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Research Article

UV Absorption Property of *Syzygium cumini* L. Leaves

Prasenjit Mitra[1], Pasanta Kumar Mitra[2]* and Tanaya Ghosh[2]

[1]*Department of Biochemistry, All India Institute of Medical Sciences (AIIMS), Jodhpur, India*

[2]*Department of Medical Biotechnology, Sikkim Manipal University, Sikkim Manipal Institute of Medical Sciences, Gangtok, Sikkim, India*

***Corresponding Author:** Prasanta Kumar Mitra, Professor and Head, Department of Medical Biotechnology, Sikkim Manipal University, Sikkim Manipal Institute of Medical Sciences, Gangtok, Sikkim, India.

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Abstract

Syzygium cumini Linn (*S. cumini* L.) is a medicinal plant of wide range of pharmacological activities. Aim of the present study is to examine effect of extraction solvents on UV absorbing property of the plant. Leaves of *S. cumini* L. were collected and identified by the taxonomist. Solvent extractions of the leaves were made separately by using methanol, ethanol, chloroform, acetone, benzene and ethyl acetate. The extractions were separately exposed for absorption of UV ray in a spectrophotometer using UV region. Result showed that all extracts of *S. cumini* L. leaves had UV absorption property but acetone extract had maximum activity. Acetone extract of *S. cumini* L. leaves may, therefore, be further studied for isolation of the active compound responsible for UV absorbing property.

Keywords: Syzygium cumini L. Leaves; Solvent Extractions; UV Absorbing Property

Introduction

In spite of the fact that solar UV-radiation is required for the cutaneous synthesis of vitamin D which covers almost 90% of the vitamin D-requirements of the human body, this radiation has adverse effects too. Solar UV-radiation is the most important environmental risk factor for development of non-melanoma skin cancer. Other detrimental effect of UV exposure is photosensitivity reactions to ingested drugs. Efforts are therefore made to invent sources through which solar/artificial UV rays can be absorbed. In this context work has been extended even in the field of medicinal plants [1,2].

Syzygium cumini L. (family, Myrtaceae) is a tropical fruit tree of great economic importance. It is a large evergreen tree up to 30m height and a girth of 3.6m with a bole up to 15m. The plant is native to Nepal, Pakistan, Bangladesh, India, and Indonesia. In India the plant is found almost everywhere. In English the plant is known as Jambul tree. In Hindi, Bengali, Punjabi, Tamil, Gujrati and Malayalam the plant is called as Jamuna, Jaam, Jammun, Naval, Gambu and Njaval respectively [3].

S. cumini L. is known to possess a wide range of medicinal properties. Leaf has anti-diabetic, anti-allergic, anti-viral, anti-bacterial and anti-DNA damage activities. Fruit is anti-hyper lipidemic, possessing anti-cancer property. Seeds exert anti-inflammatory and anti-gastric ulcer activity. Bark and pulp of the plant are efficacious for diabetes [4].

Phytochemical studies showed that stem bark of *S. cumini* L. contains n-nonacosane, sitosterol, betulinic acid, crategolic (maslinic) acid, acid oxalic, citric acid, betulinic acid, ß-sitosterol, glycolic acids, n-hentriacontane, n-octacosanol, n-triacontanol, ß-sitosterol-D-glucoside, quercetin, myricetin, astragalin kaempferol-3-o glucoside, friedelin, epi-friedelanol, eugenin and gallic acid. Leaves contain n-hepatcosane, kaempferol 3-0-ß-D-glucuronopyranoside, ellagitannin, nilocitin, myricetin 3-0-ß-D-glucaronopyranoside and amino acids like glycine, alanine etc. Oleanolic acid, erategolic acid (maslinic acid), quercetin, kaempferol and myricetin flavonoids -isoquercitrin were found in the flowers of *S. cumini* [5,6].

Anti-oxidant property of *S. cumini* L. leaf is known in literature. Using the 2,2-diphenyl-1-picrylhydrazyl (DPPH) free radical-scavenging and ferric-reducing antioxidant power (FRAP) assays Ruan., *et al.* showed that that water, ethyl acetate, chloroform, n-hexane and methanol extracts of *S. cumini* L. leaf have anti-oxidant activity [7]. By using the same methods Eshwarappa., *et al*. also showed antioxidant activity of *S. cumini* leaf gall extracts [8]. In the present study UV absorption property of various solvent extracts of *S. cumini* L. leaves was studied.

Materials and Methods

Plant material

S. cumini L. leaves were collected in morning hours (9 - 10 AM) from the medicinal plants garden of the University of North Ben-

gal, Siliguri (26041'30.9984" N, 88027'4.5756" E, elevation, 410 ft), Dist. Darjeeling, West Bengal, sometimes in the month of July, 2017. Leaves were authenticated by the taxonomist of the department of Botany of the University of North Bengal, Siliguri. A voucher specimen was kept in the department of Medical Biotechnology, Sikkim Manipal Institute of Medical Sciences of Sikkim Manipal University, Gangtok, Sikkim, India for future references.

Figure : *S. cumini* L. leaves.

Extraction of the plant leaves

Collected leaves of *S. cumini* L. were washed thoroughly. Leaves were then shade dried and powdered. 100g of this powder were extracted separately with 500 ml of methanol, ethanol, acetone, chloroform, benzene and ethyl acetate in a soxhlet apparatus at 37^0C for 15 minutes. Mixture was then filtered. Filtrate was made to dryness by using lyophilizer. Brown mass obtained. 10 mg of this mass was dissolved in 100 ml distilled water. The solution was processed in a spectrophotometer for UV ray absorption at the range of 200-400 nm.

