International Journal of New Technology and Research (IJNTR)
ISSN:2454-4116, Volume-2, Issue-10, October 2016 Pages 59-62

Review Study on Pharmacological Importance of Simarouba Glauca

Jibi Antony, Anupriya Thomas, Dr. D. Gnanasekaran, Hannah Elizabeth. S

Abstract— **Simarouba glauca is a species of flowering tree that is native to Florida in the United States, southern Florida, South America, and the Lesser Antilles. Common names include paradise-tree, dysentery-bark, and bitter wood. Its seeds produce edible oil. Different parts of the tree are used to treat various diseases. The plant has been reported to contain many important phyto constituents which have significant pharmacological importance. The aim of this paper is to highlight the Pharmacological importance of different parts of the plant simaruba glauca and it may give a good platform for future researcher to carry out the various research activities on simarouba glauca plant.**

Index Terms— **Simarouba Glauca , Pharmacological Importance, Paradise Tree .**

I. INTRODUCTION

Although in the recent past western medicines rejected the plants as an acceptable source of medicines in favor of those synthesized in laboratories, yet one in four prescription drugs contain ingredients derived from plants. Western medicine however treats a very small portion of the people on earth. Eighty percent of world population relies entirely on local medicines made almost exclusively from plants. It is estimated that between 35,000 and 70,000 different species of plants have been used by various people of the world. Indeed, well into the 20th century much of the Pharmacopoeia of scientific medicine was derived from the herbal lore of native peoples. Many drugs commonly used today are of herbal origin.

In developing world, the trend and utility of natural product of medicinal substances is increased in last decade over synthetic medicine, because of toxic effects. WHO currently recommended and encourages traditional herbal remedies in National Health Care programs because herbal drug easily available at low cost and comparatively safe.1

Jibi Antony, ,PG Scholar, Dept. of Pharmacology, Bharathi College of Pharmacy, Bharathinagara, Mandya, Karnataka, India

Anupriya Thomas, PG Scholar, Dept. of Pharmacology, Bharathi College of Pharmacy, Bharathinagara, Mandya, Karnataka, India.

Dr. D. Gnanasekaran Professor and HOD,Dept. of Pharmacology, Bharathi College of Pharmacy, Bharathinagara, Mandya, Karnataka, India

Hannah Elizabeth. S, Assistant Professor,Dept.of Zoology,Auxillium College,Vellore,Tamil nadu, India.

II. PLANT PROFILE

.

PLANT PROFILE

Common name	:	Paradise, Aceituno and Bitter wood tree
Malayalam	:	Lakshmi tharu
Tamil	:	ShorgumMaram
Hindi	:	Luxmitaru
Scientific Classification		
Kingdom	:	Plantae
Order	:	Sapindales
Family	:	Simaroubaceae
Genus	:	Simarouba
Species	:	S. Glauca

III. REVIEW OF LITERATURE

K.Santhanalakshmi et al., reported for the leaves of Simarouba glauca for their antibacterial, antioxidant, hemolytic, thrombolytic activities. Three extracts (chloroform, methanol, ethyl acetate) of Simarouba glauca were screened for activity against five pathogenic microorganisms by well diffusion method. In vitro anti oxidant activity of extract was studied using H2O2 radical scavenging assay. The hemolytic activity was determined using diffusion techniques on blood agar plate, thrombolytic activity by clot disruption and phytochemical potential by qualitative analysis. The present study revealed that the Simarouba glauca leaf poses good antimicrobial and antioxidant, hemolytic and thrombolytic activities.2

B.L. Jangale et al., reported the crude ethanol and methanol extracts from dried and fresh leaves of Simarouba glauca were tested for their inhibitory activity against two food borne pathogenic microorganisms (Staphylococcus aeureus and Escheria coli) and two food spoilage microorganism (Bacillus Subtilies and Pseudomonas aeurogenosa) screening for antimicrobial activity using well diffusion assay showed the inhibition against entire tested microorganisms. This study showed that crude ethanol and methanol extracts from medicinal plants could inhibit certain food born spoilage and pathogenic microorganism. Extract from fresh and dried leaves of Simarouba glauca inhibited all test microorganism with minimum inhibitory microorganism ranging from 160 to 10240 ppm. Result revealed extract from the leaves of Simarouba glauca could prove useful in antimicrobial food packaging.3

