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Physicochemical properties and phytochemical constituents of *Semecarpus anacardium* L. seed oil

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ABSTRACT

The present study investigated the physicochemical properties and phytochemical constituents of seed oil of Semecarpus anacardium L. to understand its biopesticidal and therapeutic potential. Preliminary phytochemical studies showed the presence of polyphenolic compounds, flavonoids, tannins, saponins, steroids in seed oil which is extracted using various organic solvents such as n-hexane, petroleum ether, methanol and acetone. 34 to 44 percent of oil was extracted using the said solvents. Physicochemical properties such as saponification value, iodine value, peroxide value, acid value, viscosity, pH, relative density of seed oil of S. anacardium were determined. The results suggest that the seed oils of S. anacardium and their physicochemical properties and phytochemical constituents are found suitable to develop biopesticide formulation for the management of insect pests and fungi. Hence the seed oil of S. anacardium could be considered as an effective biopesticide.

Key words: Phytochemical constituents, physicochemical properties, biopesticides, seed oil

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INTRODUCTION

Plant derived medicines have been the part of traditional health care in most parts of the world for thousands of year. More than 80 percent of the population in developing countries depends on plants for their medical needs. In India, medical plants are widely used by all kinds of people either directly as folk remedies or in different indigenous medicinal plants and their therapeutic values. *Semecarpus anacardium* (SA) is a deciduous tree belonging to Anacardiaceae family and is growing in tropical and temperate regions of south East Asian countries. Its seed, commonly known as 'marking nut' is largely used in Indian traditional medicine 'Ayurveda' for the treatment of rheumatoid arthritis, gout and other inflammatory diseases, tumours, asthma, epilepsy, psoriasis and leprosy[1]. The fruit of this plant is traditionally used as a folk remedy in certain regions of India for the treatment of piles in non - bleeding conditions. In Ayurvedic, Unani and Siddha system of medicine, it is called as Bhallataka, Bhilavaa, and Sorankottai respectively. The parts generally used are detoxified nut and oil [2]. The nut of semecarpus shell contains semecarpuflavone, tetrahydrorobustaflavone, jeediflavone, gulluflavone and biflavonoids. Oil from nuts contains bhilavinol and the leaves contain amentoflavone as a sole biflavonoid [3]. Reported constituent of SA seeds are, anacardoside, in fruits are nicotinic acid, thiamine, leucine, riboflavin, histidine, isoleucine, lysine, methionene, pheynylanine, arginine, threonine, tryptophan, valine, in nuts are tetrahydroamentoflavone, 3,8-biliquiritigeninnn, nallaflavanone, oil are anacardiac acid, cardol and catechol biflanoids A, B, C, 3, 8- binaringenin [4-6]. The nut of the plant proved to have protective effect in aflatoxinB1 mediated hepatocellular carcinoma through induction of in vivo antioxidant defense system [7]. The fruits are carminative, astringent, acrid, bitter, emollient digestive, anathematic, purgative, liver tonic, expectorant, alternate aphrodisiac, anti arthritic, depurative. SA nuts are used in the Ayurveda and Siddha systems of medicine, with various therapeutic properties such as anti-

atherogenic effect [8], anti-inflammatory [9], anti-oxidant [10], anti-microbial [11], CNS [12], hypoglycemic [13], anticarcinogenic [14], hyperlipidemic activity [15]. Therefore the present study aimed to investigate the physicochemical properties and phytochemical constituents of seed oil of *S. anacardium* to understand its bioprospecting potentials in terms of biopesticides and phytoceuticals.

MATERIALS AND METHODS

Survey and collection of sample

Seeds of *S. anacardium* were collected from the villages in the hillocks of Western Ghats such as Chavadi, Sholyur, Nellipathy, Gollikadavu, Semamoor, Kolikundum, Kadampara, Kavadikal, Maelathavalam, Thottapara, Thavalam and Mukkali in Tamilnadu and Kerala states.

Methods

Qualitative phytochemical screening of *S. anacardium* seed oil was carried out on the n-hexane extract, petroleum ether extract, methanol extract, acetone extract by using standard procedures [16-21].