Chemicals

Chemicals required for the study were purchased from Himedia Lab, Loba Chem. Lab, India and from Merck, Germany

Statistical Analysis

All experiments were repeated for three times. Data were analysed statistically by SPSS 20. The statistical significance between UV absorption spectra of different extracts was evaluated with Duncan's multiple range test (DMRT). 5% were considered to be statistically significant [9].

Results and Discussion

UV absorption spectra of methanol extract of *S. cumini* L. leaves is shown in figure 1. Methanol extract absorbs maximum UV ray at 200 nm (1.0). UV ray absorptions by the same extract at 250 nm, 300 nm, 350 nm and 400 nm were 0.4, 0.3, 0.1 and 0.05 respectively.

Figure 1: UV radiation absorption by the methanol extract of *S. cumini* L. leaves.

Figure 2 shows UV absorption spectra of ethanol extract of *S. cumini* L. leaves. At 200 nm wave length ethanol extract absorbs maximum UV rays 0.8. At 250 nm, 300 nm, 350 nm and 400 nm wave length ethanol extract of *S. cumini* L. leaves showed absorption 0.35, 0.2, 0.07 and 0.04 respectively.

Figure 2: UV radiation absorption by the ethanol extract of *S. cumini* L. leaves.

UV absorption spectra of chloroform extract of *S. cumini* L. leaves is shown in figure 3. Chloroform extract showed maximum UV absorption at 200 nm (0.5). UV ray absorptions by the same extract at 250 nm, 300 nm, 350 nm and 400 nm were 0.25, 0.18, 0.05 and 0.03 respectively.

Figure 3: UV radiation absorption by the chloroform extract of *S. cumini* L. leaves.

Figure 4 shows UV absorption spectra of acetone extract of *S. cumini* L. leaves. At 200 nm acetone extract absorbs maximum UV rays (1.5). At 250 nm, 300 nm, 350 nm and 400 nm wave length acetone extract of *S. cumini* L. leaves however showed absorption 0.7, 0.5, 0.2 and 0.1 respectively.

Figure 4: UV radiation absorption by the acetone extract of *S. cumini* L. leaves.

UV absorption spectra of benzene extract of *S. cumini* L. leaves is shown in figure 5. Chloroform extract showed maximum UV absorption at 200 nm (0.6). UV ray absorptions by the same extract at 250 nm, 300 nm, 350 nm and 400 nm were 0.32, 0.28, 0.06 and 0.05 respectively.

Figure 5: UV radiation absorption by the benzene extract of *S. cumini* L. leaves.

UV absorption spectra of ethyl acetate extract of *S. cumini* L. leaves is shown in figure 6. Ethyl acetate extract showed maximum UV absorption at 200 nm (0.3). UV ray absorptions by the same extract at 250 nm, 300 nm, 350 nm and 400 nm were 0.21, 0.25, 0.04 and 0.03 respectively.

Figure 6: UV radiation absorption by the ethyl acetate extract of *S. cumini* L. leaves.

UV (ultraviolet) radiation is the non-ionizing radiation. It falls under 180 - 400 nm wavelength region of the electromagnetic spectrum. Ultraviolet radiation is divided into three regions: UVA known as black light (wave length, 315 - 400 nm), UVB known as erythemal (wave length, 280 - 314 nm) and UVC known as germicidal (wave length, 180 - 280 nm). Common source of UV radiation is sunlight. UV radiation also generates in the laboratory through biological safety cabinets, germicidal lamps, transilluminators, lasers and crosslinkers. So, there are ample scopes to get exposure of ultraviolet radiation by the human body and if so it can cause severe injury including skin cancer. Protection from UV radiation is therefore important for human body [2,10].

Several medicinal plants viz. *Calotropis gigantea L., Mentha piperita, Azadirachta indica, Oscimum sanctum, Aloe vera, Lycopersicon esculantum* and *Carica papaya* have shown anti-solar activity [10,11]. Vandana., *et al*. while studying environment friendly antibacterial and UV protective finish on cotton using *S. cumini* (l.) leaves extract noted anti-solar activity of water extract of *S. cumini* (l.) leaves [12]. In the present study we have confirmed UV radiation absorption property of *S. cumini* L. leaves. Methanol, ethanol, chloroform, acetone, benzene and ethyl acetate extracts of *S. cumini* L. leaves showed UV radiation absorption property for all wave lengths of UV region but maximum absorption was found for UVC, wave length - 180 - 280 nm. Further, acetone extract of *S. cumini* L. leaves showed maximum UV radiation absorption in all UV regions (Figure 7).

Figure 7: UV radiation absorption by the methanol, ethanol, chloroform, acetone, benzene and ethyl acetate extracts of *S. cumini* L. leaves.

Secondary metabolites of plants are usually responsible for their biological activities. It is known that season has significant effect on synthesis of secondary metabolite in plants thereby changing their biologic activity [13-15]. It is, therefore, worth to investigate the seasonal effect on UV absorption property of *S. cumini L.* leaves. Work is this direction is now in progress.

Conclusion

Present study showed that acetone extract of *S. cumini* L. leaves had maximum UV absorbing property. Acetone extract of *S. cumini* L. leaves may, therefore, be further studied for isolation of the active compound responsible for UV absorbing property.

Recommendation

Acetone extract of *S. cumini* L. leaves may be used as UV absorption material.

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Conflict of Interest

Nill.

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