Rajurkar B.M et al., reported the ethanol extracts of leaves of Clerodendrum infortunatum Linn, Simarouba glauca and Psoraleacory lifolia possess antimicrobial activity. All ethanolic extracts exhibited significant anti-microbial activity comparable to the standard drug tetracycline. Ethanolic extract of Clerodendrum infortunatum shows inhibitorier zone as compared to ethanolic extracts Simarouba glauca and Psoraleacorylifolia. They concluded that some of the components from the mixture of all three extracts exhibit the synergistic action. The isolation of the active component from these extracts that exhibit synergistic action against bacteria.4

Khaling Mikawlrawng et al., reported as the methanolic and ethanolic extracts of both fresh and dried leaves of Simarouba glauca were tested for their inhibitory activity against pathogenic fungi. Screening of the crude extracts for the antifungal activity using well diffusion assay showed strong inhibition against the tested fungus. Ethanolic extracts of both the fresh and dried leaves were found to be more effective as compared to methanolic extracts against the growth of the fungi. That study also showed that the leaf extracts of Simarouba glauca is more effective against Aspergillusparasitic us as compared to Fusariumoxysporum. The antifungal assay showed that Simarouba glauca has antifungal property against the tested fungi Fusariumoxysporum and Aspergillusparasiticus.5

T.G Umesh et al., reported as the methanol, ethanol and water extracts of *Simarouba glauca* leaves were examined for total phenolics, flavonoid and tannin content. Its antioxidant properties using FRAP, Phosphomolybdenum, Ferric ferrozine assays and free radical scavenging using DPPH were determined. Further, the reducing power and iron chelating effect of the extract using spectrophotometric assays were estimated. Finally, the cytotoxic activity against few human cancer cell lines were also examined using MTT assay. The phytochemical investigations revealed that *a Simarouba glauca leaf has* only 0.14 to 0.18% of flavonoids, 250-400 µg/mg phenolics and 67-200 µg/mg tannin content in various solvent extracts. The extracts exhibited good reducing power with similar EC50 values approximately in the range of 57-61 µg/ml. Further, the leaf extracts showed iron chelation effect which was more pronounced in aqueous extract with IC50 value of 332µg/ml and exhibited very strong DPPH radical scavenging activity with IC50 values ranging from 9-13 µg/ml in various extracts. The methanolic extracts showed good antioxidant potential using FRAP and phopshomolybdenum methods. The methanolic extract showed strong cytotoxic effect on SCC9 cancer cell line and less potent on HCT116 cancer cells.6

R.C Baratakkar et al., developed male specific DNA based marker in Simarouba glauca. A total of 50 random decamer primers were used for screening of specific Random Amplified Polymorphic DNA (RAPD) markers in male and female populations. Pair of Sequence Characterized Amplified Region (SCAR) primers designed based on RAPD sequence, amplified a single 1110 base pairs DNA band only in male populations. These SCAR primers may be efficiently used as effective, convenient and reliable molecular markers for sex identification in Simaroubaglauca at pre-flowering stages. This would pave the way to screen male and female seedlings for the mass cultivation which in turn save time and economic resources.7

Ayme Fernandez et al., reported in the present study, an extensive in vitro antimicrobial profiling was performed for three medicinal plants grown in Cuba, namely Simarouba glauca, Melaleucaleucadendron and Artemisia absinthium. Ethanol extracts were tested for their antiprotozoal potential against Trypanosoma b. brucei, Trypanosomacruzi, Leishmaniainfantum and Plasmodium falciparum. Antifungal activities were evaluated against Microsporumcanis and Candida albicans whereas Escherichia coli and Staphylococcus aureus were used as test organisms for antibacterial activity. Cytotoxicity was assessed against human MRC-5 cells. Only M. leucadendron extract showed selective activity against microorganisms tested. Although Simarouba glauca exhibited strong activity against all protozoa.8

