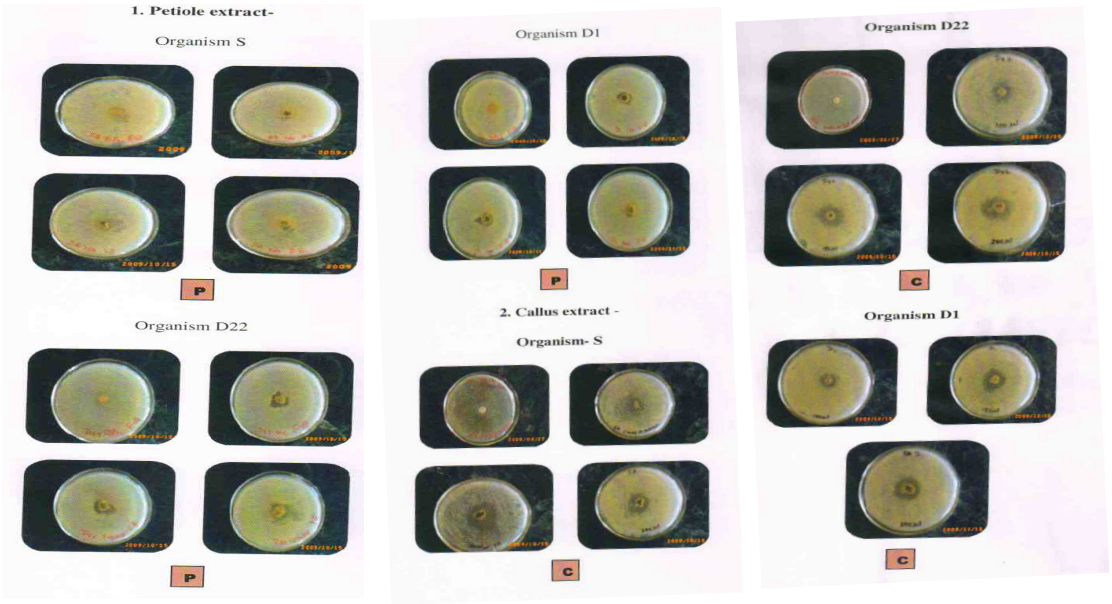

Fig 1. Showing the antimicrobial activity

DISCUSSION AND CONCLUSION

The presence of useful phytochemicals in the samples of J. *curcas* has proved it to be very important plant both economically as well as medicinally. The alkaloids present in J. *curcas* have led to the development of powerful pain killer (Kam and Liew 2002). These alkaloids have been used for the treatment of cancer.

The second important phytochemical obtained was glycosides which have been long used as cardio tonic, also in nephrological diseases. They have also been shown to be useful in managing infections.

Tannins found in the plant are useful in the treatment of inflamed or ulcerated tissues . They have also been used for treating intestinal disorders such as diarrhea and dysentery (Dharmananda 2003).

Phenolic compounds found in J. *curcas* are found to reduce the risk of heart disease, certain types of cancer and decrease cholesterol level.

Flavonoids extracted have shown to exhibit wide range of biological activities like antimicrobial, anti-inflammatory, anti allergic, anti analgesic cytostatic, and anti oxidant properties.

Higher values in the optical densities in the callus sample were indicative of higher conc. of sec. metabolite. Both the samples showed antimicrobial activities.

Thus we conclude that by using tissue culture techniques faster and bulk production of secondary metabolites can be obtained without harming the species. But further studies are required to elucidate the exact amount of changes in the concentration of secondary metabolites in tissue cultured plant as compared to wild plant.

REFERENCES

[1] Acharya, K. 2009. Energy-India: Biofuelling Confusion. *IPS.* Retrieved from http://www.ipsnews.net/news.asp?Idnews=45949

[2] Adamu, S.U.; Kela, S.L.; Suleiman, M.M. 2006. Antischistosomal properties of extracts of *Jatropha curcas* (L) on *Schistosoma mansoni* infection in mice. *Afr. J. Trad. Comp. Altern. Med*. 3:37–41.

[3] Adebowale, K.O., Adedire, C.O. 2006. Chemical composition and insecticidal properties of ;underutilized *Jatropha* curcas seed oil. *Afr. J. Biotechnol*. 5:901–906.

[4] Biedenbach, D.J.; Jones, R.N.; Erwin, M.E. 1993. Interpretive Accuracy of the Disk Diffusion Method for Testing Newer Orally Administered Cephalosporins against Morganella morganii J Clinic. Microbiol. 31(10) 2828-2830

[5] Dharmananda, S. 2003.Gallnuts and the Uses of Tannins in Chinese Medicine http: //www. itmonline. org/ arts/ gallnuts. htm

[6] Holder, I.A.; Boyce, S.T. 1994. Agar well diffusion assay testing of bacterial susceptibility to various antimicrobials in concentrations non-toxic for human cells in culture Burns 20(5) 426-429

[7] Igbinosa, O.O.; Igbinosa, E.O.; Aiyegoro, O.A. 2009. Antimicrobial activity and phytochemical screening of stem bark extracts from Jatropha curccas (Linn). *African J. Pharmacy Pharmacol*., 3: 58–62

[8] Kalimuthu, K.; Paulsamy, S.; Senthilkumar, R.; Sathya, M. 2007. In vitro Propagation of the Biodiesel Plant Jatropha curcas L. *Plant Tissue Cult. & Biotech.* **17**(2): 137-14

[9] Kam, P.C.A.; Liew, S. 2002. Traditional Chinese herbal medicine and anaesthesia. *Anaesthesia* 57(11): 1083-1089.

[10] Khafagy. S.M.; Mohamed, Y.A.; Abdel Salam, N.A.; Mahmoud, Z.F. 1977. Phytochemical study of *Jatropha curcas*. *Planta Med.* 31(3): 274-277

[11] Khandelwal, K.R. 2008. Practical Pharmacognosy, , Nirali Prakashan 19th ed.

[12] Kisangau, D.P.; Lyaruu, H.V.M.; Hosea, K.M.; Joseph, C.C. 2007. Use of traditional medicines in the management of HIV/AIDS opportunistic infections in Tanzania: A case in the Bukoba rural district. *J. Ethnobiol. Ethnomed*. 3:29

[13] Kokate, C.K.; Purohit, A.P.; Gokhale, S.B. 2008. Pharmacognosy, Nirali Prakashan 41st ed.

[14] Li, H.; Wang, Z.; Liu, Y. 2003. Review in the studies on tannins activity of cancer prevention and anticancer. *Zhong-Yao-Cai,* 26(6): 444-448

[15] Soomro, R.; Qureshi, R.A.; Ayaz, M. 2002. Studies on Phytochemical properties, medicinal uses and economic value of Jatropha curcas Linn. *Hamdard medicus* 45(4) 35-40

[16] Yang He, Xiulian Guo, Ran Lu, Bei Niu, Vijaya Pasapula, Pei Hou, Feng Cai, Ying Xu and Fang Chen.2009. Changes in morphology and biochemical indices in browning callus derived from J. curcas hypocotyles, *Plant cell, tissue and organ culture* 98 (1).