Extraction of *S. anacardium* seed oil

The seed oil extraction was carried out with Soxhlet apparatus, various polar and Non-polar solvents such as acetone, methanol, petroleum ether, n-hexane were used to extract the desired materials from *S.ancardium* seed.

Quantitative phytochemical analysis of *S. anacardium* seed oil

Quantitative Phytochemical analysis such as Total phenols, flavonoids, saponins and tannins were analyzed by using the methods which are already reported [22-24].

Physicochemical properties of *S. anacardium* seed oil

Physicochemical properties such as acid value, saponification value, peroxide value, Iodine value, pH, viscosity, relative density were carried out by the standard techniques [25-28].

RESULTS AND DISCUSSION

Seed oil of *S. anacardium* was extracted using various organic solvents such as n-hexane, petroleum ether, methanol and acetone. Physicochemical properties viz., saponification value, iodine value, peroxide value and acid value were studied and the results were tabulated in Table 1. Acid and iodine values were found to be higher in methanol extract. However there is no significant different in viscosity of oil. Acetone extract is considered as more acidic than other extracts. n-hexane and petroleum ether extracts has high saponification value 486.4mgKOH/g, 499.824mg KOH/g respectively compare to methanol and acetone extracts.

Table.1 Physicochemical properties of *Semecarpus anacardium* seed oil

S.No	Physico chemical properties	n-Hexane extract	Petroleum ether extract	Methanol extract	Acetone extract
1.	Saponification value (mg KOH/g)	486.4	499.83	195.74	104.08
2.	Peroxide value(meqO_2/kg)	13.00	11.45	11.42	13.38
3.	Acid value(mg KOH/g)	336.6	140.25	420.25	252.45
4.	Iodine value (mgI_2/g)	356.51	268.15	647.16	572.69
5.	pH	2.3	3.9	3.1	1.6
6.	Viscosity (cP)	280.8	299.7	290	296.7
7.	Relative density(g/ml)	0.8627	0.8221	0.8476	0.9255

Phytochemical screening of seed oil of *S.anacardium* was studied and tabulated in Table 2. It is found that high content of phenols in seed oil ranging from 115mg/g to 162.56mg/g. Among the four solvent extracts used, acetone extract is found to have high phenols (162.56mg/g), saponins (109.09mg/g) and tannins (42.25mg/g). Flavonoid content was also found to be high in seed oil (56.63 to 83.85 mg/g). Methanol extract has more flavonoids content (83.85mg/g) compare to other extracts. Phenols are the class of Chemical compound consisting of hydroxyl group (-OH) attached to an aromatic hydrogen group, within the phenolics the flavonoids are known to possess insecticidal properties. A mitochondrial poison, "Rotenone" from *Derris eliptica* is the most recognized example of the toxic flavonoids [29, 30].

Table. 2. Phytochemical constituents present in *Semecarpus anacardium* seed oil

S.No	Phytochemical constituents	n-Hexane extract	Petroleum ether extract	Methanol extract	Acetone extract
1.	Total phenols (mg/g)	115	153.24	157.7	162.56
2.	Flavonoids (mg/g)	56.63	64.86	83.85	82.62
3.	Saponins (mg/g)	32.24	30.99	133	109.09
4.	Tannins (mg/g)	21.5	16.44	17.50	42.25

Tannins and saponins are play an important role in management of pest and diseases and it could be used in insect pests and disease management. Among the other extracts methanol and acetone extracts gave high amount of the major bioactive components. Hence, methanol and acetone are found to be more suitable solvents in extraction of seed oil of *S. anacardium* as well as for the development of biopesticidal preformulation.

CONCLUSION

This study provides information on physicochemical properties and phytochemical constituents of seed oil of *S. anacardium*. *S. anacardium* seed oil has good physicochemical characters. The phytochemicals, especially polyphenolic compounds such as flavonoids, saponins, and tannins are present abundantly in the seed oil of *S. anacardium*. The seed oil of *S. anacardium* has number of bioactive compounds useful to control insect pests and diseases of agricultural and forestry importance.