Shankara Sharma et al., reported as the acute oral toxicity and anti ulcer profile of the chloroform extract of Simarouba glauca extract in albino rats. CSG at the doses of 200 and 400 mg/kg body weight orally was administered to evaluate antiulcer activity by using Ethanol and Indomethacin induced gastric ulcer models in albino rats. Chloroform extract of Simarouba glauca dose dependent inhibition in ethanol induced gastric lesions, causing 82.63% protection at 400 mg/kg and 53.48% protection at 200 mg/kg. CSG dose dependent inhibition in indomethacin induced gastric lesions, causing 62.65% protection at 400 mg/kg and 54.86% protection at 200 mg/kg. All result are found to be statistically significant ($p<0.05$).Results are evaluated as the chloroform extract of the leaves of Simarouba glauca was able to decrease the acidity.9

Ashwani Kumar et al., reported as the Methanolic and Ethanolic extracts of the leaves of Simarouba glauca contain phytochemicals like alkaloids, phenols, flavonoids, tannin, lignin, steroids, glycosides, saponins, terpenoides and anthraquinone with their biochemical tests and their conformation was done with the help of Thin Layer Chromatography (TLC).10

Mali V.V et al, reported as the effect of fluoride concentration (5ppm, 10ppm, 25ppm, 50ppm and 100ppm) on the photosynthetic pigments (chlorophylls and carotenoid

content) .It was noticed that the total chlorophylls and carotenoids were increased in response to fluoride stress. It indicate that the Simarouba glauca plant tolerate the fluoride stress by improving photosynthetic efficiency.11

SnehaKochath Santhosh et al., reported as crude petroleum ether and ethyl acetate extracts from dried leaves of Simarouba glauca were tested for the antibacterial and antioxidant activity. Antibacterial activity was studied using disc diffusion assay against the organisms like Staphylococcus, Salmonella, Bacillus, Klebsiella, Pseudomonas sp and Escherichia coli. Antioxidant activity was evaluated using total antioxidant assay, Hydroxyl radical scavenging assay and 2, 2, - diphenyl- 1- picrylhydrazyl (DPPH) scavenging activity. Both extracts showed significant antioxidant activity in a dose dependent manner. However, ethyl acetate extract was found to be more effective as compared to petroleum ether extract.12

Rajamane et al., reported as study impact of salinity stress in the Simarouba glauca, 5-month-old seedlings were grown with increasing NaCl concentrations (ECe 4,8,12 and16). The antioxidant capability of the plants was determined by measuring non-enzymatic antioxidant activities such as total polyphenols, total flavonoids, anthocyanins and malondialdehyde content was measured. Data indicate that in Simarouba glauca responded to salt-induced oxidative stress by increasing non-enzymatic antioxidant defenses proportionally to the increasing of the stress imposed, and that in all treatments the total polyphenols, total flavonoids, anthocyanins and malondialdehyde content increases.13

Patil M.S et al., reported as germination was conducted in plastic trays with a mixture of soil, and farm yard manure in a ratio of 1:1. Results reveal that pre-sowing treatments influences the germination rates of seeds and the germination percentage was significantly increased as compared to control. The highest germination rate was found in boiled water treatments followed by tap water treatments .Further the days required for germination was reduced from 32 days to 20 days in all treatments. Thus, it reveals that the problem of seed dormancy of Simarouba glauca might be overcome due to these pre treatments.14

Ashwani Kumar et al., reported as the Methanolic and Ethanolic extracts of the leaves of Simarouba glauca were prepared with the help of simple extraction and by soxhlet extraction. The extracts were used to detect the presence of different phytochemicals like alkaloids, phenols, flavonoids, tannin, lignin, steroids, glycosides, saponins, terpenoides and anthraquinone with their biochemical tests and their conformation was done with the help of Thin Layer Chromatography (TLC). It was seen that the methanolic extracts yielded higher amount of phytochemicals in comparison to ethanolic extracts of Simarouba glauca.15

Shastri P et al., reported as, highest regeneration frequency (90%) and shoot number (7.00 ± 1.00 shoots per explants) were obtained in nodal explants in Murashige and Skoog's(MS) medium supplemented with 6-benzylaminopurine (BAP) 4.43 µM and α-naphthalene acetic acid (NAA)5.36 µM. Induced shoot buds were multiplied and elongated on the MS medium supplemented with BAP (4.44µM), NAA (5.36 µM) and TDZ(Thidiazuron) 2.27 µM with 9.66±0.33 (mean length 5.35±0.32 cm) and 9.00±0.57 (mean length 4.51±0.15cm) shoots using nodal segments and shoot tip explants, respectively. Half strength woody plant medium (WPM) containing 2.46µM indole-3-butyric acid (IBA) produced the maximum number of roots (6.00±1.15). The rooted plantlets were hardened on MS basal liquid medium and subsequently in poly cups containing sterile soil and vermiculite (1:1) and successfully established in pots.16

Mishra S.R et al, reported as trans esterification of Simarouba glauca oil by means of methanol in presence of Potassium hydroxide catalyst at less than 650C.The viscosity of biodiesel is nearer to that of the diesel. The biodiesel is characterized by TLC and the important properties of biodiesel such as density, flash point, cloud point, pour point, carbon residue and ash content are found out and compared with that of diesel. The studies encourage the production of biodiesel from unrefined Simarouba glauca oil as viable alternative to the diesel fuel.17

Sharun mendonca et al, reported as, influence of injection timing of 20% blend Simarouba biodiesel on performance and combustion characteristics. The effect of varying injection timing was evaluated in terms of thermal efficiency, specific fuel consumption, and heat release rate and peak cylinder pressure. By retarding injection timing brake thermal efficiency can be improved of S20.18

IV. CONCLUSION

The investigation and research on medicinal plants might bring to the scientific world many useful remedies for the treatment and cure of human sufferings. The bark and leaf extract of Simarouba is well known for its different types of pharmacological properties such as haemostatic, antihelmenthic, antiparasitic, antidysentric, antipyretic and anticancerous. The bark is used to cure fever, malaria, stomach and bowel disorders, haemorrhages, ameobiasis as well as leaf, fruit pulp and seeds are possessing medicinal properties such as analgesic, antimicrobial, antiviral, astringent emmenagogue, stomachic tonic and vermifuse. The crushed seeds are used as antigo against snake bites. The crude drug contents and active principles such as glaucarubin, quassinoids, ailanthinone, benzoquinone, holacanthone, melianone, simaroubidin, simarolide, simarubin, simarubolide , sistosterol. It can be concluded that further studies on these plants may helpful for future researchers to develop some new pharmacophores.

REFERENCES

[1] Wealth of India, NISCOM, CSIR publications, I, 1985; 439-40.
[2] K. Santhana Lakshmi, D. Sangeetha, S.Sivamani, M.Tamilarasan, T.P Rajesh, B.Anandraj. In vitro, Antibacterial, Antioxidant, Hemolytic, Thrombolytic activities and phytochemical analysis of Simarouba glauca. International Journal of Pharmaceutical Sciences and Research. 2014;5(2):432-437.
[3] B.L, Jangale, T.B.Vogale, P.S Aher, N.R Toke, A.N Shirangikar and N.T Sanap. Anti bacterial activity of Simarouba glauca against food born spoilage and pathogenic organism. International Journal of Pharmaceutical Sciences and Research. 2012; 28: 497-500.
[4] Rajurkar B.M, comparative study on antimicrobial activity of Clerodendrum infotunatum, Simarouba glauca and Psoralea Coryfolia. International Journal of Research and Review in Pharmacy and applied science. 2011; 1(4):278-282.