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REFERENCES

[1] C.P. Khare; Encyclopedia of Indian medicinal plants (NewYork: Springes-Verlag Berlin Heidelberg, **2004**)
[2] C.P. Khare; Indian Medicinal Plants Illustrated Dictionary. (New York: Springer Science Business Media LLC, **2007**) 597.
[3] R.R. Gil, L.Lin, G.A Cordell, M. Kumar, *Phytochemistry*, **1995**, 39, 405-407.
[4] S.S.N. Murthy, *Phytochemistry*, **1983**, 22, 6, 1518- 1520.
[5] S.S.N. Murthy, *Phytochemistry* **1984**, 23 ,4, 925-927.
[6] S.S.N. Murthy, *Phytochemistry*, **1988**, 27 , 9, 3020-3022.
[7] B. Premalatha, P. Sachdanandam, *J. Ethnopharmacol*, **1999**, 66, 131–1399.
[8] A. Sharma, R. Mathur, V.P. Dixit, Dhaka Univ. *J Pharma Sci* **2008**, 7, 47-52.
[9] M.J. Bhitre, S. Patil, M. Katarial, S. Anwikar, H. Kadri, *Asian J chem*. **2008**, 20, 47-52.
[10] A.K. Sahoo, N. Narayanana, S. Sharma, S.S .Rajanb, P.K .Mukherjee, *Pharmacology online* **2008**, 3, 27-35.
[11] T.K. Mohanta, J.K Patra, S.K. Rath, D.K Pal, H.N. Thatoi, *Sci Res Essay* **2007**, 2, 28-69.
[12] S.M Farooq, T.R. Alla, K. Prasad, K. Shalam, Satyanarayna, *Pharmco.online* **2007**, 149-163
[13] B. Arul, R. Kothari, A.J. Christine, *Clin pharmcol*. **2004**, 7, 59-62.
[14] K. Veena, P. Shanthi, P. Sachdanandam, *Chem. Biol. Interact*. **2006**, 169, 69-78.
[15] S.K. Kaladevi, B.H.K. Haseema, G. Keerthiga, P. Shanthi, P. Sachdanadam, *Chin.J. inte. Med* **2012,** 3, 2321-2575.
[16] A. Sofowara, Medicinal plants and tropical medicine in Africa. **1993**, 289.
[17] W.C. Evans, Trease , (15thEd.), Pharmacognosy (WB Saunders and Company, London **2002**)
[18] A. J. Harborne, Phytochemical methods a guide to modern techniques of plant analysis. Springer Science & Business Media, **1998**.
[19] O.I. Oloyed, *Pak. J. Nutr*, **2005**, 4, 379-381.
[20] Chang, *Journal of food and drug analysis* **2002**, 10, 3.
[21] Ercisli, Sezai; *Food Chemistry*, **2007,** 104.4, 1379-1384.
[22] Abd EIslam, M. Naser, Riaz Ullah, and Muhammad Waseem. *Life Science Journal* , **2013**.
[23] S.A. Baba, A. H. Malik, Z. A. Wani, T. Mohiuddin, Z. Shah, , N. Abbas, , & N. Ashraf, *South African Journal of Botany*, **2015**, 99, 80-87.
[24]N. Devanaboyina, N. Rama Lakshmi, B. Satyanarayana, P. Sudeepthi, K. Hemachakradhar, N. Pavankumar Raju, *IJSIT*. **2013**, 2, 31-9.
[25] E. B. Robert, *Agro J* **1971,** 63 511.

[26] H.E. Cox and D. Pearson, The Chemical Analysis of Foods Chemical Publishing Co. Inc New York **1962**,p 420.
[27] H.E. Cox and D. Pearson, The Chemical Analysis of Foods Chemical Publishing Co. Inc New York, **1962** p 421.
[28] William Horozitz (ed) Official Methods of Analysis of AOAC (Association of Official Analytical Chemists, Washington, **1975**) 488.
[29] I.B. Isman, *Annu. Rev. Entomol*., **2006**, 51, 45-66.
[30] P.E. Kaufman, R.S Mann, J.F. Butler, *Sci*, **2010**, 66, 497-504.