[5] Khaling Mikawlrang, Sandsseep Kaushik, Anand Kumar Pushkar, Suresh Kumar, Gurumayum Suraj Sharma. Compartivein vitro antifungal activities of Simarouba glauca against Fusarium oxysporum and Aspergillus Parasiticies. Journal of medicinal plants studies.2014; 2 :(3):1-7.
[6] T.G Umesh , in vitro anti oxidant potential, free radical scavenging and cytotoxic activity of Simarouba glauca leaves. International Journal of pharmacy and pharmaceutical sciences.2015; 7(2):411-416.
[7] R.C Baratakke, C.G, Patil, Deveolpment of male specific DNA based marker in simarouba glauca. International Journal of plant. Animal and environmental science. 2014; 4(2):27-34.
[8] Ayme Fernandez- calienesvalides- Judith mendiola Martinez, Ramon Scull Lizama, Marie kevermeersch, paul cos, louiesmaes, Invitro antimicrobial activity of the Cuban medicinal plants Simarouba glauca , Melaleuca leucadendron L and Artemisia absinthium L. Memorias do Instituto Oswaldo Cruz. 2008; 103(6):615-618.
[9] Shankara Sharma, N.Sriram. Antiulcer activity of Simarouba glauca against ethanol and indomethacin induced ulcer in rats. International Journal of Research in Pharmacology and Pharmacotherapeutics.2014; 3(2):85-89.
[10] Ashwani Kumar, VishwaRawat, Amardeep and Vikas Kumar. Comparative Evaluation of Phytochemicals in Methanolic and Ethanolic Leaf Extracts of Anticancer Paradise Tree Simarouba glauca DC. International Journal of Current Microbiology and Applied Sciences. 2016;5(6): 679-686
[11] Mali V.V., Bhoite A.S. and Gaikwad, D.K. Influence of fluoride stress on photosynthetic pigments of medicinally important plant Simarouba glauca DC. Indian Journal of Advances in Plant Research. 2014; 1(6):1-4.
[12] SnehaKochath Santhosh, Aswathy Venugopal, Meera Chakrappully Radhakrishnan. Study on the phytochemical, antibacterial and antioxidant activities of Simarouba glauca. South Indian Journal Of Biological Sciences. 2016; 2(1): 119- 124
[13] Rajamane N.N and Gaikwad, D.K. Effect of sodium Chloride stress on polyphenol, flavonoid, anthocyanins contents and Lipid peroxidation of leaflets of Simarouba glauca. Indian Pharmacology and Pharmacy Research. 2014;1(2): 1-5
[14] Patil M.S. and Awate P.D. Effect of different pre-sowing treatments on seed germination of medicinal plant Simarouba glauca. Indian Journal of Advances In plant Research. 2014;1(1): 24-26
[15] Ashwani Kumar, Vishwa Rawat, Amardeep and Vikas Kumar. Comparative Evaluation of Phytochemicals in Methanolic and Ethanolic Leaf Extracts of Anticancer Paradise Tree Simarouba glauca DC. International Journal of Current Microbiology and Applied Sciences.2016;5(6) :679-686
[16] Shastri P. Shukla and G. Padmajain. In vitro regeneration from shoot tip and nodal explants of simarouba glauca dc. A promising biodiesel tree. International journal of applied biology and pharmaceutical technology. 2013;4(2): 206-2013
[17] Mishra S.R., Mohanty M.K., Das S.P. and Pattanaik A.K., Production of Bio-diesel (Methyl Ester) from Simarouba glauca Oil. Research Journal of Chemical Sciences,2012;2(5):66-71
[18] Sharun mendonca1, John Paul Vas, Ravikantha Prabhu, Rudolf C Dsouz. Influence of Injection Timing on Performance and Combustion Characteristics of Simarouba. Biodiesel Engine. International Journal of Innovative Research in Science. 2016;5(4) :4865-4872